# BIBLIOGRAPHY OF SOIL TAXONOMY

## 1960–1979

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U.S. Department of Agriculture

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## FOREWORD

The objective of this bibliography is to present an inventory of the world literature on Soil Taxonomy, the soil classification system in use by the U.S. Soil Conservation Service and other soil survey organizations. This report lists journal articles, monographs, conference proceedings, technical reports, and dissertations on this subject which were published between 1960 and 1979. Citations on all aspects of Soil Taxonomy are included: explanations, criticisms, proposed modifications, and applications of the system, as well as contributions to the management problems of soils that have been classified by this system.

The bulk of the citations contained in this bibliography were retrieved from machine readable computer data bases, using specific key words. The data bases utilized were:

(1) AGRICOLA, compiled by the National Agricultural Library, U.S. Department of Agriculture, for the period 1970-1979, and

(2) CAB ABSTRACTS, compiled by the Commonwealth Agricultural Bureaux of the United Kingdom for the period 1972-1979.

In addition, a manual search of major soil science journals was made for pertinent citations that were published prior to the development of these data bases, as well as for citations that were not retrievable by computer methods. All citations retrieved from the CAB ABSTRACTS data base contain abstracts, but those retrieved from the AGRICOLA data base and those retrived manually have no abstracts.

The search terms employed for retrieval were selected from the names of diagnostic horizons and other special features, and from the order, suborder, and great group terminology of Soil Taxonomy. The search terms "soil taxonomy", "comprehensive soil classification" and "seventh approximation" (in various forms) were also utilized. Some category terms, such as "vertisols" and "histosols" presented a dilemma, as they are not exclusive to Soil Taxonomy; to avoid the possible exclusion of significant citations, all titles and abstracts containing these terms were included regardless of the classification system of reference. Citations recorded in the data bases which contained the selected terms in their titles, abstracts, or in a descriptive term list were retrieved and captured on a magnetic tape for review. Incomplete records, "false-drops", and most duplicated records were discarded in the review, and where the same citation was found on both data bases, the CAB ABSTRACTS record was selected in preference to the AGRICOLA record because of the abstract. Where the same contribution was published in several forms, only one was selected, and reference was made to other formats. The selected citations are listed in this bibliography by principal author, and subject and geographic indexes are included. The subject index was compiled by computer, and is based on keywords in titles; the geographic index was compiled manually, and is

only partly based on keywords in the titles.

Users of this bibliography should note that there is little consistency in the citation formats other than in the placement of the author name(s) and title; the lack of uniformity is due to format difference between the two data bases as well as format changes within each data bases between 1972 and 1979. In some cases, the use of "vol." and "No." is indiscriminate, and this interchangability should be kept in mind is searching for the original documents. Citations in foreign languages are indicated with the language, but citations in English are not consistently indicated as such. Some abstracts appear to contain nonsense terms, e.g. "dagger" or numeric codes, which are used for processing citations for the Commonwealth Agricultural Bureaux publications; attempts to remove these nonsence terms have resulted in truncation of the first word of nineteen abstracts, and since restoration of these words may result in additional errors the reader is referred to the errata sheet for corrections to these abstracts.

It is conceivable that significant citations have been overlooked in the compilation of this bibliogarphy, and users are requested to submit additional pertinent citations on soil taxonomy for the period 1960-1979, preferably with abstracts, for inclusion in subsequent editions. Address all correspondence to

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The compiler would like to extend thanks to Dr. R.L. Guthrie, Auburn University, and Dr. C.S. Holzhey, S.C.S. for aid in the planning of this bibliography. Special thanks are extended to Charles Bebee, NAL, USDA for search techniques, and to E.A. Warnick NAL, USDA for computer processing. Acknowledgement is made to the Commonwealth Agricultural Bureaux for permission to reprint copyrighted abstracts.

Hari Eswaran, Project Leader
Soil Management Support Services
Soil Conservation Service, USDA

## Errata

The first words of the abstracts which were truncated by machine processing are listed below by citation number.

0013 The
0022 Under
0027 The
0032 Twelve
0144 In
0155 Zinc
0342 Maize
0405 Ironstone
0530 Soil
0581 Iron-manganese
0614 In
0711 On
0882 Documentation
0977 Temperatures
1005 Soil
1017 Chemical
1068 Profiles
1217 In
1306 The

ACKNOWLEDGEMENT

Permission to reproduce copyrighted abstracts with citations extracted from the CAB ABSTRACTS data base has been extended by the Commonwealth Agricultural Bureaux.

0001

Supplement to soil classification system; 7th approximation. Washington. USDA.

U.S., Soil Conservation Service. Vol. USDA-SCS 1967. Vol.207 p.

Issued Mar. 1967. Earlier issue, published Aug. 1960, has title. Soil classification, a comprehensive system. (A56 1.S635 Ed. 7).

0002

Soil series of the United States, Puerto Rico, and the Virgin Islands: their taxonomic classification. Washington. U.S. Govt. Print. Off. USDA

U.S., Soil Conservation Service. Vol. USDA-SCS. 1972. Vol. 1 v. (various pagings).

Issued Aug. 1972.

0004

Soil taxonom. A basic system of soil classification for making and intepreting soil surveys. Agriculture Handbook. Soil Conservation Service. USDA

Vol. No 436. English. p. 754 pp. 1975

The topics considered are: the definition of soil, buried soils, the pedon and the polypedon, soil taxonom, and soil classification, soil horizons and diagnostic properties for the higher categories of mineral soils and organic soils, the categories of the system, the identification of the taxonomic class of a soil, descriptions of Alfisols, Aridisols, Entisols, Histosols, Inceptisols, Mollisols, Oxisols, Spodosols, Ultisols and Vertisols, family and series differentiae and names, the applications of the taxonomy described to soil surveys, soils of the USA; the relat on of this taxonomy to other soil taxonomies; appendices in which the terms used to describe soils, pores and roots and pedons are presented

0003

Soil taxonom. A basic system of soil classification for making and intepreting soil surveys. Agriculture Handbook. Soil Conservation Service. USDA.

Vol. No.436. English. p. 754 pp. 1975.

The topics considered are: the definition of soil, buried soils, the pedon and the polypedon; soil taxonomy and soil classification; soil horizons and diagnostic properties for the higher categories of mineral soils and organic soils; the categories of the system; the identification of the taxonomic class of a soil; descriptions of Alfisols, Aridisols, Entisols, Histosols, Inceptisols, Mollisols, Oxisols, Spodosols, Ultisols and Vertisols; family and series differentiae and names; the applications of the taxonomy described to soil surveys; soils of the USA; the relation of this taxonomy to other soil taxonomies; appendices in which the terms used to describe soils, pores and roots and pedons are presented.

0005

Survey of soils, land capability and land use in the Federal Territory of Rondonia. Belo Horizonte, Brazil; Fundacao Joao Pinheiro.

436. Portuguese. p. 171 pp. 1975.

The soils are classified as oxisols, alfisols, ultisols, inceptisols and entisols. Representative profiles are described, and land use and agricultural potential are discussed.

0006

Annual Report for 1977. Ibadan, Nigeria; International Institute of Tropical Agriculture.

English. p. 98pp. 1978.

Includes a discussion of maize physiology, soil management of rice in Sierra Leone, crop management of cowpeas, soil nitrogen and soil moisture in relation to cassava pathology, benchmark soils, physico-chemical properties of soil oxides, silica solubility, cover and conservation crops (eg. effect of plant residues as mulches on plant parasitic nematodes, crop water requirements), biological nitrogen fixation, mycorrhizae and phosphorus nutrition, soil acidity and nutrient imbalance, fertility management of alfisols, entisols, ultisols, crop residue management, soil management in relation to soil erosion, effect of mulching on yield and earthworm activity.

0007

Vertisols properties, classification and genesis. Annotated Bibliography, Commonwealth Bureau of Soils.

SA 1786. English. p. 8pp. £.50 1976

0008

Black tropical soils, 1957-1965 (A reprinting, with additional material, of Annotated Bibliograph, No 763) Annotated Bibliograph,. Commonwealth Bureau of Soils

S763R English. p 12 pp 3 50 UK ( 4.20 Overseas) 1977.

0009

Black tropical soils, 1924-1957. (A reprinting of Annotated Bibliograph, No 153). Annotated Bibliograph,. Commonwealth Bureau of Soils

S153R English. p 24 pp. 4.50 UK ( 5.40 Overseas). 1977.

0010

**Aandahl, A R ed; Buol, S W ed; Hill, D E ed; Bailey, H H ed**
Histosols, their characteristics, classification, and use SSSA Spec Publ (Soil Sci Soc Am)

1974 Vol.6. 136 p Map

0011

**Aandahl, A.R.**
The first comprehensive soil classification system. Journal of Soil and Water Conservation

Vol. 20, No 6 p. 243-246. 1965

0012

**Abdel-Kader, F. H.; Abdel-Hamid, N. E.**
Comparative micromorphology of some soil types of lower Egypt Geoderma. Department of Soil and Water Science, Faculty of Agriculture, Alexandria University, Egypt

Vol. 12 3. English. p. 245-262 1974

Six soil types (typic pellustert, typic chromustert, aquic udifient, typic salorthid, typic calciorthid, typic quartzipsamment) representing the main soils of lower Egypt are described. They are mostly apedal. The main pedological features are the sesquioxidic and/or carbonate nodules and gypsic crystallaria. In general, the plasmic fabric is argillasepic, but it is vo- or skel-masepic in the clayey soil types. The plasma-skeleton grains fabric is mainly porphyroskelic. The basic structure includes vughy and planar types, and the elementary and primary structures include glaebular, crystallaric and subcutanic types. Only the heavy clayey horizons show secondary structures such as platy to subrounded blocky peds. Micromorphological features are discussed in relation to soil-forming processes.

0013

**Abdel-Kader, F. H.**
Characteristics of salt-affected soils of Tellel-Kebir region, AR Egypt. Beitrage zur Tropischen Landwirtschaft und Veterinarmedizin. Faculty of Agriculture, El-Chatby, Alexandria, Egypt

Vol 1' 4. English. p. 387-394. 1973.

survey distinguishing between the taxonomic units of sodic vertisols, sodic gleysols, and typical calcisols, and distinguished between 3 main mapping units characterized by morphological features, particle-size distribution, CO3 and soluble-salt contents, organic-matter level and humic-matter distribution, and some local units according to properties of the fine solum and intensity of horizon formation. Some profiles are described, and analytical data are given in tables.

0014

**Abrams, R.; Cruz-Perez, L.; Pietri-Oms, R.; Julia, F. J.**
Effects of fertilizer N, P, K, Ca, Mg, and Si on tomato yields in an oxisol. Journal of Agriculture of Puerto Rico. Mayaguez Compus, Puerto Rico University, Rio Piedras, Puerto Rico.

Vol. 59 1. English. p. 26-34. 1975.

The effect of different levels of N, P, and K with and without Ca, Mg and Si, was studied on tomato and results showed that 224 Kg N and P/ha appear to be adequate for tomato production in a Coto clay, an oxisol. A fertilizer-yield equation was employed to describe the relationship between applications of nitrogen, phosphorus and potassium and the yield in metric tons/ha of marketable tomatoes, in an experiment conducted in the same soil. The equation fitted very well the yield data obtained with nitrogen and phosphorus, but not so well with that obtained with potassium. The poor fit of the potassium equation may have been due to the high level of potassium in the soil.

0015

**Abrao, J J R; Grimm, S S**
Avaliacao do efeito residual da calagem e da adubacao fosfatada num oxissolo, durante tres anos de cultivo; Assessment of residual effect of lime and phosphate fertilizer in an Oxisol during three years of cultivation of alfalfa and wheat. Agron Sulriograndense.

Portuguese. 1975. Vol.11 (1). 105-127. Ref. Eng. sum.

0016

**Abruna, F; Figarella, J; Caro-Costas, R**
Efficiency of sulfur-coated urea and potassium chloride compounds applied to stargrass growing on an Ultisol under humid tropical conditions. J Agric Univ P R.

July 1976. Vol.60 (3). 310-315. Ref.

0017

**Abruna, F.**
Crop response to soil acidity factors in Ultisols and Oxisols in Puerto Rico. V. Sweetpotato (Foliar diagnosis, yields). Journal of agriculture of the University of Puerto RicoPuerto Rico. -University.

v. 63 (2). English. p. 250-267.- ill. Apr 1979.

Rio Piedras.

0018

**Abruna, F.; Perez-Escolar, R.; Vicente-Chandler, J.; Figarella, J.; Silva, S.**
Response of green beans to acidity factors in six tropical soils. Journal of Agriculture, University of Puerto Rico. Agricultural Experiment Station, Mayaguez Campus, University of Puerto Rico, Rio Piedras.

Vol. 58 1. English. p. 44-58. 1974.

Intensively managed green beans grown on five ultisols and on an oxisol, all of which were typical of the humid tropics responded greatly to applications of limestone thoroughly worked into the top 6 inches of soil. The Ca content of the leaves increased and the Mn content decreased with increasing lime rate and yield. Yields increased with increasing soil pH to about 5.2 (at which level these soils contained essentially no exchangeable Al), with increasing base saturation to about 70%, and with decreasing exchangeable soil Al to essentially 0. Soil pH and exchangeable base and Al contents were thus effective indicators of the lime requirements of these soils.

0019

**Abruna, F.; Perez-Escolar, R.; Vicente-Chandler, J.; Pearson, R. W.; Silva, S.**
Response of corn to acidity factors in eight tropical soils. Journal of Agriculture, University of Puerto Rico. Agricultural Experiment Station, Mayaguez Campus, University of Puerto Rico, Rio Piedras.

Vol. 58 1. English. p. 59-77. 1974.

On eight ultisols and oxisols typical of the humid tropics, pH values increased from about 3.8 with a base saturation of about 20% to about pH 5 with a base saturation of around 70%. Maize responded strongly to liming particularly on the ultisols which had high exchangeable Al contents when acid. Ca content of the leaves increased with soil base content and with yields, but foliar composition was not otherwise affected by liming. Yields increased with pH to about 5.2, with base saturation to about 70%, and with decreasing Al in the soil to essentially 0. Soil pH, exchangeable base, and exchangeable Al content were effective criteria for liming these soils.

0020

**Abruna, F.; Vicente-Chandler, J.; Figarella, J.; Silva, S.**
Potassium supplying power of the major Ultisols and Oxisols of Puerto Rico. Journal of Agriculture of the University of Puerto Rico. ARS, US Department of Agriculture, Agricultural Experiment Station, Rio Piedras, Puerto Rico.

Vol. 60 1. English. p. 45-60. 1976.

The K supplying power of 17 Ultisols and 6 Oxisols typical of vast areas in the tropics was determined by cropping 181 pots, each filled with 11.4 kg of soil from as many sites, with Pangola grass for 4 consecutive years. During the first year of cropping the soil groups released the following amounts of K: Oxisols, 234 kg/ha; Ultisols of the uplands, 260 kg/ha; clay Ultisols of the coastal plains, 230 kg/ha; and sandy Ultisols of the coastal plains, 90 kg/ha. After the first year, K removal dropped off sharply averaging about 50 kg/ha yearly for the Oxisols and clay Ultisols of the coastal plains, 35 kg/ha yearly for the sandy Ultisols of the coastal plains and 90 kg/ha for the Ultisols of the uplands. There was close agreement between various soil K values determined at the beginning and at the end of the experiment and K removal by Pangola grass over different periods. The close relationship between exchangeable K at start of the experiment and K removed by Pangola grass over the first year of cropping shows that exchangeable K values are a good criterion for evaluating the capacity of these soils to supply K to grasses.

0021

**Acevedo, G.; Kunze, G. W.; Lugo-Lopez, M. A.**
Morphological, mineralogical, and physico-chemical characteristics of some dark clay soils of Puerto Rico. Journal of Agriculture of the University of Puerto Rico. Univ. of Puerto Rico, Mayaguez Campus, Agric. Exp. Station, Rio Piedras (G.w.K.)

Vol. 60, 4. English. p. 491-507. 1976.

Morphological studies of some dark clay soils of Puerto Rico indicate that they are similar to the black or dark soils of the Tropics and other areas, now mostly classified as Vertisols and some as Mollisols. They are clayey, with high saturation and porosity. Small pores predominate, resulting in low hydraulic conductivity and poor internal drainage. They are alkaline, soil pH increasing with depth. Organic matter is generally high in the surface horizons. Quartz is the dominant mineral in the silt fraction, but feldspars are present. Montmorillonite is the dominant clay mineral, with kaolinite occurring in variable amounts. Clay diffraction results for the Aguirre and Guabisa soils were indicative of minimum weathering. The clay minerals in the surface horizon of the Ponceña and Camague soils showed a small amount of weathering. The dark clay soils of Puerto Rico meet many of the requirements of the Pellusterts, Pelluderts, and Rendoll soil groups.

0022

**Achar, H. P., Dastane, N. G.**
Percolation losses, effective rainfall and consumptive use of irrigated rice in black soils (vertisol) by drum culture technique. Indian Journal of Agronomy. Indian Agricultural Research Institute, New Delhi-12.

Vol. 16, 3. English. p. 348-350. 1971, publ. 1972.

Rice percolation losses averaged 19.1 mm/day. Consumptive use in the kharif season and in summer was 7.8. Drum culture technique, such as wheat, cotton and jowar are recommended in preference to rice in these areas. (132 267 145.33).

0023

**Adams, F.**
Liming and fertilization of Ultisols and Oxisols. Melbourne, Australia, CSIRO. Dep. of Agronomy and Soils, Auburn Univ., Alabama 36830, USA.

English. p. 377-394. 1978.

Mineral Nutrition of Legumes in Tropical and Subtropical Soils. Proceedings of a workshop held at CSIRO Cunningham Laboratory, Brisbane, January 1978 (Andrew, C.S.; Kamprath, E.J. - Editors). Liming of acid soils is discussed in terms of soil pH, acid-soil toxic factors, and the availability of inorganic nutrients. Soil pH, which is dependent on several variables, remains the most commonly used measure for predicting the need for lime. Al toxicity is common to all low-pH soils. Mn toxicity may be the first limiting yield factor on low-pH, high-Mn soils. Ca deficiency is likely on Oxisols and Ultisols with low CECs. Liming acid soils increases the availability of both soil and fertilizer Mo and S; liming does not increase soil P availability, but it does increase the availability of subsequently added fertilizer P. Nodulation and Rhizobium growth are both pH sensitive.

0024

**Adams, P.W.**
Cation release from Michigan Spodosols leached with aspen (Populus grandidentata) leaf extracts. Soil Science Society of America journalSoil Science Society of America.

v. 43 (3). English. p. 593-596.- ill. May/June 1979.

Madison, Wis.

0025

**Adinarayana, V.; Gangwar, M. S.; Sachan, R. S.**
Relation between different soil-test methods of nitrogen, phosphorus and potassium in mollisol of Uttar Pradesh. Pantnagar Journal of Research. Dep. of Soil Science, G.B. Pant Univ. of Agric. and Technology, Pantnagar, U.P., India.

Vol. 1, 2. English. p. 127-129. 1976.

Linear correlation coefficients and linear regression equations were determined for the different soil test methods for N, P and K and for organic C in a mollisol.

0026

**Adu, S. V.; Tei, I. M., Galley, A. K.**
Report on the preliminary soil survey of the North Tongu cattle ranch area, Volta Region. Technical Report. Soil Research Institute, Ghana. Soil Research Institute, Ghana.

Vol. No.90. English. p. 1-20. 1973.

Ten associations are described (mainly vertisols and weakly developed, hydromorphic and sesquioxidic soils) and mapped at a scale of 1:31 250. The parent materials consist of basic gneiss and schist, acid gneiss and schist, and sandstone. The suitability of the area for habitation and possible land use is discussed.

0027

**Agrawal, R. P.**
Oxidation of soil organic matter and microaggregates in soils. Agrochimica. Queensland University, Brisbane, Australia.

Vol. 16 6. English. p. 534-538. 1972

effectiveness of H2O2 oxidation of the organic matter after various pretreatments of 3 vertisols with varying particle size distribution and chemical properties was studied. H2O2 oxidation was ineffective after mechanical dispersion, water soaking and NaCl pretreatments. Pretreatment with HCl and H2SO4 increased the amount of organic matter oxidised by H2O2, but H2SO4 was less effective than HCl in calcareous soil. (Eng. Sp.)

0028

**Aguilar, J; Fernandez, J; Garcia, A; Iniguez, J**
Estudio edafico de la zona de Cabo de Gata. I. Caracteristicas generales, estudio de entisuelos, inceptisuelos, vertisuelos. Soil stud. of the zone of Cabo de Gata. I. General characteristics and stud. of the entisols, inceptisols and vertisols. An Edafol Agrobiol.

Spanish. Mar/Apr 1973. Vol. 32 (3/4). 299-340. maps. Eng. sum.

0029

**Ahmad, N; Jones, R. L.**
A Plinthaquult of the arid savannas, North Trinidad. I. Properties of the soil and chemical composition of the natural vegetation. Nodules, ecolog. Soil Sci Soc Amer Proc.

Sept/Oct 1969. Vol. 33 (5). 762-765.

Bibliography. p. 765

0030

**Ahmad, N; Jones, R. L.**
A Plinthaquult of the Aripo Savannas, North Trinidad. II. Mineralogy and genesis. Nodules, weathering. Soil Sci Soc Amer Proc.

Sept/Oct 1969. Vol. 33 (5). 765-768

Bibliography. p. 768

0031

**Ahmad, N; Prashad, S**
Dispersion, mechanical composition, and fractionation of west Indian volcanic yellow earth soils (Andepts). J Soil Sci.

Mar 1970. Vol. 21 (1). 63-71.

Bibliography. p. 70-71.

0032

**Ahmad, N.; Davis, C. E.; Jones, R. L.**
Ammonium fixation and its effect on mineralogical properties of West Indian soil clays. Tropical Agriculture. West Indies University, Trinidad.

Vol. 49 4. English. p. 347-353. 1972.

West Indian soil clays, representing six diverse soil types from Trinidad and Barbados were investigated. The soils comprised an inceptisol and an ultisol developed on alluvial/colluvial materials, a mollisol occurring over calcareous glauconitic sandstone, a vertisol on marl, an inceptisol on lacustrine claystone and an alfisol formed on pure coralline limestone of (1% insoluble residue. The mineralogies of the clays showed great variation. All clay fractions contained montmorillonite, kaolinite and mica but in general the finer fraction was richer in montmorillonite. Native NH4 contents were high probably due to prolonged use of N and the occurrence of some mineralization. All clays fixed NH4 in amounts ranging from 1.06 to 9.54 meq/100g. Mineralogical changes were not definitive for all the clays, especially for the coarse fractions. Shifts in basal spacings occurred in some clays. An almost complete collapse of the 17A spacing with NH4 saturation helps to explain the lower surface area of the clays so treated.

0033

**Ahmad, N.; Paul, C. L.**
Effects of subsoiling on soil physical conditions and sugar cane root distribution in a Trinidad cla, soil. Chichester, UK; John Wiley & Sons. Dep. of Soil Science, Univ. of the West Indies, St.Augustine, Trinidad.

English. p. 419-429. 1978

Modification of Soil Structure (Emerson, W.W.; Bond, R.D.; Dexter, A.R. - editors). Subsoiling of an acid Vertisol resulted in an initial improvement in the distribution of sugar cane roots in the subsoil (40-60cm), but this effect disappeared after the second ratoon crop. Soil strength, bulk density and micro-porosity increased while macro-porosity decreased as crop ratooning increased. Root growth decreased with depth as a result of changes in soil physical properties. The variations in root distribution with ratooning were not closely related to variations in these physical factors. Changes in soil physical properties with time were much greater in subsoiled fields. Bulk density, soil strength and micro-porosity values were greater and macro-porosity lower in all cases under subsoiling. Water-stable aggregates were smaller in size in fields that were subsoiled.

0034

**Ahuta, R.I.**
Soil survey of village Pilimandauri, Hissar (Haryana) and their (sic) classification according to the 7th approximation. Haryana University Journal of Research.

Vol. 2, No. 1. p. 29-34. 1972.

0035

**Al-Barrak, S.; Lewis, D. T.**
Soils of a grassland-forest ecotone in eastern Nebraska. Soil Science Society of America Journal. Department of Agronomy, University of Nebraska, Lincoln, NE 68583, USA.

Vol. 42 2 English p. 334-338. 1978

In Otoe County, in eastern Nebraska, loessal soils on very steep slopes along the bluffs of the valle, of the Missouri River exhibit weakly developed characteristics that are often associated with soils formed under deciduous forests. While these soils are Mollisols and show the dominant effects of the prairie, they have superimposed on the Mollisol characteristics that appear to be effects of having existed under forests for some time. In spite of the fact that these soils are on very steep slopes, the, appear to be more highly weathered than adjacent soils on the divides. Evidence of this weathering includes a weakly developed A2 horizon and an argillic horizon, discontinuous cutans in the argillic horizon, gray coatings on ped surfaces to a depth of over 120 cm, and a much deeper solum than nearby soils within the Marshall and Monona Soil Series that show none of the above characteristics. Data suggest that the soils on the bluffs accumulate more moisture than those on the divides. The additional moisture, plus the effects of the forest may be the factors that are related to the differences in morpholog,.

0036

**Alexander, E.B.**
Post-Mazama natrargids in Dixie Valley, Nevada. Soil Science Society of America, Journal.

Vol. 41, No 6. p. 1210-1211. 1977.

0037

**Alexandre, J; Nzengu, J**
Le regime hydrique dans les sols de la region de Lubumbashi (Haut-Shaba, Zaire); The moisture regime of the soils of the Lubumbashi area (Upper Shaba, Zaire). Pedologie.

French. 1974. Vol.24 (1): 49-63. Ref. Eng. sum.

0038

**Alfred, S. D.; Hyde, A. G.; Larson, R. L.**
Soil Survey of Emmet County, Michigan. Washington, D.C., USA; US Department of Agriculture.

English. p. 99 pp. 1973.

Forty-two series (mainly spodosols, entisols, inceptisols, histosols and mollisols) are described and mapped at a scale of 1:20 000. Parent meterials include glacial till, outwash materials and lacustrine deposits.

0039

**Ali, M. A.**
Nitosols and Rhodic Ferralsols in Sudan. Morphological and chemical properties -use and management. World Soil Resources Reports, FAO. Soil Survey Dep., P.O. Box 388, Wad Medani, Sudan.

Vol. No. 47 English. p. 24-31. 1977.

Descriptions and analyses of four profiles from southern Sudan, representing a tuposequence of soils on the flat plateau top and soils on the mid-slopes are presented. These soils are located in an area shown on the FAO/Unesco Map as Orthic Ferralsols, but no evidence of the existence of the latter soil type has been found. The profiles cascribed are classed as Typic Rhodudult, Dystropeptic Tropudult, Rhodic Paleudult and Plinthic Tropudult.

0040

**Alias, L J; Ortiz Silla, R**
Aridisoles del Campo de Cartagena (Murcia). I. Camborthids: caracteristicas generales y mineralogicas; Aridisols of the Campo de Cartagena (Murcia). I. Camborthids: general and mineralogical characteristics. An Edafol Agrobiol.

Spanish. Mar/Apr 1977. Vol.36 (3/4): 193-205. Eng. sum.

0041

**Alias, L J; Ortiz Silla, R**
Aridisoles del Campo de Cartagena (Murcia). II. Calciorthids. caracteristicas generales y mineralogicas; Aridisols of the Campo de Cartagena (Murcia). II.Calciorthids: general and mineralogical characteristics. An Edafol Agrobiol.

Spanish. Mar/Apr 1977. Vol.36 (3/4): 207-231. Eng. sum.

0042

**Alias, L J; Ortiz Silla, R**
Aridisoles del Campo de Cartagena (Murcia). III. Paleorthids: caracteristicas generales y mineralogicas; Aridisols of the Campo de Cartagena (Murcia). III. Paleorthids: general and mineralogical characteristics. Soil analysis and morphology. An Edafol Agrobiol.

Spanish. Mar/Apr 1977. Vol 36 (3/4) 329-339. Ref. Eng. sum.

0043

**Alias, L J; Ortiz, R; Albaladejo, J**
Aridisoles del Campo de Cartagena (Murcia). IV. Argids: caracteristicas generales y mineralogicas. Aridisols from the Campo de Cartagena (Murcia). IV. Argids: general and mineralogical characteristics. An Edafol Agrobiol.

Spanish. Sept/Oct 1977. Vol.36 (9/10) 1047-1060. Eng. sum.

0044

**Alias, L J; Perez Pujalte, A**
Vertisols of the province of Granada, Spain. An Edafol Agrobiol.

Spanish. Nov/Dec 1968. Vol.27 (11/12): 885-901.

English summary.

0045

**Alias, L J; Perez Pujalte, A**
Placaquods from the north of Galicia. I. General macromorphological and analytical characteristics. Soil profiles. Spain. An Edafol Agrobiol.

Spanish. Sept/Oct 1968. Vol.27 (9/10): 663-680.

English summary. Includes bibliography.

0046

**Alias, L. J.; Linares, P.; Garcia, G. S.; Ortiz, R.**
Forest soils of the Sierra de la Pila (Murcia). I. Macromorphology. Anales de Edafologia y Agrobiologia. Departamento de Geologia, Facultad de Ciencias, Universidad de Murcia, Spain.

Vol. 32 11/12. Spanish. p. 1091-1117. 1973.

The geography, geology, vegetation and climate of the area are described. Fourteen soil series ranging from lithic xeropsamments and rendollic ustochrepts to rendolls and haplic calciustolls are described.

0047

**Alias, L. J.; Ortiz Silla, R.**
Entisols of the Campo de Cartagena (Murcia); general and mineralogical properties. Anales de Edafologia y Agrobiologia. Departamento de Geologia, Facultad de Ciencias, Universidad de Murcia, Spain.

Vol. 36 1/2. Spanish. p. 109-120. 1977.

Soils of the Campo de Cartagena include Entisols, Aridisols and Mollisols. The Entisols have an A-C profile with relatively undifferentiated horizons. They are poor in well humified organic matter and have a high calcium carbonate content. The dominant clay mineral is montmorillonite, followed by illite and some kaolinite, chlorite and quartz.

0048

**Alias,, L.J.**
Mollisols of the Campo de Cartagena (Murcia). General and mineralogical characteristics (Soil analysis and morphology). Anales de edafologia y agrobiologia.

v. 37 (1/2). Spanish. p. 139-163.- ill. Jan/Feb 1978.

Madrid, -Instituto Nacional de Edafologia y Agrobiologia

0049

**Allan, R.J.**
Clay accumulation of some hapludalfs as related to calcareous till and incorporated loess on drumlins in Wisconsin. Soil Science.

Vol. 32, No. 3. p. 403-408. 1968.

0050

**Allen, G. W.**
Soil Survey of Chittenden County, Vermont. Washington, D.C.; USA; US Department of Agriculture.

English. p. 149 pp. 1974.

Thirty-eight series (mainly spodosols, inceptisols, alfisols and entisols) are described and mapped at a scale of 1:15 840. Parent materials include glacial till and alluvial, lacustrine and recent organic deposits.

0051

**Almeida, A M de; Bornemisza, E**
Efecto del encalado sobre las cargas electricas y otras propiedades quimicas de tres inceptisoles de Costa Rica. The effect of liming on the electric charges and other chemical properties of three inceptisols in Costa Rica. Turrialba

Spanish. Oct/Dec1977. Vol.27 (4). 333-342. Ref. Eng. sum

0052

**Alruna, F**
Efficiency of sulfur-coated urea and potassium chloride compounds applied to stargrass growing on an Ultisol under humid tropical conditions. Financ Agric.

Jan/Mar 1976. Vol 7 (4). 11-14.

0053

**Alvarado, A, Buol, S W**
Toposequence relationships of Dystrandepts in Costa Rica Tropical soils. Proc Soil Sci Soc Am

Sept/Oct 1975. Vol.39 (5). 932-937. Ref.

0054

**Alvarado, A**
Fertilidad de algunos Andepts dedicados a potreros en Costa Rica; Fertility of some grassland Andepts in Costa Rica Soil analysis. Turrialba.

Spanish. July/Sept 1975. Vol 25 (3). 265-270. Ref. Eng. sum

0055

**Alvarado, A; Lopez, C**
Quimica y fisica de algunos ultisoles de Costa Rica, America Central. Chemistry and physics of some Costa Rica ultisols. Turrialba.

Spanish. July/Sept 1971. Vol.21 (3): 304-311. Ref. Eng. sum.

0056

**Alwis, K. A. de; Pluth, D. J.**
The red latosols of Sri Lanka. I Macromorphological, physical, and chemical properties, genesis, and classification. Soil Science Society of America Journal. Land Use Division, Irrigation Department, Buller's Road, Colombo 7, Sri Lanka

Vol. 40 6. English. p. 912-920. 1976.

Variation in mineralogy and texture of parent materials accounted for differences among three very deep, excessively drained Paleustults and Paleustalfs. These soils have low silt contents, show some illuviation of clays and free iron oxides, have low CEC's with a high proportion of pH-dependency, and contain Ca as the dominant basic cation.

0057

**Ameryckx, J.**
Note on a fossil ultisol. Pedologie.

Vol. XII, No. 2. FRENCH. p. 196-203. 1962.

0058

**Amir, A.; Gammon, N., Jr.**
Redistribution as indication of movement of manganese from different sources applied to the surface of an EauGallie var. fine sand. Proceedings, Soil and Crop Science Society of Florida. Soil Science Department, University of Florida, Gainesville, FL 32611, USA.

Vol. 35. English. p. 168-170. 1976.

The distribution of Mn in the soil profile to a depth of 15 cm was measured four years after six Mn sources had been applied to the surface of this fine sand (Aeric Haplaquod). The soil was not disturbed after the Mn applications. Most of the applied Mn was found in the top 2.5 cm of soil. Application of the most soluble Mn source, $MnSO_4$, resulted in slightly more Mn at depths of 7.5 cm. Examination of profiles from check plots, as well as plowed and virgin areas suggested that accumulation of Mn at or near the surface of this spodosol was the result of upward movement of $Mn^{2+}$ and oxidation to $Mn^{4+}$.

0059

**Andersen, R. H.; Matthews, E. D.**
Soil survey of Cecil County, Maryland. Washington, D.C., USA; US Department of Agriculture.

English. p. 119pp. 1973.

Thirty-four series (mainly ultisols, alfisols and inceptisols) are described and mapped at a scale of 1:15 840. Land use and management of the soils are given. Parent materials include

Pre-Cambrian igneous and metamorphic crystalline rocks and unconsolidated Cretaceous and Pleistocene alluvial sediments.

0060

**Anderson, G. D.; Herlocker, D. J.**
Soil factors affecting the distribution of the vegetation types and their utilization by wild animals in Ngorongoro Crater, Tanzania. Journal of Ecolog, Ministr, of Agriculture and Co-operatives, Tanzania.

Vol. 61 3. English. p. 627-651. 1973.

(173 678).C. Twelve soil-vegetation associations are described in detail and presented on a sketch-map. A toposequence of seven major soil groups was found saline-alkali soils at the lowest levels, mineral hydromorphic soils on lower slope colluvium, topomorphic vertisols in depressions, lithomorphic vertisols and brown calcareous soils on mid-slopes, eutrophic brown soils and weakly acid ferruginous tropical soils on upper slopes. Other soils described are four poorly, or imperfectly, drained lacustrine and alluvial complexes on the crater floor and an excessively drained lithosolic creep complex on the wall.c

0061

**Anderson, J. L.; Bouma, J.**
Relationships between saturated hydraulic conductivity and morphometric data of an argillic horizon. Proc. Soil Sci. Soc. Am.

May/June 1972. Vol. 37 (3). 408-413. Ref.

0062

**Anderson, J. U.; Bailey, O. F.; Rai, D.**
Effects of parent material on genesis of borolls and boralfs in South-Central New Mexico mountains. Soil Science Society of America Proceedings. New Mexico State University, Las Cruces, New Mexico, USA.

Vol. 39 5. English. p. 901-904. 1975.

Borolls forming from Sar Andres Limestone are compared to adjacent Boralfs forming from sandstone in a mixed conifer zone in New Mexico. Less illuviation in Borolls than Boralfs is attributed to the presence of calcium carbonate. Differences in organic matter content cannot be adequately accounted for by the data presented.

0063

**Anderson, J. U.; Fadul, K. E.; O'Connor, G. A.**
Factors affecting the coefficient of linear extensibility in vertisols. Soil Science Society of America Proceedings. New Mexico State Agricultural Experimental Station, Las Cruces, USA.

Vol. 37 2. English. p. 296-299. 1973.

In horizon samples from ustert and torrert profiles from the Sudan, Arizona and New Mexico, the coefficient of linear extensibility was high, correlated with percent fine clay plus ESP. A predictive model which assumes that these vertisols expand because of basal spacings of fine clay, and that external expansion does not occur until voids are filled, yields results which are highly correlated with the measured coefficients.

0064

**Anderson, J. U.; Silberman, D.; Rai, D.**
Humus accumulation in a forested haploboroll in South-Central New Mexico. Soil Science Society of America Proceedings. New Mexico State University, Las Cruces, New Mexico, USA.

Vol. 39 5. English. p. 905-908. 1975.

Borolls forming from limestone in a mixed conifer zone in New Mexico have unusually higher organic matter contents than adjoining Boralfs. Higher organic matter content in Borolls results from slow decomposition of organic litter. Probable cause of slow decomposition rate is protection by mixing with mineral soil in the gut of terrestrial snails (Ashmunella rhyssa).

0065

**Andrews, W. F.**
Soil survey of Yolo County, California. Washington, D.C., USA, US Department of Agriculture.

English. p. 102pp. 1972.

Thirty-three series (mainly xeralfs, xererts and hydromorphic and entic associates) are described and mapped at a scale of 1:20 000; their engineering properties and their suitability for maize, sorghum, rice, lucerne, pasture, sugar beet, tomatoes, apricots, almonds and walnuts under irrigated conditions, for barley and safflower under dryland conditions and for range are indicated. Parent materials are mainly alluvial deposits, interbedded sand, silt and clay formations, sandstone and shale.

0066

**Angell, R. C.; Youberg, C. F.; Bell, E. L.; Hagihara, J. S.**
Soil Survey of Sherman County, Kansas
Washington, D.C., USA, US Department of Agriculture

English. p. 47 pp. 1973

Nine series (mainly mollisols) are described and mapped at a scale of 1:31 680, and engineering and land-use interpretations are given. Parent materials include loess, plains outwash, alluvium and colluvium.

0067

**Anonymous**
Soil taxonomy and soil properties.
Transportation Record, Transportation Board

No. 641. English. iv, 81 p. - ill., map. -

Washington - Transportation Research Board, Commission on Sociotechnical Systems, National Research Council, National Academy of Sciences - 1977

0068

**Anonymous**
Report on the 7th approximation soil classification system of the United States Department of Agriculture. Publication, Australian Soil Science Society.

No. 1. pp. 16. 1969.1

Australian Soil Science Society

0069

**Anonymous**
Some references relating to the genesis of spodic, cambic, and oxic horizons (1966-1967). Annotated Bibliography.

No. 1181. pp. 11. 1967.

Commonwealth Bureau of Soils.

0070

**Antoine, P; Delacourt, A**
Observations sur deux sols argileux (vertisols) irrigues depuis 25 ans dans la plaine du Gharb (Maroc); Observations on two irrigated clay soils (vertisol) since 25 years in the Sharb plain of Morocco Summary. In Arid Land Irrigation in Developing Countries: Environmental Problems and Effects; E. B. Worthington, ed.

French. 1977. Vol.p. 277.

0071

**Antoine, P.P.**
Soil properties and the use of the U.S. Soil taxonomy in Northern and Western Africa. Agron Mimeo Cornell Univ Dep Agron. OTHER US.

1977. Vol.77-23. 189-194.

0072

**Arimitsu, K.**
An application of the 7th approximation to the forest soils of Japan. Pedologist.

Japanese. June 1971. Vol.15 (1): 22-31.

0073

**Arno, J. R.; Willey, R. B.; Farley, W. H.; Bither, R. A.; Whitney, B. A.**
Soil Survey of Somerset County, Maine: Southern Part. Washington, D.C., USA, US Department of Agriculture

English. p. 74 pp. 1972.

Twenty-three series (mainly orthods) are described and mapped at a scale of 1:20 000, and engineering and land-use interpretations are given. Parent materials include glacial till, outwash deposits, alluvium, organic materials and lacustrine deposits.

0074

**Arnold, R.W.**
Cyclic variations of the pedon. Soil Science Society of America, Proceedings.

Vol. 28, No. 6. p. 801-804. 1964.

0075

**Arnold, R.W.**
Multiple working hypotheses in soil genesis. Soil Science Society of America, Proceedings.

Vol. 29, No. 6. p. 717-724. 1965.

0076

**Arnold, R.W.**
Concept of the argillic horizon and problems of its identification. Second International Soil Classification Workshop, Proceedings.

Vol. 2. p. 21-33. 1979.

Soil Survey Division, Land Development

Department, Thailand

0077

**Atencio, A R; Blue, W G**
The effect of calcium carbonate on availability of phosphorus to guineagrass Panicum maximum on an Ultisol. Proc Soil Crop Sci Soc Fla. OTHER U

1978. Vol.37: 171-176. Ref.

0078

**Avery, B. W.; Clayden, B.; Ragg, J. M.**
Identification of podzolic soils (Spodosols) in Upland Britain. Soil Science. Rothamsted Experimental Station, Harpenden, Herts. AL5 2JQ, UK.

Vol. 123 5. English. p. 306-318. 1977.

Criteria for identifying Spodosols are compared with those used to identify podzolic soils in England and Wales, with particular reference to upland soils classed as brown podzolic soils and stagnopodzols. Applied to British soils, the chemical criteria for the spodic horizon seem unduly restrictive, whereas those for the podzolic B entail the identification as brown podzolic of soils with nonilluvial B horizons which may resemble those of Andepts. Some stagnopodzols also fail to qualify as Spodosols, but grouping them in different classes at the highest categorical level is considered inadvisable on both genetic and practical grounds.

0079

**Ayanaba, A.; Verstraete, W.; Alexander, M.**
Formation of dimethylnitrosamine, a carcinogen and mutagen, in soils treated with nitrogen compounds. Soil Science Society of America Proceedings. Cornell University, Ithaca, New York, USA.

Vol. 37 4. English. p. 564-568. 1973.

Dimethylamine was formed from trimethylamine in a spodosol, a silty clay loam and a silt loam. Dimethylnitrosamine was formed if the soils amended with the tertiary amine also received nitrate or nitrite. The nitrosamine was detected in a spodosol treated with (a) nitrate or nitrite and (b) thiram in the absence of supplemental inorganic nitrogen. Both dimethylamine and dimethylnitrosamine disappeared with time from the soils.

0080

**Ayoub, A. T.**
Effect of some soil amendments on sodium uptake and translocation in dry beans (Phaseolus vulgaris L.) in relation to sodium toxicity. Journal of Agricultural Science, UK. Hudeiba Research Station, P.O. Box 31, El-Damer, Sudan.

Vol. 84 3. English. p. 537-541. 1975.

On vertisols low in N and organic matter, at three levels of salinity, gypsum and wheat straw mulch treatments reduced the translocation of sodium from the roots to the stems and leaves at the higher external sodium level. Incorporation of animal manure with the soil had little effect on translocation at the higher level but may have promoted sodium translocation to the stems at the lower level. Plant growth and survival were negatively correlated with the sodium content in the plant, particularly with that of the stems.

0081

**Azevedo, A. L.; Fernandes, M. L. V.**
Changes in soil organic matter of heavy clay soils under minimum tillage. 1. Organic carbon. Anais do Instituto Superior de Agronomia. Instituto Superior de Agronomia, Lisbon, Portugal.

Vol. 33. Portuguese. p. 181-213. 1972.

(117.1:213) Minimum tillage practices markedly increased the organic matter content of vertisols under a four-course rotation in a Csa-type climate (Koppen's classification).

0082

**Azolin, M. A. D.; Klamt, E.; Santos, M. C. L. D.**
Surface geomorphological features in relation to soil parent material in the south-west of Rio Grande do Sul. Campinas, Brazil; Brazilian Society of Soil Science.

Portuguese. p. 345-350. 1976.

Annals of the Fifteenth Brazilian Congress of Soil Science. Four profiles were studied along the depression of the Central and Campanha regions. Paleudeults occurred at the top of the depression on stable depositional surfaces, hapludalfs on the unstable younger erosional surfaces of the middle slope, and argiaquolls on the alluvial and colluvial material of the lower slope.

0083

**Badhe, N. N.; Begum, M.; Varade, S. B.**
Effect of potassic fertilizer on ammonium fixation in the soils from Marathwada. Bulletin, Indian Society of Soil Science Marathwada Agricultural University, Parbhani, Maharashtra, India.

Vol. No.10. English. p. 103-106. 1976.

Ammonium fixation in samples of four vertisols (clay content 42-58%) incubated at 20% moisture content was much higher when KCl was added six hours after ammonium sulphate than when the two fertilizers were added simultaneously or when the KCl was added six hours before the ammonium sulphate.

0084

**Badillo-Feliciano, J; Lugo-Lopez, M A; Lamboy, S V**
Performance of Irish potato varieties in an oxisol in northwestern Puerto Rico. J Agric Univ P R. EXP STN.

Oct 1976. Vol.60 (4). 612-617.

0085

**Badillo-Feliciano, J; Lugo-Lopez, M A; Scott, T W**
Effect of planting distance on yield and agronomic characteristics of red kidney and native white beans in an Oxisol. J Agric Univ P R. EXP STN.

Puerto Rico. Agricultural Experiment Station Puerto Rico. University. Apr 1978. Vol 62 (2) 145-148.

0086

**Badillo-Feliciano, J.; Abrams, R.; Pietri, R.**
Effect of foliar-applied fertilizers on pigeonpeas (Cajanus cajan). Journal of Agriculture of the University of Puerto Rico. Agric. Exp. Sta., Puerto Rico Univ., Mayaguez, Rio Piedras, Puerto Rico 00928.

Vol. 61 2. English. p. 217-220. 1977.

The effect of the foliar-applied fertilizer, Nutrileaf at 2.24 kg/ha given at 1-wk, 2-wk, 3-wk or monthly intervals or N and P as urea and superphosphate, resp. applied at equivalent amounts at 2-wk intervals on the growth of C. cajan cv. Kaki and 28-Bushy growing in an oxisol was studied. For Kaki and 28-Bushy, green pod yields were 9.24-11.7 and 3.27-4.18 t/ha, resp. and CP contents were 21.4-22.4% and 21.3-22.8%, resp. For each cv. there were no differences in plant ht., 100-seed wt. and grain:pod ratio.

0087

**Badillo-Feliciano, J.**
Sweetpotato production in Oxisols under a high level of technology. Bulletin,Puerto Rico. -Agricultural Experiment Station.

July 1977. (256). English. 15 p.- ill. July 1977.

Rio Piedras. -The Station.

0088

**Badillo-Feliciano, J.**
Influence of cultivars, N (nitrogen) levels and time of N application on plant characters, leaf composition, and yield of corn grown on an Oxisol (Tropical soils, northwestern Puerto Rico). Journal of agriculture of the University of Puerto Rico,Puerto Rico. -University.

v. 63 (3). English. p. 273-280.- ill. July 1979.

Rio Piedras. -Agricultural Experiment Station.

0089

**Badillo-Feliciano, J.; Lugo-Lopez, M. A.**
Effect of four levels of N, P, K and micronutrients on sweetpotato yields in an oxisol. Journal of Agriculture of the University of Puerto Rico. Agric. Exp. Sta., Puerto Rico Univ., Rio Piedras, Puerto Rico.

Vol. 60 4. English. p. 597-605. 1976.

Plants of sweet potato cv. Mina were grown on an Oxisol in NW Puerto Rico with post-planting applications of N as ammonium sulphate at 0, 39, 78 or 157 kg/ha, P as superphosphate at 0, 17, 33 or 67 kg/ha, K as KCl at 0, 67, 134 or 269 kg/ha and a trace-element mixture at 0, 33, 67 or 134 kg/ha. All plots received pre-planting application of lime to bring soil pH to 6.5 and Mg as MgSO4 at 50 kg/ha. Leaf samples including the petiole (from leaves 3 or 4) were collected at 12 and 21 wk (at harvesting) after planting. With the exception of N, the amount of a given element absorbed by the plants was not consistently related to the amount applied. The marketable tuber yield from non-fertilized plots was 9.7 t/ha; the highest marketable yield obtained was 17.0 t/ha with 78 kg N + 30 kg P/ha without trace elements. High rates of N tended to increase top growth and tuber yields were not affected by P, K and trace-element applications.

0090

**Bailey, H H; Barnhisel, R J; Rice, H B**
Similarities of two major Haplaquepts mapped along tributaries of the Ohio River in northwestern Kentucky. Soil Sci Soc Amer Proc.

July/Aug 1971. Vol.35 (4): 617-620. Ref.

0091

**Bakhtar, D.; Gray, F.; Warde, W. D.**
A quantitative approach to characterization and classification of Natrustolls in Oklahoma. Soil Science. Agric. Exp. Sta., Oklahoma State Univ., Stillwater, 74074, USA (F.G.).

Vol. 124 2. English. p. 82-89. 1977.

A better classification of sodic soils within grasslands of north-central Oklahoma, based on quantitative data, was the objective of this work. The data matrix has 79 rows and 43 columns. Rows indicate the number of horizons which were sampled from seven sampling pedons. Columns indicate a total of 39 laboratory data, either measurable or interpretative, together with hue, value, chroma, and the thickness of each horizon. A computer program was used to construct the dendrograph based upon the result of clustering, using the unweighted pair-group method. In order to use the program, the coefficient of similarity between every two horizons in the data matrix was computed. The lower triangle of the 79 X 79 symmetrical similarity matrix was punched on the I.B.M. cards. The 79 soil samples were clustered into 19 groups. A correlation-type similarity of .58 or more existed within each group. Soils were clustered disregarding their relative position within the pedons. Transition matrices with 19 rows and 19 columns were built for each pedon separately. The transition matrix approach was followed in order to separate the seven sampling pedons into groups. Five groups were recognized which were comparable to the subgroups in conventional taxonomy.

0092

**Bal, L.; Buursink, J.**
An inceptisol formed in calcareous loess on the 'Dast-i-Esan Top' plain in North Afghanistan. Fabric, mineral and trace element analysis. Netherlands Journal of Agricultural Science. Soils Department, State University, Sorbonnelaan 4, Utrecht, Netherlands.

Vol. 24 1. English. p. 17-42. 1976.

The calcixerollic xerochrept described has a low bulk density (1.1 g/cm3) which is attributed to faunal activity. The average mineral composition was 25% quartz, 20% CaCO3, 15% feldspars, 15% micas, 15% chlorites, 2-3% other minerals and 10% amorphous material and there was a clear relationship between minerals and particle size fractions. Trace element contents were 0.6, 11.0, 23.2, 49.1; 19.4, 75.9, 18.7 and 525 mg/kg for V, Cr, Co, Ni, Cu, Zn, Sr and Ba, respectively. Sr and Ba contents were related to carbonate redistribution.

0093

**Balasubramanian, V; Kanehiro, Y**
Surface chemistry of the Hydrandepts and its relation to nitrate adsorption as affected by profile depth and dehydration Volcanic ash soils. J Soil Sci.

Mar 1978. Vol.29 (1): 47-57. Ref.

0094

**Balasubramanian, V.; Kanehiro, Y.**
Field study of solute movement in a highly aggregated oxisol with intermittent flooding: 1. Nitrate. Journal of Environmental Quality. Department of Agronomy and Soil Science, University of Hawaii, Honolulu 96822, USA.

Vol. 2 3. English. p. 359-362. 1973.

Movement of applied KNO3 (a concentrated solution sprayed uniformly over the soil surface) under intermittent flooding was investigated in a slightly acid silty clay (typic torrox), an important soil for sugarcane and pineapple in Hawaii. NO3 distribution in the profile was characterized under an extended irrigation scheme by in situ sampling of soil solutions with suction probes one week after each water application. The NO3 peak moved only 1/3 as far as would have been predicted by a piston displacement model. Equilibration of applied NO3 solution with the aggregated surface soil for one week prior to flood irrigation further retarded NO3 leaching. Apparently, equilibration involved bulk flow and diffusion of NO3 into aggregate micropores where the solute was less susceptible to transport in water being conducted mostly in the macropores during and soon after irrigation. Prediction of NO3 distribution based on the dispersion (diffusion plus convection) equation approximated experimental results for successive irrigations reasonably well when equation parameters were obtained by fitting one set of experimental data. The drawback of this theoretical model is discussed.

0095

**Baligar, V C; Barber, S A; Myhre, D L**
Cation exchange equilibria in Florida and Indiana Histosols. Soil Sci. OTHER US.

Aug 1978. Vol.126 (2): 109-117. Ref.

0096

**Ballard, R.; Fiskell, J. G. A.**
Phosphorus retention in coastal plain forest soils: I. Relationship to soil properties. Soil Science Society of America Proceedings. Florida Agricultural Experiment Station, Gainesville, USA.

Vol. 38 2. English. p. 250-255. 1974

Phosphorus retention in 42 forest soils of the Southeastern Coastal Plain was significantly correlated with soil pH, loss on ignition, silt and clay content, and Al and Fe extracted by a range of extractants. NH4OAc (pH 4.8) extractable Al provided the best single index of P retention. Many of these soils, particularly those in the Spodosol order, had negligible P-retention capacities in their surface horizons.

0097

**Banerjee, A K**
The morphogenesis of an umbraquult soil in forests of Kalimpong Himalayas, West Bengal. Indian For.

Sept 1976. Vol 102 (9) 568-578.

0098

**Bangar, A R**
Release of phosphorus from some organic manures in a calcareous soil (vertisols). J Maharashtra Agric Univ.

Jan 1977. Vol.2 (1) 60-61.

0099

**Bangar, A R**
Relative availability of phosphorus from various phosphatic fertilisers in vertisols and ultisols. Agric Agroind J.

Nov 1977. Vol.10 (11) 27-30. Ref.

0100

**Barnes, J. S.; Kamprath, E. J.**
Availability of North Carolina rock phosphate applied to soils. Technical Bulletin, North Carolina Agricultural Experiment Station. Department of Soil Science, North Carolina State University, Raleigh, USA.

Vol. No.229. English. p. 21pp. 1975.

Field and greenhouse studies showed that when conditions were favourable for its efficient response, North Carolina rock phosphate was 73-100% as effective as superphosphate in promoting maize and soya bean yields. Factors affecting response to rock phosphate were soil pH, time of reaction, particle size and source. For maximum efficient yields on a typic hapludult and on other mineral soils low in organic matter, a soil pH of 5.8-6.2 was generally needed. For organic soils, efficient yields were produced at pH 4.8-5.0.

0101

**Barnhill, W. L.; Goodwin, R. A. Jr.; Bostian, M. R.; McLoda, N. A.; Leishman, G. A.; Scanu, R. J.**
Soil Survey of Wayne County, North Carolina. Washington, D.C., USA; US Department of Agriculture.

English. p. 72 pp. 1974.

Thirty-five series (mainly ultisols, entisols and inceptisols) are described and mapped at a scale of 1:20,000. Parent materials are unconsolidated sedimentary material and alluvium.

0102

**Barragan Landa, E; Iniguez Herrero, J**
Evolucion de mica potasica en suelos formados sobre material calizo (alfisoles); Weathering of potassium mica in soil developed over limestone (alfisols). An Edafol Agrobiol.

Spanish. Sept/Oct 1977. Vol.36 (9/10). 1019-1028. Ref. Eng. sum.

0103

**Bartelli, L.J.**
The comprehensive soil classification system (7th approximation). Louisiana Association of Agronomy, Proceedings.

Vol. 5. p. 100-110. 1964.

0104

**Bartelli, L.J.**
Diagnostic soil horizons in soil taxonomy. Transportation Research Record.

No. 642. p. 6-9. 1977.

National Academy of Sciences, Transportation Research Board.

0105

**Bartlett, R J**
Field test for spodic character based on pH hydrogen-ion concentration-dependent phosphorus adsorption. Soil classification. Soil Sci Soc Amer Proc.

July/Aug 1972. Vol.36 (4): 642-644.

0106

**Bartlett, R J; McIntosh, J L**
PH-dependent bonding of potassium by a spodosol. Soil Sci Soc Amer Proc.

July/Aug 1969. Vol.33(4):535-539.

0107

**Bascomb, C L; Banfield, C F; Burton, R G O**
Characterisation of peaty materials from organic soils (Histosols) in England and Wales. Geoderma.

Oct 1977. Vol.19 (2): 131-147. Ref.

0108

**Batchelder, A. R.; Jones, J. N. jr.**
Soil management factors and growth of Zea mays L. on topsoil and exposed subsoil. Agronomy Journal. US Department of Agriculture Research Service, Soil and Water Conservation Research Division, Northeast Branch, Blacksburg, Virginia.

Vol. 64 5. English. p. 648-652. 1972.

The clay subsoil of a typic hapludult (pH4.6-5.2 and low fertility) was mulched with 0 and 6818 kg/ha straw, limed with 7280 and 5600 kg/ha lime in the first and second years of the experiment, respectively. The corresponding clay loam topsoil was not mulched and was limed with 5488 and 4480 kg lime. Both topsoil and subsoil were fertilized with 224, 196 and 372 kg/ha N, P and K, respectively, in the first year, 168, 73 and 139 kg N, P and K in the second year and 369, 112 and 139 kg N, P and K in the last 2 years and Cu, Fe, Mn, Mo and Zn were also applied. Plots were irrigated at rates of 0 and 0.89 cm/hr when the average maximum soil water tension reached 700-800 mbar at 15 cm depth. Mulching reduced runoff from the subsoil and increased net water input. Soil water tensions at 45 cm were generally lower in unirrigated mulched subsoil than in irrigated topsoil. Grain yields generally increased on the subsoil each year and in the fourth year yields from irrigated subsoil without mulch and irrigated and unirrigated mulched subsoil were equivalent to those from irrigated topsoil and significantly greater than from unirrigated topsoil.

0109

**Batista, A. et al. .**
Semi-detailed soil survey of the Jaiba Agro-Industrial District. Campinas, Brazil; Brazilian Society of Soil Science.

Portuguese. p. 325-329. 1976.

Annals of the Fifteenth Brazilian Congress of Soil Science. The survey covered an area of 3000 km2 mostly under forest. Twenty mapping units were recognized. The soils were identified as dark-red latosols, red-yellow latosols, planosols, cambisols, lithosols, vertisols, alluvial soils and sandy soils.

0110

**Bauder, J. W.; Schneider, R. P.**
Nitrate-nitrogen leaching following urea fertilization and irrigation. Soil Science Society of America Journal. Dept. of Soils, North Dakota State Univ., Fargo, ND 58105, USA.

Vol. 43 2. English. p. 348-352. 1979.

Wheat (Triticum aestivum) was grown in undisturbed columns of Gardena silt loam (a coarse-silty, mixed Pachic Udic Haploboroll). Optimum and excessive irrigation rates and 135 kg N/ha (as urea in single application vs. three increments applied during the growing period) were compared. Chloride was added to all columns for comparison with NO3--N. Leachate samples were collected throughout the study and analyzed for NO3--N, NH4+-N and Cl-. Columns were dismantled at crop maturity and sampled for residual NO3--N. Total N was determined in wheat at maturity. Leaching fractions (LF) differed significantly between optimum and excessive irrigation but were not affected by applied urea. Cl- moved with the wetting front. Leaching patterns for NO3--N and Cl- were similar, but a slight lag in NO3--N was observed. Concentration of NO3--N in drainage water from all columns was initially similar (30 ppm NO3--N), but then decreased as leaching volume changed. Maximum NO3--N leaching occurred with split urea and excess irrigation. Minimum leaching occurred with optimum irrigation and split urea. Total NO3--N leachate load was directly correlated with leachate volume. Soil solution concentrations at crop maturity were as much as 170 mu g NO3--N/ml. Residual NO3--N varied among treatments and revealed as many as three peaks in NO3--N concentration in the profile, indicating that N leaching occurred following each urea application. The results indicate marked NO3--N movement from urea under excessive irrigation.

0111

**Beavington, F.**
Studies of some cracking clay soils in the Lake Chad basin of north east Nigeria. Journal of Soil Science. Dep. of Geography, King's College, Strand, London, UK.

Vol. 29 1. English. p. 575-583. 1978.

The pedological characteristics, and physical, chemical and mineralogical properties are investigated for soils developed in a 1 m to 1.5 m layer of lacustrine clay material deposited on a former sand plain in the Lake Chad basin. (These soils are being developed for intensive crop production under

irrigation). The surface layer has about 60% clay, a pH of about 7.9, and a coarse, strong prismatic structure. The sub-soil is often notably higher in clay content, pH and exchangeable Na. The smectite content of the clay fraction (surface soil) is 35 to 45% and the CEC 350 meq/kg. The levels of montmorillonite and CEC, and the size of the cracks in dry soil, are all notably less than the values reported for clay soils of the Sudan Gezira. The Chad basin clay soils are not considered to be vertisols according to the FAO Soil Map of the World, though it seems the French pedologists would regard them as paravertisols.

O112

**Beery, M; Wilding, L P**
The relationship between soil pH and base-saturation percentage for surface and subsoil horizons of selected Mollisols, Alfisols, and Ultisols in Ohio. Ohio J Sci.

Jan 1971. Vol.71 (1): 43-55.

Bibliography: p. 55.

O113

**Begon, J. C.; Jamagne, M.**
Concepts of pseudogley and pelosol in the soil classification of the Federal German Republic. Bulletin de l'Association Francaise pour l'Etude du Sol. INRA, Paris, France.

Vol. 4. French. p. 223-239. 1974.

(145.12) The classification of pseudogleys and pelosols is discussed, with reference to profile descriptions and analytical data obtained during the 1971 ISSS congress in Stuttgart.

O114

**Beinroth, F H**
Oxisols--highly weathered, red soils of the tropics. South Coop Ser. EXP STN.

Mississippi, Agricultural Experiment Station Arkansas, Agricultural Experiment Station Louisiana, Agricultural Experiment Station U.S., Soil Conservation Service. 1973. Vol.174: 87-91. Ref.

O115

**Beinroth, F H**
Relationships between U.S. Soil taxonomy, the Brazilian soil classification system, and FAO/UNESCO Food and Agriculture Organization/United Nations, Educational,Scientific and Cultural Organization soil units. In Soil Management in Tropical America; Proceedings of a Siminar. OTHER US.

1974 (pub. 1975). Vol.p. 92-107. Ref.

O116

**Beinroth, F. H.; Uehara, G.; Ikawa, H.**
Geomorphic relationships of oxisols and ultisols on Kauai, Hawaii. Soil Science Society of America Proceedings. Department of Agronomy, Puerto Rico University, Mayaguez Campus.

Vol. 38 1. English. p. 128-131. 1974.

(146.5:145.72) A pedologic study of Kauai, Hawaii, revealed a climosequence of Oxisols on the same geomorphic surface. Ultisols that juxtapose these Oxisols on younger surfaces are the result of soil creep. Clay mobilization induced by soil shear is discussed.

O117

**Beinroth, F. H.**
The general pattern of the soils of Puerto Rico. Geological Bulletin.

Vol. No. 5. English. p. 225-230. 1971.

Entisols, histosols, vertisols, inceptisols, alfisols, mollisols, ultisols and oxisols are described. (173.729.5).

O118

**Beinroth, F.H.**
Classification of the soil series of Hawaii in four systems. A guide to correlating tropical soils. Miscellaneous Publication.

No. 166. pp. 55. 1979.

Hawaii Agricultural Experiment Station.

O119

**Beinroth, F.H.**
The oxisols of Puerto Rico. Second International Soil Classification Workshop, Proceedings.

Vol. 1. p. 263-275. 1979.

Soil Survey Division, Land Development Department, Thailand.

0120

**Bell, L. C.; Gillman, G. P.**
Surface charge characteristics and soil solution composition of highly weathered soils. Melbourne, Australia; CSIRO, Dep. of Agriculture, Univ. of Queensland, St. Lucia, 4067, Australia.

English. p. 37-57. 1978.

Mineral Nutrition of Legumes in Tropical and Subtropical Soils. Proceedings of a workshop held at CSIRO Cunningham Laboratory, Brisbane, January 1978 (Andrew, C.S.; Kamprath, E.J. - Editors). The colloidal fraction of highly weathered soils of the tropics and sub-tropics is dominated by Fe and Al oxides and hydroxides and 1:1 layer silicates. These do not possess an appreciable quantity of permanent negative charge but develop a charge whose sign and magnitude is influenced by pH and the ionic composition of the soil solution. The upper limits for the soil solution ionic strength of surface and subsoil horizons are commonly 0.005 and 0.002, respectively. The CEC of the surface horizon is commonly (5 meq/100 g and the anion exchange capacity (AEC) is immeasurably small; in subsoils the CEC and AEC are both generally (5 meq/100 g. Conventional methods of CEC measurement which employ extracting solutions of high pH and ionic strength seriously overestimate the negative charge and underestimate the base saturation of these soils. The pH at which soils dominated by variable charge colloids have net zero charge varies from 2 to 4 in surface horizons and from 3 to 7 in subsoils, and in general follows the order Oxisols ) Ultisols ) Alfisols. The magnitude of the point of zero charge is a function of the variable charge colloids, permanent charge colloids, and specific adsorption of solution ions.

0121

**Bellinfante, N.; Paneque, G.; Olmedo, J.; Banos, C.**
Micromorphological study of vertisols in southern Spain. Kingston, Ontario, Canada; Limestone Press. University of Sevilla, Sevilla, Spain.

English. p. 296-305. 1974.

Soil Microscopy (Rutherford, G.K., Editor). Macro- and micromorphological, chemical and mechanical data are presented for six profiles situated on recent alluvial sediments, clayey sediments, and marl in flat or undulating topography of the Guadalquivir Valley.

0122

**Benayas, J.**
Micromorphological study of some Vitrandepts. I. Tenerife (Soil profiles, Canary Islands). Anales de edafologia y agrobiologia.

v. 37 (3/4). Spanish. p. 295-302.- ill. Mar/Apr 1978.

Madrid, -Instituto Nacional de Edafologia y Agrobiologia.

0123

**Bennema, J; Jongerius, A; Lemos, R C**
Micromorphology of some oxic and argillic horizons in south Brazil in relation to weathering sequences. Geoderma.

Sept 1970. Vol.4 (3). 333-355. map.

Bibliography: p. 354-355.

0124

**Bennema, J.**
Total-phosphorus in oxisols. Kuala Lumpur, Malaysia; Malaysian Society of Soil Science. Agricultural University, Wageningen, Netherlands.

English. p. 27. undated.

Abstracts of Papers. CLAMATROPS. Conference on Classification and Management of Tropical Soils, Kuala Lumpur, Malaysia, August 1977. In oxisols, 'phosphorus profiles' have been formed which are often strongly dependent on the iron and carbon content of the soils. Four different kinds of phosphorus profiles were recognized, viz. 1) mature profiles 2) phosphorus profiles with a strong accumulation in the surface layer 3) irregular phosphorus profiles 4) anthropogenically enriched phosphorus profiles. The results of a statistical study using 42; samples of oxisols from Brazil are discussed. The relationship of total phosphorus with organic carbon and with total iron for all samples studied can be expressed as: P205 = 0.002 + 0.010C + 0.0007 Fe203 The regression coefficient for C at the 95% level has confidence limits of 0.0056 and 0.0141 and for Fe203 of 0.0065 and 0.0075. Notable is the small interval for the regression coefficient of Fe203. The deviation in P205 content of some typical oxisols is further discussed.

0125

**Bennema, J.**
Organic carbon profiles in Oxisols. Pedologie. Landbouwhogeschool, Wageningen, Netherlands.

Vol. 24 2. English. p. 119-146. 1974.

The organic carbon content (C) of Oxisol profiles under virgin forest could be described by the function: C = apG where p is the depth in the profile and a and b are constants (b is always negative). This function was valid for a depth of 1 to 3 m. Many C profiles under tropical rainforest in Brazil were described by: C = a/p0.5 where a is dependent on soil texture and temperature. These profiles were compared with those for grassland and

agricultural soils.

0126

**Bennema, J.**
Some remarks on Brazilian latosols in relation to the oxisols of soil taxonomy. Second International Soil Classification Workshop. Proceedings.

Vol. 1. p. 233-261. 1979.

Soil Survey Division, Land Development Department, Thailand.

0127

**Berdanier, C.R.**
Mollisols in aridic regimes. Agronomy abstracts.

1979. English. p. 187. 1979.

Madison, Wis., -American Society of Agronomy.

0128

**Berghe, C.H. van den**
A laboratory rainfall simulator study for determining the nutrient erodibility of an Oxisol. Journal of the science of food and agriculture.

v. 30 (5). English. p. 532-539.- ill. May 1979.

Oxford, -Blackwell Scientific Publications.

0129

**Bertrand, R.**
Morphopedology and land-use capability of the Sudanese climatic regions of Sine Saloum (Senegal). Agronomie Tropicale.

Vol. 27 11. French. p. 1115-1190. 1972.

The pedology and geomorphology of the area situated to the south-east of Kaolack are described. The soils include raw mineral soils, weakly developed soils, vertisols, tropical ferruginous soils, rubefied soils, hydromorphic soils and polyphasic soils. Their morphology, and their chemical and physical characteristics are described, and their agricultural potential is discussed.

0130

**Bhadrapur, T. G.; Rao, T. S.**
Salt distribution in irrigated black cotton soils. Mysore Journal of Agricultural Sciences. University of Agricultural Sciences, Dharwar-580005, Karnataka, India.

Vol. 10 3. English. p. 374-386. 1976.

In the Tungabhadra River Valley project, soils which have been flood-irrigated for 33 years showed a decrease in water-soluble Ca ions compared with pre-irrigation data; electrical conductivity also showed a small decrease. Gypsum has been precipitated in both flood and light irrigated soils. Variations in bicarbonate, sulphate, chloride and Na are reported.

0131

**Bhangoo, M. S.; Albritton, D. J.; McKee, W. H. Jr.**
Cation exchange capacity and base saturation of imperfectly drained surface coastal plain soils. Communications in Soil Science and Plant Analysis. University of Arkansas, Pine Bluff, USA.

Vol. 7 3. English. p. 279-293. 1976.

Testing three imperfectly drained forest soils (Alfisols and Ultisol) by nine methods showed that cation exchange capacities were highly pH dependent. Adding lime increased CEC values obtained by buffered and unbuffered methods but decreased CEC values when total bases were added to total acidity or salt replaceable acidity. No method tested completely explained the change in CEC caused by liming. Fractionation of the whole soil CEC indicated an appreciable masked change caused by an apparent complexing of amorphous metal oxides with clay or organic matter. In both buffered and unbuffered solutions, calcium saturation usually gave higher CEC values than monovalent ion saturation.

0132

**Bhargava, G P; Biswas, N R D; Rajan, S V G**
Studies on the Tungabhadra catchment soils. II. Physico-chemical properties and soil taxonomy. J Indian Soc Soil Sci.

June 1973. Vol.21 (2): 193-203. Ref.

0133

**Bhatnagar, R. K.; Nathani, G. P.; Chouhan, S. S.; Seth, S. P.**
Potassium fractions and fixing capacity of medium black soils of Rajasthan. Journal of the Indian Society of Soil Science. Agricultural Chemistry Section, Kota, Rajasthan, India.

Vol. 21 4. English. p. 429-432. 1973.

Content of water soluble, available, exchangeable, fixed, HCl-soluble, and total K was 1.7, 6.7, 10, 110, 500 and 688.7 mg/100 g soil, respectively. Close correlations were found between fixed K and HCl-soluble K, and between total K and available K.

0134

**Bhattacharjee, J. C.; Landey, R. J.; Kalbande, A. R.**
A new approach in the study of Vertisol morphology. Journal of the Indian Society of Soil Science. National Bureau of Soil Survey and Land Use Planning, Regional Centre, Nagpur, Maharashtra, India.

Vol. 25 3. English. p. 221-232. 1977.

Vertisol profiles of the Umbraj, Otur and Linga soil series occurring in semi-arid and sub-humid areas of Maharashtra were characterized by wide shrinkage cracks and gilgai surface micro-relief. The upper part of the A1 horizon of these profiles shows a pedality derived from prolate dispheric slickensided peds of double convex form; in the lower part of the A1 these intersecting slickensides form wedge-shaped peds called parallelepipeds. The amplitude of the cyclic pattern of the A1 horizon is directly related to the linear frequency of puffs and shelves in the gilgai micro-relief. A profile of the Sawargaon soil series belonging to the Vertic subgroups of Ustropepts and occurring in semi-arid areas showed wide shrinkage cracks but no gilgai micro-relief; there was development of a cambic B horizon and an angular blocky structural profile with shiny pressure faces on the peds.

0135

**Bhola, S. N.; Jayaram, N. S.**
Erodibility character of black soils of Bellary. Mysore Journal of Agricultural Sciences. Soil Conservation Research, Demonstration and Training Centre, Bellary-2, Karnataka, India.

Vol. 12 1. English. p. 86-90. 1978.

In the four soil series investigated, clay ranged from 40 to 48 per cent, $CaCO_3$ from 9 to 20 per cent, pH from 7.5 to 8.9, exchangeable sodium percentage (ESP) from 3.1 to 14.8, moisture equivalent from 26.47 to 57.4. The suspension per cent ranged from 10 to 25, percolation ratio from 6.7 to 30.6 per cent, clay ratio from 0.68 to 1.26, colloid/moisture equivalent ratio (C/M) from 0.83 to 1.51, dispersion ratio from 15 to 39.69 and erosion ratio from 10.70 to 47.82. Highly positive significant correlations were obtained between erosion ratio, and dispersion ratio, percolation ratio, suspension percentage, ESP; a highly significant negative correlation was obtained with C/M ratio. No significant correlation of erosion ratio with clay ratio, clay per cent, silt/clay or organic carbon was found.

0136

**Biermans, V.; Baert, L.**
Characterization of amorphous Al, Fe, and Si oxides in sesquioxidic soils. Pedologie. Laboratorium voor Fysische en Radiobiologische Chemie, Fakulteit van de Landbouwwetenschappen R.U.G., Coupure 533, 9000 Gent, Belgium.

Vol. 27 3. English. p. 313-322. 1977.

Amorphous Al, Fe and Si oxides in samples of oxisols under savannah from Zaire, oxisols and ultisols under rainforest from Nicaragua and Malaysia, a soil under pine forest from Belgium, an alfisol from Lebanon and andosols from Ethiopia and Chile, were extracted with an alkaline Tiron solution. Studies on 2:1 layer silicates were conducted to check the selectivity of the method. The amorphous oxides were characterized and compared with clay content, C content and pH. Results conform with Jackson's view that allophane may occur in volcanic ash soils as well as in heavily weathered oxisols.

0137

**Bigham, J. M.; Golden, D. C.; Bowen, L. H.; Buol, S. W.; Weed, S. B.**
Iron oxide mineralogy of well-drained Ultisols and Oxisols: I. Characterization of iron oxides in soil clays by Mossbauer spectroscopy, X-ray diffractometry, and selected chemical techniques. Soil Science Society of America Journal. North Carolina Agric. Exp. Sta., Raleigh, 27650, USA (D.C.G.).

Vol. 42 5. English. p. 816-825. 1978.

The iron oxides in subsoil clays (( 0.2 mu m) from five North Carolina Ultisols and two Brazilian Oxisols were analyzed by Mossbauer spectroscopy, X-ray diffractometry, and selected chemical techniques. Goethite and hematite were identified as the dominant crystalline iron oxides in these clays. Partial substitution of Al(III) or other nonmagnetic ions for Fe(III) in the oxide structures caused reduced unit cell dimensions and subnormal effective internal magnetic fields. All samples exhibited strong superparamagnetic relaxation, a collapse of the Mossbauer magnetic splitting at ambient temperatures due to the ultrafine size of the oxide particles. Negligible amounts of iron were solubilized with acid ammonium oxalate; however, the Ultisol clays did contain significant amounts of silicate and/or interlayer iron that was not extractable with dithionite-citrate-bicarbonate.

0138

**Bigham, J. M.; Golder, D. C.; Buol, S. W.; Weed, S. B.; Bowen, L. H.**
Iron oxide mineralogy of well-drained Ultisols and Oxisols: II. Influence on color, surface area, and phosphate retention. Soil Science Society of America Journal. North Carolina Agric. Exp. Sta., Raleigh, 27650, USA (D.C.G.).

Vol. 42 5. English p. 825-830. 1978.

Subsoil samples from selected North Carolina Ultisols and Brazilian Oxisols were analyzed to determine how the colors of these materials were influenced by the nature and distribution of their constituent iron oxides. The effects of extraneous variables were minimized by utilizing pairs of red and yellow soils that were otherwise similar. The iron oxides were concentrated in the < 0.2 mm fractions, and the colors of these clays were the same as or similar to those of the parent soils. The spectral properties of these clays were primarily influenced by iron mineralogy. Goethite or mixtures of goethite and hematite were identified in all of the clays, however. Mossbauer analyses indicated that the red members contained larger proportions of hematite than did their yellow counterparts. As the clays became redder in hue, the ratio of hematite to goethite generally increased. Calculated surface areas for the iron oxides ranged from 60 to 200 m2/g. Values for the yellow clays were consistently higher than those for the red clays. The yellow clays were also more efficient adsorbers of phosphate.

0139

**Billaux, P.**
Estimation of soil water regimes using climatic data. The graphic method. Its use within the framework of the American soil taxonomy. Cahiers d'ORSTOM, Serie Pedologie.

Vol. 16, No. 3. FRENCH. p. 317-338. 1978.

0140

**Birch, H. F.; Hamito, A. D.**
The fertility status of Ethiopian soils. In "Improving soil fertility in Africa." Proceedings of the Third Conference on Soil Fertility and Fertilizer Use in Africa. Addis Ababa 1970. FAO Soils Bulletin. Institute of Agricultural Research, Ethiopia.

Vol. No 14. English. p. 1-4. 1971.

Samples of a vertisol and a ferrisol derived from basalt in the Central Highlands were studied. Crop responses were given to nitrogen and to phosphate to a greater degree especially in sandy soils. (IS 143 17)

0141

**Biswas, R.R.**
Taxonomic-cum-morphometric photo-interpretation with full check for detailed soil survey. J. Indian Soc. Soil Sci.

Sept. 1977. Vol.25 (3). 347-348.

0142

**Black, A. S.; Waring, S. A.**
Nitrate determination in an oxisol using K2SO4 extraction and the nitrate-specific ion electrode. Plant and Soil. Department of Agriculture, University of Queensland, St. Lucia, Queensland 4067, Australia.

Vol. 49 1. English. p. 207-211. 1978.

Water did not quantitatively extract nitrate from an adsorbing soil. A 0.05 M K2SO4 extractant quantitatively recovered added nitrate and was compatible with the nitrate-specific ion electrode. The results obtained with the electrode and sulphate extractant were highly correlated (r = 0.99, p < 0.01) with those obtained using an extraction distillation procedure.

0143

**Black, A. S.; Waring, S. A.**
Effect of nitrate leaching in oxisol columns on 15N abundance and nitrate breakthrough curves. Communications in Soil Science and Plant Analysis. Dep. of Agriculture, Univ. of Queensland, St. Lucia, 4067, Australia (S.A.W.).

Vol. 10 3. English. p. 521-529. 1979.

Nitrate (20 mg nitrate-N/l) was leached through 180 cm columns of oxisol subsoil until the leachate attained the initial nitrate concentration. Leaching was continued with water until no nitrate was detectable in the leachate. The DELTA 15N for the first aliquot of leachate containing nitrate was 2.2 units lower than that of the added solution indicating that 15N was preferentially adsorbed to 14N. The breakthrough curve for nitrate indicated that nitrate adsorption decreased after six pore volumes. The implications for modelling nitrate leaching are discussed.

0144

**Blake, G.; Schlichting, E.; Zimmermann, U.**
Water recharge in a soil with shrinkage cracks. Soil Science Society of America, Proceedings. Minnesota University, St. Paul, USA.

Vol. 37 5. English. p. 669-672. 1973.

a field experiment the flow of tritiated water into a relatively dry pelosol characterized by fine shrinkage cracks between peds was studied. Results indicated that water flowed down fine cracks in the A and B horizons as free water, some of it soaking into ped walls or running into the C horizons.

0145

**Blake, G. R.; Nelson, W. W.; Allmaras, R. R.**
Persistence of subsoil compaction in a mollisol. Soil Science Society of America Journal. Minnesota Agricultural Experiment Station, University of Minnesota, St.Paul, USA.

Vol. 40 6. English. p. 943-948. 1976.

Subsoil of Nicollet clay loam, a Mollisol, was packed in 1960, tilled normally thereafter, and cropped to corn and alfalfa for 9 years. Over-winter soil water content was increased by late fall irrigation. No amelioration of the packed layer was observed as a result of cropping or over-winter water content differential.

0146

**Blamey, F.P.C.**
Soil amelioration effects on boron uptake by sunflowers (on Ultisols amended with lime and gypsum). Communications in soil science and plant analysis.

v. 10 (7). English. p. 1057-1066.- ill. 1979.

New York. -Dekker.

0147

**Blue, W G**
Fertilizer nitrogen uptake by Pensacola bahiagras (Paspalum notatum) from Leon fine sand, a spodosol. In International Grassland Congress. Proceedings.

1970. Vol.11th: 389-392.

0148

**Blue, W. G.; Graetz, D. A.**
The effect of split nitrogen applications on nitrogen uptake by Pensacola bahiagrass from an Aeric Haplaquod. Soil Science Society of America Journal. Univ. of Florida, Gainesville, USA.

Vol. 41 5. English. p. 927-930. 1977.

On a Florida Spodozol, N uptake by Pensacola bahiagrass (Paspalum notatum Flugge) forage was essentially the same at a given N rate regardless of the number of N applications from 1 to 16/growing season. Nitrogen was leached from the surface soil only during one year when rainfall was intense immediately following fertilization in March, and this loss resulted in reduced N uptake from treatments involving one or two annual applications.

0149

**Blue, W. G.**
Role of Pensacola bahiagrass stolon-root systems in fertilizer nitrogen utilization on fine sand. Agronomy Journal. Florida Agricultural Experiment Station, Florida University, Gainesville 32601, USA.

Vol. 65 1. English. p. 88-91. 1973.

In a six-year experiment on fine sand (spodosol), NH4NO3 was applied on paired plots at rates of 112, 224 and 448 kg/ha N, but was discontinued on one of the treatment pairs for a two-year period. During this period the residual effect of N in the harvested foliage was 8, 41 and 95 kg/ha N at the respective N rates. Unrecovered N was approx. 200, 350 and 770 kg/ha N lost from the solon-root systems through decrease in mass and N concentration was 60, 100 and 190 kg/ha. Little of the unrecovered N could be accounted for by analysis of the surface soil. Lack of residual effect on plant growth confirmed that little available N was was present in the soil profile to rooting depth. Previous studies suggested a limited importance of leaching when N was applied to well established perennial grass pastures during the growing season. Conditions imposed in this soil by high water table, large amounts of plant residues, and rapid decomposition during the summer season could make denitri-fication a significant factor. (326.6:224).

0150

**Blue, W. G.**
Management of ultisols and oxisols. Proceedings, Soil and Crop Science Society of Florida. Soil Science Department, Florida Agricultural Experiment Stations, University of Florida, Gainesville, USA.

Vol. 33. English. p. 126-132. 1974.

Ideas concerning the effects of liming and fertilization on soil fertility and productivity are discussed. A review with 50 references.

0151

**Blue, W. G.**
Comparison of sulfur-coated urea and ammonium nitrate as fertilizers for Pensacola bahiagrass on a Spodosol. Soil Science Society of America Journal. Soil Science Dep., Florida Agric. Exp. Sta., Gainesville, 32611, USA.

Vol. 41 6. English. p. 1191-1193. 1977.

Two sulfur-coated urea (SCU) materials were compared with ammonium nitrate as N sources for 'Pensacola' bahiagrass (Paspalum notatum) on Myakka fine sand (sandy, siliceous, hyperthermic Aeric Halaquod). Forage yields and N contents over the 3-year comparison period were relatively high and were not affected by N

sources or number of applications. There is no justification for the added cost of SCU materials for this system.

O152

**Blue, W.G.**
Forage production and N (nitrogen) contents, and soil changes during 25 years of continuous white clover-Pensacola bahiagrass (Paspalum notatum) growth on a Florida Spodosol (Limed treatments). Agronomy journal.American Society of Agronomy.

v. 71 (5). English. p. 795-798.- ill. Sept/Oct 1979.

Madison, -The Society.

O153

**Bogard, V. A.**
Soil Survey of Pontotoc County, Oklahoma. Washington, D.C.; USA; US Department of Agriculture.

English. p. 69 pp. 1973.

Thirty-five series (inceptisols, mollisols, vertisols and alfisols) are described and mapped at a scale of 1:20 000, and engineering and land-use interpretations are given. Parent materials include shales, sandstones and conglomerates.

O154

**Bone, S. W.; Doren, D. M. Van, Jr.; Triplett, G. B., Jr.**
Corn and soybean production potential of selected tillage practices on a Typic Argiaquoll (Brookston) soil. Research Bulletin, Ohio Agricultural Research and Development Center. Dep. of Agron., Ohio Agric. Res. and Development Cent., Wooster, Ohio, USA.

Vol. No.1099. English. p. 13pp. 1978.

In trials on Brookston silty clay loam soil in Ohio, tillage treatments established in 1967 and maintained on the same plots for 8 yr were (a) mouldboard ploughing to 20 cm depth in the previous autumn + spring disking the wk before sowing, (b) mouldboard ploughing to 20 cm depth in April plus disking the wk before sowing, (c) field cultivation to 10 cm depth (timing ranged from autumn to day of sowing), (d) rotary tilling to 13 cm depth (timing as in (c)), (e) disking to 10 cm depth the wk before sowing or (f) no tillage. Maize was grown for the 1st 4 yr and soyabeans for the next 4 yr. In the 9th yr (1975), half the plots were treated as (b) and half as (f), with maize as the test crop. Maize yields from (a) and (b) treatments (1967-70) av. 9% higher than the av. of all the other tillage treatments and soyabean yields from the (e) treatment (1971-4) averaged 7% less than the av. for all other treatments. Grain m.c. at harvest was not significantly affected by tillage treatments. Tillage history had no significant effect on yields of maize produced by the 1975 (b) or (e) techniques. While 1975 (b) treatments produced 990 kg/ha more grain and 2.4% lower grain m.c. than the 1975 (e) treatment, the 1975 (b) treatment averaged 16 500 plants/ha greater stand than the (e) treatment and this probably accounted for most of the yield difference.

O155

**Boneva, K.; Kabakchiev, I.**
Zinc, copper and manganese contents in the mineral components of certain granulometric fractions in smonitzas. Pochvoznanie i Agrokhimiya. Institut po Pochvoznanie "N. Pushkarov", Sofia, Bulgaria.

Vol. 8 1. Bu. p. 3-11. 1973.

was bonded mainly to the primary mineral forming the coarse fractions (0.4-0.01 mm) but a part of it was incorporated in the composition of the clay minerals. Cu was mainly concentrated in the clay mineral composition of the clay fraction. Mn occurred in mineral forms bonded to the primary minerals. Differences in the petrographical origin of the soil-forming material in these soils were reflected quantitatively and qualitatively in the primary minerals.

O156

**Boneva, K.**
Total chemical composition of the mechanical fractions of leached smonitzas, leached cinnamonic and cinnamonic-podzolic soils. Pochvoznanie i Agrokhimiya. N. Poushkarov Institute of Soil Science, Sofia, Bulgaria.

Vol. 12 2. Bulgarian. p. 14-23. 1977.

The type of parent rock considerably affects the distribution pattern and the absolute amounts of elements contained in the granulometric fractions. Most of the silt and smaller-sized particles, are characterized by the accumulation of silicon dioxide and by a decreased sesquioxide content in the A horizon in all cinnamonic-podzolic soils. The primary and clay minerals have apparently been subjected to acidic destruction (podzolization) in the eluvial horizon. In soils formed on andesitic parent rock the silt fraction contained more magnesium and smaller amounts of potassium than in soils formed on granite. The magnesium content in the silt fraction increased in the order: cinnamonic-podzolic - leached cinnamonic - leached smonitzas.

0157

**Bonnet, J.A.**
The soils of Puerto Rico and the classification of the Seventh Approximation. Revue de Agricoltura de Puerto Rico.

Vol. 50, No. 2. Spanish. p. 114-124. 1963 (pub. 1964).

0158

**Borkert, C; Freire, J R J; Vidor, C; Grimm, S S**
Efeito do calcario e do cloreto de potassio sobre as concentracoes de manganes e aluminio nos oxissolos Santo Angelo e Passo Fundo e absorcao de manganes por duas cultivares deGlycine max (L.) Merrill; Effects of limestone and potassium chloride on manganese and aluminum concentrations in the Oxisols of Santo Angelo and Passo Fundo, and absorption of manganese by two soybean(Glycine max (L.) Merrill) cultivars. Agron Sulriograndense.

Portuguese. 1975. Vol.11 (1): 45-51. Eng. sum.

0159

**Bornemisza, E.; Constenla, M.; Alvarado, A.; Ortega, E. J.; Vasquez, A. J.**
Organic carbon determination by the Walkley-Black and dry combustion methods in surface soils and Andept profiles from Costa Rica. Soil Science Society of America Journal. Sch. Pl. Industry, Univ. of Costa Rica.

Vol. 43 1. English. p. 78-83. 1979.

The efficiency of oxidation of organic C by the Walkley-Black method was compared with determinations using dry combustion and gravimetric determination for the evolved $CO_2$. Fifty surface soils (0-30 cm) were studied, belonging to the following taxonomic suborders: Fluvents, Andepts, Tropepts, Udults, and Ustults. Samples from 17 Andept profiles were also analysed to study changes of oxidation efficiency with depth. The results for the surface samples indicated that the commonly used conversion factor was too small. It was therefore recommended that 75% oxidation be used as the base for conversion to total C. The organic matter in the deeper horizons was more easily oxidized through the Walkley-Black procedure, perhaps because plant residues were less abundant and there was an accumulation of fulvic acids. In some cases the oxidation was almost complete. This oxidation was rather variable and was not correlated with soil texture or pH. The extent of oxidizability may allow conclusions on the relative age of horizons in Andept profiles and may indicate the presence of buried horizons.

0160

**Boul, S W; ed.**
Histosols; Their characteristics, classification, and use. Madison, Wis.

1974. Vol.136 p. illus.

Proceedings of a symposium held on 30 Oct. 1972 during the annual meeting of the Soil Science Society of America in Miami Beach, Fla. Includes bibliographies.

0161

**Bouma, J; Hole, F D**
Soil structure and hydraulic conductivity of adjacent virginand cultivated pedons at two sites: a Typic Agriudoll (silt loam) and a Typic Eutrochrept (clay). Soil Sci Soc Amer Proc.

Mar/Apr 1971. Vol.35 (2): 316-319. Ref.

0162

**Bouma, J; Schuylenborgh, J van**
On soil genesis in temperate humid climate. VII. The formation of a Glossaqualf in a silt-loam terrace deposit. Neth J Agr Sci.

1969. Vol.17 (4): 261-271.

Bibliography: p. 271.

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**Bouma, J.**
On soil genesis in temperate humid climates. VI. The formation of A a glossudalf in loess. Netherlands Journal of Agricultural Science.

Vol. 16, No. 1. English. p. 58-70. 1968.

0164

**Bowman, G. A.; Ragon, L. G.; Hammond, G. L.; Brown, L. E.; Bocchecianp, R. A.**
Soil survey of Phelps County, Nebraska. US Department of Agriculture.

English. p. 91pp. 1973.

Twenty-five series (mainly mollisols and entisols) are described and mapped at a scale of 1:20 000. The parent materials include loess, eolian sand and alluvium. Soil suitability for farming, woodland, range and engineering uses is indicated.

0165

**Bradford, J M; Blanchar, R W**
Profile modification of a fragiudalf to increase crop sorghum production Soils. J Soil Sci Soc Am. USDA.

Jan/Feb 1977. Vol.41 (1): 127-131.

0166

**Braggio Morucchio, G.**
Palynological stud, and vegetation of the peat-bog of Lajone near Riampaludo (Group M. Beigua, western Ligurian Apennines). Archivio botanico e biogeografico italiano.

v. 54 (3/4) [Italian] p. 115-136.- ill., maps, 4 plates. 1978

Forlì, -Lito-Tipo Valbonesi

0167

**Brandon, C. E.; Buol, S. W.; Gamble, E. E.; Pope, R. A.**
Spodic horizon brittleness in Leon (Aeric Haplaquod) soils. Soil Science Society of America Journal. North Carolina Agric. Exp. Stn., Raleigh, USA.

Vol. 41 5. English. p. 951-954. 1977.

In three mapping delineations of Leon soils (Aeric Haplaquods sandy, siliceous, thermic) on two geomorphic surfaces in the lower Coastal Plain of North Carolina, the consistency of the upper part of the spodic horizon ranged from friable to brittle. Brittleness was associated with mineral material whose mean particle size was slightly finer, that was less well sorted, and slightly more finely skewed than in spodic horizons that were not brittle. In brittle spodic horizons, the macropacking voids are filled with organic matter and silt-sized mineral material.

0168

**Brasfield, J F; Carlisle, V W; Johnson, R W**
Spodosols--soils with a spodic horizon. South Coop Ser. EXP STN

Mississippi, Agricultural Experiment Station Arkansas, Agricultural Experiment Station Louisiana, Agricultural Experiment Station U.S., Soil Conservation Service. 1971. Vol.174: 57-60.

0169

**Brawand, H.; Hossner, L. R.**
Nutrient content of sorghum leaves and grain as influenced by long-term crop rotation and fertilizer treatment. Agronom, Journal. Texas Agricultural Experiment Station, College Station, TX 77843, USA.

Vol. 68 2. English. p. 277-280. 1976.

The treatments featured continuous versus rotations of grain sorghum wheat and cotton with and without fertilizer. Most treatments have been applied annually, for over 20 years. Fertilization of grain sorghum predominantly consisted of N and P at rates of 45 and 20 kg/ha, respectively, in field plots on a Houston Black clay soil (fine montmorillonitic thermic family of Udic Pellusterts). Apart from some selective positive influence on sorghum leaf N, leaf P and leaf K, the crop rotational effect on leaf composition was considered inconclusive. Generally, crop rotation did result in larger grain production with fertilized as well as with unfertilized sorghum. Levels of sorghum leaf N, leaf P, leaf K, and leaf Ca were mostly higher in plants receiving fertilizer than in checks. Grain sorghum leaf N, leaf P, leaf Ca, and leaf Mg percentages decreased, increased, or remained nearly constant during the interval from plant booting to half bloom. Sorghum leaf K percentages generally decreased from booting to half bloom. Fertilizer increased grain protein percentage and grain yield. Yet, high rates of fertilizer are not usually recommended in the Texas Blackland Prairie because of frequent soil moisture depletion prior to or at grain formation. Sorghum leaf composition, grain protein level and grain yield showed noticeable response to applied cattle manure plus fertilizer N and P. As the measurable response to fertilizer P was below expectation, its significance on longterm maintenance of balanced soil fertility remains an important consideration.

0170

**Brenes, E.; Pearson, R. W.**
Root responses of three gramineae species to soil acidity in an oxisol and an ultisol. Soil Science. University of Puerto Rico.

Vol. 116 4. English. p. 295-302. 1973.

(315.115.1).c. Sorghum roots were highly sensitive to soil solution Al present in acid ultisols and oxisols. Maize roots were moderately sensitive, and stargrass (Cynodon plectostachyus) roots were tolerant. Soil solution Al concentration could be calculated satisfactorily from soil pH and the EC of the saturation extract using an equation developed from the data presented.!

0171

**Brent, F. V., Jr.**
Soil survey of Oktibbeha County, Mississippi. Washington, D.C., USA, US Department of Agriculture

English. p. 94pp. 1973

Twenty-eight series (mainl, alfisols, inceptisols, ultisols, mollisols and vertisols) are described and mapped on a scale of 1:20 000. Use and management of the soils are recorded. Parent materials include Prairie Blackland marl and chalk, Coastal Plain Formation shale and clayey deposits, and alluvium.

0172

**Brewer, E. O.; Brown, R. M.; McIntyre, J. H.**
Soil survey of Allegnan, Count,, North Carolina. US Department of Agriculture.

English. p. 56pp. 1973

Seventeen series (mainly inceptisols and ultisols) are described and mapped at a scale of 1:15 840. Parent materials include gneiss, schist and alluvium. The soils are classified according to their suitability for farming, woodland, wildlife, range and engineering uses.

0173

**Brinkman, R.**
Surface-water gley soils in Bangladesh. Genesis. Geoderma. Department of Soil Science and Geology, Agricultural University, Wageningen, Netherlands

Vol. 17 2. English. p. 111-144. 1977

Extensive areas of periodicall, wet, acid soils in Bangladesh have a seasonall, fluctuating pH in the surface horizon, and there is evidence of net clay loss. Morphological, chemical, mineralogical and other data mainly for a typical profile of these surface-water gley soils indicate a clay loss of some 1.5 kg/dm2; alteration of smectite to a "soil chlorite", interlayered material with trapped ferrous iron; the consequent drop in C.E.C. of the clay fraction; and the presence of amorphous silica. The data were used to reconstruct a sequence of three soil forming processes. Vertisol formation, argilluviation, and ferrolysis. Ferrolysis involves, in the wet season: reduction with production of ferrous iron, which displaces part of the exchangeable basic cations and aluminium; leaching of bases and part of the aluminium; and interlayer formation by the remaining aluminium while some exchangeable ferrous iron is trapped in the interlayers. In the dry season, oxidation of exchangeable ferrous iron produces exchangeable hydrogen, part of which attacks the clay minerals and ir neutralized by liberation of Al, Mg and other ions from the clay structure. Part of the silica remaining from the clay structure is leached out in the next wet season, and part accumulates in amorphous form. In soils used for a long time for paddy cultivation, ferrolysis has been concentrated in the ploughed layer because the formation of a slowly permeable ploughpan has resulted in strong reduction in the surface horizon only. The hydromorphic albic horizon over more clayey material is indicative of the dominant process in surface-water gley soils. This sequum could usefully have a more important place in soil classification than it has at present, e.g. at great group level.

0174

**Briones, A. A.; Uehara, G.**
Soil elastic constants. I. Calculations from sound velocities. Soil Science Society of America Journal. Hawaii Agricultural Experiment Station, University of Hawaii, Honolulu, USA.

Vol. 41 1. English. p. 22-25. 1977.

The modulus of elasticity, shear modulus and bulk modulus of materials from a Vertisol and two Oxisols were calculated from measured compressional and shear wave velocities. Wave velocities were measured in cylindrical soil samples adjusted to varying water contents and densities. The elastic constants were sensitive to water content and density changes.

0175

**Briones, A. A.**
Shearing resistance of disturbed soil materials. Philippine Agriculturist. Dep. of Soil Science, College of Agriculture, Univ. of the Philippines at Los Banos, Laguna.

Vol. 60 9/10. English. p. 401-412. 1977.

Samples of two Oxisols and a Vertisol from Hawaii were used in this study. Shear strength varied with moisture content and imposed load. In the moisture range used, maximum shear strength occurred at the highest normal stress imposed. At a given water content, high shear strength was related to high plastic index and soil shrinkage, as shown by the sample containing montmorillonitic clay. Fragmentation of compacted soil aggregates required less force at water contents below rather than at the optimum molding water content. In addition, the soil mass was less susceptible to the adverse effects of puddling, compared with samples sheared at moisture contents above the optimum molding water content.

0176

**Bronger, A.**
Climatic sequences of steppe soils from eastern Europe and the USA with emphasis on the genesis of the "argillic horizon". Catena. Geographisches Inst. der Univ., Olshausenstrasse 40-60, D-2300 Kiel, German

Federal Republic.

Vol. 5 1. English. p. 33-51. 1978.

In loess soils of the climatic sequence between forest-steppe and dry steppe in Eastern Europe, clay illuviation can be observed micromorphologically only in soils under old forest sites in the forest-steppe. In the central prairies of the United States, not only udolls, but also ustolls and even aridisols are widespread, which have [illegible] than or equal to 20% higher clay content [illegible] the subsoil which is refered to genetically, as a horizon of clay illuviation or "argillic horizon". However, the micromorphological evidence indicates that clay accumulation in these soils is not due to illuviation except to a very small extent. It is most probably due to discontinuity in the parent material. Three soils of the short-grass prairie are polygenetic soils in the sense that the subsoils are probably the result of much older soil-forming processes.

0177

**Brook, R. H.; Schuylenborgh, J. Van**
Weathering geochemistry of a Paleudult in tropical Surinam. Geoderma. Royal Tropical Institute, Amsterdam, Netherlands.

Vol. 14 1. English. p. 3-13. 1975.

Chemical analyses and mineral norm calculations of a Paleudult, situated on a dolerite dike, revealed that the soil was derived not from the dolerite but from schistose material from adjacent areas which has been deposited over the dolerite. Thin-section micromorphology of the argillic horizon indicates that clay illuviation is not now an active process. With respect to clay mobility, the soil is paleosolic. The weathering of the quartz-dolerite rocks under the deposit of schistose material was studied by analyzing the spheroidal weathering layers. Most minerals of the rock dissolve completely and little clay has been formed during the early stages of weathering.

0178

**Brown, K. W.; Turner, F. T.; Thomas, J. C.; Deuel, L. E.; Keenar, M. E.**
Water balance of flooded rice paddies. Agricultural Water Management. Department of Soil and Crop Sciences, Texas A & M University, College Station, Texas 77843, USA.

Vol. 1 3. English. p. 277-291. 1979.

Rice (Oryza sativa L. var. Labelle) was grown in 300 m2 paddies of Beaumont clay soil (Typic pelludert) and subjected to two management schemes of flooded rice culture. These schemes were continuous irrigation and intermittent irrigation. Careful measurements of irrigation, precipitation, evapotranspiration, deep percolation and runoff were made, and the total water balance for the two water management schemes was calculated. The results show continuous irrigation to be very wasteful of water with slightly over 1 m of irrigation water applied to supply an evapotranspirational need of 0.5-0.6 m. The intermittent irrigation management is less wasteful but still could be improved upon. Suggestions are presented for techniques to help improve the water use efficiency and reduce runoff losses.

0179

**Brown, W. T.; Jackson, W. C.; Keathley, G. L.; Moore, C. L.**
Soil Survey of Obion County, Tennessee. Washington, D.C., USA; US Department of Agriculture.

English. p. 58 pp. 1973.

Twenty-four series (entisols, alfisols, mollisols and inceptisols) are described and mapped at a scale of 1:15 840, and engineering and land-use interpretations are given. Parent materials are mainly loess and alluvium.

0180

**Brownfield, S. H.**
Soil survey of Shelby County, Indiana. Washington, D.C., USA; US Department of Agriculture.

English. p. 92pp. 1974.

Thirty-two series (mainly inceptisols, mollisols and alfisols) are described and mapped at a scale of 1:15 840. Land use and managment are recorded. Parent materials include glacial till, alluvium and aeolian sand.

0181

**Bruce, R. R.**
Hydraulic conductivity evaluation of the soil profile from soil water retention relations. Soil Science Society of America Proceedings. U.S. Department of Agriculture, Watkinsville, Georgia.

Vol. 36 4. English. p. 555-561. 1972.

The water content-suction data measured for samples of each horizon of a Hapludult adequately represented their water retention characteristics. Using water content-suction data, the hydraulic conductivity-water content relation calculated by various methods was compared with measured hydraulic conductivity. The calculated data, for coarse grained systems, or those with a narrow range of pore size and well--defined bubbling pressure, were sufficiently accurate for many purposes. For fine textured horizons, or those with a wide range of pore size, and poorly defined bubbling pressure, the Marshall or Millington and Quirk methods had to be matched at a water content in

the 0.1 to 0.3 bar range.

0182

**Bruckert, S; Metche, M**
Dynamique du fer et de l'aluminum en milieu podzolique. Caracterisation des complexes organo-metalliques des horizons spodiques; Dynamics of iron and aluminum in a podzolic medium. Characterization of organo-metallic complexes of spodic horizons. Nanc, Ecole Nat Super Agron Bull.

French. 1972. Vol.14 (2). 263-275. Ref. Eng sum.

0183

**Bruckert, S; Souchier, B**
Mise au point d'un test de differenciation chimique des horizons cambiques et spodiques; Shaping of a test of chemical differentiation between cambic and spodic horizons Soils. C R Hebd Seances Acad Sci, Ser D Sci Nat.

French. Mar 17, 1975. Vol 280 (11). 1361-1364. Ref. Eng sum.

0184

**Bunting, B. T.**
The relation of profile development and microfabric of albic and spodic horizons in some podzolic soils (spodosols) from southern Ontario. Kingston, Ontario, Canada, Limestone Press. Pedology Laboratory, Department of Geography, McMaster University, Hamilton, Ontario, Canada.

English. p. 333-349. 1974.

Soil Microscopy. (Rutherford, G.K., Editor). Six profiles from three sets of associated soils were studied with particular reference to soil horizonation, micro- and micromorphology of Bisequa Podzols, macromorphological and microfabric development in Podzols on granitic sands, macro- and micromorphology of well-developed Podzol, and indices of weathering and translocation.

0185

**Buntley, G.J.**
Making soil classification more definite. International Seminar on Soil and Water Utilization, Proceedings.

p. 114-118. 1962.

0186

**Buol, S.W.**
Soil moisture and temperature regimes in soil taxonomy. Transportation Research Record.

No. 642. p. 9-12. 1977.

National Academy of Sciences, Transportation Research Board.

0187

**Buol, S.W.**
Geomorphology of some oxisols. Second International Soil Classification Workshop, Proceedings.

Vol. 1. p. 37-43. 1979.

Soil Survey Division, Land Development Department, Thailand.

0188

**Buol, S.W.**
Occurence of soils with low activity clays in the U.S. and Puerto Rico. Second International Soil Classification Workshop, Proceedings.

Vol. 2. p. 147-165. 1979.

Soil Survey Division, Land Development Department, Thailand.

0189

**Buss, G. R.; Lutz, J. A., Jr.; Hawkins, G. W.**
Yield response of alfalfa cultivars and clones to several pH levels in Tatum subsoil. Agronomy Journal. Virginia Polytechnic Institute and State University, Blacksburg, 24061, USA.

Vol. 67 3. English. p. 331-334. 1975.

Eighteen alfalfa cultivars were planted in unlimed (pH 4.4) and limed (pH 6.0) Tatum (Typic Hapludults, clayey, mixed, thermic) subsoil. None survived in the unlimed soil and all grew in the limed soil. Clones were selected for root development in unlimed soil after growing down through a 5 cm layer of limed soil. When grown at pH levels of 5.3, 6.1, and 7.5, they showed a highly significant clone X pH interaction for yield. However, on the average they did not seem much more acid tolerant than unselected clones. This screening technique was somewhat successful in isolating acid tolerant clones, but forage yield at low pH appeared to be a better criterion.

0190

**Bustamante, B.A.**
An example of application of the seventh approximation. Ingeniera Agronomie

Vol. 8. Spanish. p. 21-29. 1962

0191

**Buzio, C. A.; Burt, G. W.; Foss, J. E.**
Deicing salt movement and its effects on soil parameters and vegetation. Agronom, Journal. Department of Agronom,. Maryland University,. College Park, MD 20742, USA

Vol. 69 6. English. p. 1030-1032. 1977

The distribution of salt leached from a deicing salt pile, and its effects on soil parameters (pH, Mg, P and K) and plant successional changes in a hardwood forest area were studied. The soil was a sand, loam (Typic Hapludult). Lateral movement (of chloride) was extensive with subsequent leaching to a depth greater than 76 cm. Of the measured soil parameters, only, K was found to be correlated with NaCl concentration. Within 3 years of the establishment of the salt stockpile, all the trees in the sampled area were dead. Out of 29 plant species found to have invaded the sites with less than 5,000 ppm of NaCl, only 10 were found in sites with concentrations greater than 15,000 ppm. Recommendations to be considered when establishing a deicing salt p e are presented.

0192

**Cabezas Viano, D; Hernandea Moreno J; Tejedor Salguero, M L; Fernandez Caldas, E**
Caracteristicas mineralogicas de la fraccion arena en und secuencia cronologica de andepts de las Islas Canarias. Mineralogical characteristics of the sand fraction in a chronological sequence of andepts in the Canary Islands. An Edafol Agrobiol.

Spanish. July/Aug 1977. Vol.36 (7/8) 787-803. Ref. Eng. sum

0193

**Cabezas Viano, D; Rodriguez Pascual, C; Fernandez Caldas, E; Hernandez Moreno, J**
Caracteristicas mineralogicas de la fraccion inferior a 2mieras en dystrandepts. II; Mineralogical characteristics of the clay fraction (less than 2 micra) of dystrandepts. II. Andasols, Canary Islands. An Edafol Agrobiol.

Spanish. July/Aug 1977. Vol.36 (7/8) 805-824. Ref. Eng. sum.

0194

**Cady, J G, Daniels, R B**
Genesis of some very old soils--the paleudults. Int Soc Soil Sci Trans.

1968. Vol.9th Congr. ,v.4:103-112.

0195

**Cady, J.G.**
Genesis of some very old soils - the paleudults. International Congress of Soil Science, Transactions. 9th.

Vol. 4. p. 103-112. 1968.

0196

**Cajuste, L. J.; Kussow, W. R.**
Use and limitations of the North Carolina method to predict available phosphorus in some oxisols. Tropical Agriculture. Postgraduate College, Chapingo, Mexico.

Vol. 51 2. English. p. 246-252. 1974.

The North Carolina method of extraction was compared with the Bray No 1 and Olsen procedures and also with the uptake of P by Setaria italica in pot experiments. When no P was applied the North Carolina method extracted 30% more P when shaken for 16 h rather than 5 min, whereas P readsorption occurred in the other methods (soil solution=1:10). When 250 ppm P were added to the soil the P extracted after 16 h was 22% less than that extracted in 5 min.

0197

**Caldwell, A G; Ebon, A H**
Characteristics of selected Alfisols and Ultisols from Beauregard Parish, Louisiana Soil classification. Rep Proj Dep Agron La State Univ Agric Mech Coll Agric Exp Stn. EXP STN.

Louisiana, Agricultural Experiment Station, Dept. of Agronomy. 1975?. Vol.p. 244-248.

0198

**Caldwell, R. E.; Pourzad, J.**
Characterization of selected paleudults in West Florida. Proceedings. Soil and Crop Science Society of Florida. Department of Soil Science, IFAS, Gainesville, Florida, USA.

Vol. 33. English. p. 143-147. 1974.

Characterization data obtained by physical, chemical and mineralogical analyses was used to classify the soils investigated as rhodic,

grossarenic and plinthic paleudults.

0199

**Calhoun, F. G.; Carlisle, V. W.**
Statistical analysis of spodosol parameters. Proceedings, Soil and Crop Science Society of Florida. University of Florida, Gainesville, USA.

Vol. 33. English. p. 139-143. 1974.

Statistics for certain physical, chemical and morphological properties for spodosol pedons, sampled in Florida, are presented. It was concluded that fine sand was the best index constituent to use for pedogensis studies of Florida spodosols.

0200

**Calhoun, F. G.; Hammond, L. C.; Caldwell, R. E.**
Influence of particle size and organic matter on water retention in selected Florida soils. Proceedings, Soil and Crop Science Society of Florida. Soil Science Department, Florida University, Gainesville, 32601, USA.

Vol. 32. English. p. 111-113. 1973.

Samples from 212 horizons of 44 mineral soil profiles representing entisols, inceptisols, mollisols, spodosols, alfisols and ultisols were analysed for organic matter content, bulk density, silt and clay contents, moisture equivalent, 0.06, 0.10, 0.33 and 15 bar water contents. Multiple regression analysis indicated that 80-90% of the total variability in water retention at 15-bar suction and moisture equivalent (0.5 bar) could be accounted for by silt, clay and organic matter contents. Multiple regression equations for 0.33 and 0.06 bar water contents accounted for less total variation (75 and 60%, respectively).

0202

**Calhoun, F. G.**
Taxonomy of oxisols, ultisols, and andepts. Proceedings, Soil and Crop Science Society of Florida. Soil Science Department, University of Florida, Gainesville, USA.

Vol. 33. English. p. 108-111. 1974.

The classification and important differentiating properties of soils in the oxisol and ultisol orders and andept suborder are discussed.

0201

**Calhoun, F. G.**
Taxonomy of oxisols, ultisols, and andepts. Proceedings, Soil and Crop Science Society of Florida. Soil Science Department, University of Florida, Gainesville, USA.

Vol. 33. English. p. 108-111. 1974.

The classification and important differentiating properties of soils in the oxisol and ultisol orders and andept suborder are discussed.

0203

**Calvert, D. V.**
Fertilization of citrus on the alfisols and spodosols of Florida. Murcia, Spain, Ministerio de Agricultura. Agricultural Research Center, Citrus Division Fort Pierce, Florida 33450, USA.

English. p. 207-211. 1974.

I Congreso Mundial de Citricultura, 1973. Volume I. Past and recent developments in the fertilization of citrus grown on lowland soils of Florida are reviewed on account of the current rapid expansion of the citrus industry into these areas, which were previously considered marginal for citrus production. Many of the soils have shallow profiles and are moderately to poorly drained in contrast to the deep, sandy, well-drained soils in Florida's central ridge section where most of the citrus is produced.

0204

**Canarache, A; Clorescu, C I; Dumitriu, R**
Observatii asupra regimului hidric al solurilor de stepa din sud-estul romaniei in conditiile specifice ale toamnei anului 1972; Some observations on the moisture regime of the steppe soils from the south-eastern areas of Romania under the conditions specific to the autumn of 1972. Probl Agr (Bucharest).

Rumanian. 1973. Vol.25 (5): 64-68.

0205

**Canode, C. L.; Law, A. G.**
Influence of fertilizer and residue management on grass seed production. Agronomy Journal. Washington State Univ., Pullman, WA 99164, USA.

Vol. 70 4. English. p. 543-546. 1978.

Post-harvest residue burning, a standard practice in grass seed production in the Pacific Northwest, may be restricted because of concerns for air quality. The effects of burning were compared with those of mechanical residue removal in red fescue (Festuca rubra),

smooth bromegrass (Bromus inermis) and crested wheatgrass (Agropyron desertorum). The experiments were conducted on a silt loam soil (Pachi Ultic Haploxerolls) as a split-plot within each grass species. Main plots were 3 levels of 18-10-10-7 fertilizer applied to supply N at 90, 112 and 135 kg/ha, with an associated increase in P, K and S. Main plots were split for open burning and 2 levels of mechanical residue removal. 2 crops of red fescue and 4 seed crops of smooth bromegrass and crested wheatgrass were evaluated. Av. seed yields after burning were 636, 1222 and 872 kg/ha for red fescue, smooth bromegrass and crested wheatgrass, resp., compared with 459, 848 and 790 kg/hr after mechanical straw removal. Straw and stubble removal, compared with straw removal alone, increased seed yield of red fescue and smooth bromegrass but decreased seed yield of crested wheatgrass. Interactions of fertilizer rates and residue management were not significant. Increasing the fertilizer rate did not compensate for the reduction in seed yield associated with mechanical removal of residue. Seed yields of smooth bromegrass and crested wheatgrass were increased by high fertilizer rates as the age of stand increased. The increase in seed production resulting from burning residue was associated with control of downy bromegrass (Bromus tectorum) and increased vigour of autumn regrowth.

0206

**Cardoso, J. C.; Bessa, M. T.; Marado, M. B.**
Soil map of Portugal (1/1000000). Agronomia Lusitana. Estacao Agronomica Nacional, Oeiras, Portugal.

Vol. 33 1-4. Portuguese. p. 481-602. 1971, publ. 1973.

The soil map of Portugal, prepared as a contribution to the soil map of Europe (FAO), is included and described. Fifty taxonomic units are recognized and named according to the FAO nomenclature, with the equivalent Portuguese terms. Soil associations are expressed as symbols representing the dominant soil unit, the textural class and the slope. The main soils include fluvisols, regosols, lithosols, rankers, vertisols, solonchaks, cambisols, luvisols, podzols and planosols. (173.469).

0207

**Cardoso, J. C.**
Mollisols in Mozambique. Agronomia Lusitana. Estacao Agronomica Nacional, Oeiras, Portugal.

Vol. 37 1. Portuguese. p. 37-76. 1975.

An area of about 100 000 ha in Northern Mozambique was studied for determining the suitability of soils for irrigation. Eleven soil profiles are described and their chemical, physical and mineralogical properties are tabulated. The soils are classified as Haplic Phaeozems, Luvic Phaeozems and Gleyic Phaeozems.

0208

**Cardoso, J.C.**
The soils of Sao Tome e Principe in the New American system of soil classification. Estudios Agronomicos.

Vol. 3, No. 4. Portuguesetuguese. p. 157-176. 1962.

0209

**Cardoso, J.C.**
Classification of the soils of Southern Portugal according to the 7th approximation. Conference on Mediterranean Soils, Transactions.

p. 395-399. 1967.

0210

**Carlisle, V W; Schoon, C L**
Stratification in a Spodosol. Soil Crop Sci Soc Fla Proc.

1970. Vol.29: 332-336.

Bibliography: p. 336.

0211

**Carlisle, V. W.; Zelazny, L. W.**
Subjacent mineralogy of selected Paleudults. Proceedings, Soil and Crop Science Society of Florida. Soil Science Department, University of Florida, Gainesville, FL 32611, USA.

Vol. 35. English. p. 192-195. 1976.

Particle size distribution and mineralogical analyses for subjacent horizons of three Rhodic and three Plinthic Paleudults were undertaken to determine argillic horizon thickness and characterize the clay fraction in deep profiles of representative western Florida Ultisols. Argillic horizons were underlain by sandy materials at depths ranging from 4 to 6 m. Kaolinite, non-expandable 14A intergrades, and quartz were identified throughout practically all depths of all soils. Gibbsite occurred in large amounts in some soils. Detectable mica occurred in the lower subjacent horizons of all except one of the profiles. Minor amounts of montmorillonite were present in the lower subjacent horizons of some profiles. Subjacent mineralogy of Rhodic and Plinthic Paleudults was strikingly similar.

0212

**Carlisle, V. W.**
Mineralogy of selected Florida Grossarenic Paleudults and Ultic Hapludalfs. Proceedings, Soil and Crop Science Society of Florida. Soil Science Department, University of Florida, Gainesville, 32611, USA.

Vol. 36. English. p. 126-129. 1977.

In three Grossarenic Paleudults and three Ultic Hapludalfs on similar landscapes, sand was the major fraction in all pedons and horizons except for the C horizon of one soil. Cation exchange capacity increased considerably in argillic horizons containing detectable amounts of interstratified expandable minerals. Kaolinite, 14A intergrades, and quartz were identified from X-ray diffractograms throughout all depths of the Grossarenic Paleudults. Although these minerals also occurred in the upper horizons of the Ultic Hapludalfs, they occurred in small amounts in, or were absent from, the deeper horizons. Whereas interstratified expandable minerals were not detectable or occurred in low amounts in the lower horizons of Grossarenic Paleudults, these were the dominant minerals in the deeper horizons of the Ultic Hapludalfs. Vermiculite with extensive hydroxy interlayers (14A intergrades) appeared to be the most resistant mineral species in these soils. Profile and mineralogical differences have probably resulted from slight differences in parent materials that have been accentuated by differences in internal drainage over a period of time.

0213

**Caro-Costas, R; Abruna, F; Vincente Chandler, J**
Effect of three levels of fertilization on the productivity of stargrass Cynodon nlemfuensis pastures growing on a steep Ultisol in the humid mountain region of Puerto Rico Consumed by grazing cattle. J Agric Univ P R.

Apr 1976. Vol.60 (2): 172-178.

0214

**Carroll, D. M.; Hope, W. A.**
The soils of the Biu-Mubi Area, North Eastern State, Nigeria. Soil Survey Bulletin, Samaru, Nigeria. Institute for Agricultural Research, Samaru, Zaria, Nigeria.

Vol. No.43. English. p. 1-57. 1974.

Thirty-six soil series (mainly vertisols and weakly developed, sesquioxidic and hydromorphic soils) are described and mapped as fifteen associations at scales of 1:100 000 and 1:250 000. Parent materials include volcanic rocks, sandstone and alluvial deposits. Present and proposed land-use are described.

0215

**Carroll, D. M.**
The soils of the Maiduguri-Bama Area. Soil Survey Bulletin, Samaru, Nigeria. Institute of Agricultural Research, Samaru, Zaria, Nigeria.

Vol. No. 40. English. p. 1-41. 1974.

Thirty-five soil series (mainly vertisols and weakly developed, sesquioxidic, halomorphic and hydromorphic soils) are described and mapped as twenty associations at a scale of 1:250 000. Parent materials include aeolian, lacustrine and fluviatile deposits. Present and proposed land use are discussed and the soils are classified into soil capability classes.

0216

**Carvalho, A.; Lepsch, I. F., Oliveira, J. B.; Valadares, J.; Rotta, C. L.**
Semi-detailed soil survey of Atibaia municipality, Sao Paulo. Bragantia. Instituto Agronomico, 13100 Campinas, Sao Paulo, Brazil.

Vol. 34. Portuguese. p. 1-58. 1975.

The geology, topography, climate and vegetation of the area (478 km2) are described. Eleven soil mapping units were identified, the soils being classified as oxisols, ultisols and inceptisols. Representative profiles are described, and a soil map is included.

0217

**Cascio, B. Lo**
Irrigation systems and aggregate stability. Quaderni de "La Ricerca Scientifica". Istituto di Agronomia Generale e Coltivazioni Erbacee, Facolta di Agraria, Universita - Palermo, Sicily, Italy.

Vol. No.99. Italian. p. 336-341. 1977.

Aggregate stability in a Vertisol under lucerne and irrigated for 3 years was the same after sprinkling as after basin irrigation.

0218

**Cascio, B. Lo**
Relationships between soil structure and methods of irrigation in different soil types. Rivista di Agronomia. Gruppo coordinato per le ricerche agronomiche sulla irrigazione, Istituto di Agronomia Generale di Palermo, Sicily, Italy.

Vol. 12 1/2. Italian. p. 80-84. 1978.

During one irrigation season in which two soils under tomatoes for processing were irrigated by sprinkling, furrow irrigation and drip irrigation, the structure of a sandy alluvial soil after irrigation was the same for all three methods of irrigation, but in the top

layer of a clayey vertisol aggregate size and water stability were decreased at the points of direct contact of the soil with the water supplied by furrow irrigation and drip irrigation.

0219

**Castillo, J. B.**
Classification of some soils from the Venezuelan Andes using a numerical method and the 7th Approximation. Cuadernos Geograficos, Universidad de Los Andes.

Vol. No. 6. English. p. 84pp. 1975.

Twenty-four soil profiles from two different climatic zones and three geomorphic positions from an area of the Venezuelan Andes, State of Merida, were studied. From an earlier study, the six soil associations most important because of use or area were selected: three around 2000 m elevation and three around 3000 m. At each elevation the associations represent soils on mountain slopes, debris cones, and terraces. Variations within each unit were studied by means of four soil profiles selected in a way to show extreme variations related to position in the unit or to mesorelief characteristics. The 24 soil profiles were classified in the 7th Approximation in three subgroups of different orders. 11 were Typic Humitropepts, 9 were Entic Hapludolls, and 4 were Typic Troporthents.

0220

**Castro, A. F. de; Anastacio, M. de L. A.; Barreto, W. de O.**
Available potassium in surface horizons of some Brazilian soils. Pesquisa Agropecuaria Brasileira, Serie Agronomia. Equipe de Pedologia e Fertilidade do Solo, Rio de Janeiro, Brazil.

Vol. 7. Portuguese. p. 75-80. 1972.

Total, exchangeable and available K were determined in the surface horizons of 81 Brazilian soils. Available K was obtained by extraction with N HNO3 or with dilute H2SO4 solutions at two concentrations. A high correlation was obtained between K extracted with N HNO3 and with dilute H2SO4 (10 ml H2SO4 in 25 ml H2O). Exchangeable K (extracted with 0.05 N HCl) was correlated with available K extracted with 1 ml H2SO4 in 25 ml H2O. Soils from low rainfall areas contained the highest amounts of total K. Lithosols, vertisols, non-calcareous brown soils, brunizems, regosolic latosols, regosols and red-yellow podzolic soils had the highest contents of available K. A correlation was found (r = 0.4697) between K extracted with N HNO3 and silt content.

0221

**Catlett, V. R.**
Soil Survey of Ouachita County, Arkansas. Washington, D.C., USA; US Department of Agriculture.

English. p. 61 pp. 1973.

Eighteen series (mainly ultisols, entisols and inceptisols) are described and mapped at a scale of 1:20 000. Parent materials are Pleistocene and Recent sediments.

0222

**Chandel, A. S.; Maharaj Singh; Singh, T. A.**
Forms of potassium in Mollisols of Nainital Tarai. Bulletin, Indian Society of Soil Science. G.B.Pant University of Agriculture and Technology, Pantnagar, Uttar Pradesh, India.

Vol. No.10. English. p. 13-20. 1976.

The total, exchangeable, nonexchangeable and water-soluble K contents were determined for tarai soils representing various textural classes. The available K ranged from 54 ppm to 172 ppm in the top 0-15 cm of soil. The soils contain considerable reserves of K mainly in micaceous and chlorite clay minerals.

0223

**Chang Jong-Min**
The red soils of Chinmen Island. Journal of the Agricultural Association of China. Department of Agricultural Chemistry, National Taiwan University.

Vol. No.92. Chinese. p. 112-126. 1975.

The soils derived mainly from Pleistocene sediments are red, clayey and acid. The clay fraction consists mainly of kaolinite with various amounts of mica, gibbsite and amorphous material. It is suggested that they should be classified as Rhodustults.

0224

**Chang, J. M.**
Mineralogy and related chemical properties of the soils developed from two-pyroxene-hornblende-andesite and olivine-bearing-hornblende-two-pyroxene-andesite in Tatungshan region. Journal of the Chinese Chemical Society. National Taiwan University, Taipei, Taiwan.

Vol. 12. Chinese. p. 36-53. 1974.

All four soils studied were of low fertility, even though the organic matter content of the surface soils was somewhat higher than normal for agricultural soils of Taiwan. The SiO2/Al2O3 ratio was about 2.5, suggesting that podzolization is the main soil-forming process.

The $SiO_2/Al_2O_3$ ratio of the clay fractions remained virtually constant throughout an individual profile. A significant accumulation of clay particles occurred in the subsoil horizons as a result of illuviation. The soils can be classed as red yellow podzolic soils or hapludults.

0225

**Chatterjee, R. K.; Rathore, G. S.**
Plant available copper in black soils of Madhya Pradesh and its relationship with soil and clay mineral properties. Journal of the Indian Society of Soil Science. Indian Agricultural Research Institute, New Delhi 110012, India.

Vol. 22 4. Engl. sm. p. 383-385. 1974.

The low availability of Cu to plants was probably due to the high content of clay and to the large proportions of smectite minerals.

0226

**Chatterjee, R. K.; Rathore, G. S.**
Clay, mineral composition, genesis and classification of some soils developed from basalts in Madhya Pradesh. Journal of the Indian Society of Soil Science. Division of Soil Science and Agricultural Chemistry, Indian Agricultural Research Institute, New Delhi, India.

Vol. 24 2. English. p. 144-152. 1976.

The dominant minerals of four black soils developed from basalt were montmorillonitic with some poorly crystallised kaolinite and small amounts of illite and quartz. The soils are classified as chromusterts.

0227

**Chavan, A.S.**
Response of rice to iron-zinc interrelationships in a lateritic soil (Oxisol) (from Dapoli, Maharashtra). Plant and soil.

v. 52 (2). English. p. 311-313.- ill. July 1979.

The Hague, -Nijhoff.

0228

**Chiba, M.**
Regurs in western India. Pedologist.

Vol. 17 1. Japanese. p. 37-46. 1973.

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0229

**Christensen, P.**
Jarrah Dieback : Soil temperature and moisture regimes of some southern forest types / by P. Christensen. -. Perth : Forests Dept.,.

1975. Vol.19. 1 p. : ill. -.

Bibliograph. p. 20 .

0230

**Christenson, D. R.; White, R. P.; Doll, E. C.**
Yields and magnesium uptake by plants as affected by soil pH and calcium levels. Agronomy Journal. Michigan Agricultural Experiment Station, East Lansing 48823, USA

Vol. 65 2. Engl. sm. p. 205-206. 1973.

In Mg-deficient spodosols, uptake of Mg by oats was significantly higher when 800ppm Ca was applied as $CaCO_3$ than as $CaSO_4$. Application of Mg significantly increased Mg uptake regardless of Ca level or source. Results suggest that soil pH level affected Mg uptake more than did Ca level. (313 221 46 115).

0231

**Ciolkosz, E. J.; Peterson, G. W.; Cunningham, R. L., Matelski, R. P.; Pennock, R., Jr.**
Characteristics, interpretations and uses of Pennsylvania soils developed from cherty limestone materials. Progress Report, Agricultural Experiment Station, Pennsylvania State University. Agricultural Experiment Station, Pennsylvania State University Park, USA.

Vol. No.341. English. p. 108pp. 1974.

The soil profile morphology, site characteristics and physical, chemical and mineralogical properties of typic and aquic hapludults and aeric ochraquults in Central Pennsylvania are reported. Their agricultural suitability and engineering limitations are discussed.

0232

**Cipra, J E; Bidwell, O W; Whitney, D A; Feyerherm, A M**
Variations with distance in selected fertility measurements of pedons of western Kansas ustoll. Soil Sci Soc Amer Proc.

Jan/Feb 1972. Vol.36 (1): 111-115. Ref.

0233

**Clemente Salas, I, Medina Carnicer, M; Paneque Guerrero, G**
Suelos del Valle Medio del Guadalquivir. zona Posadas-Fuente Palmera. V Suelos hidromorfos minerales y vertisoles; The soils of the Guadalquivir River Medium Valley: the Posadas-Fuente Palmera zone. V. Mineral hydromorphic soils and vertisols. An Edafol Agrobiol.

Spanish July/Aug 1977. Vol 36 (7/8) 661-679. Ref Eng sum

0234

**Cline, M. G.**
Origin of the term Latosol. Soil Science Society of America Proceedings Cornell university, Ithaca, New York, USA.

Vol. 39 1 English p 162 1975.

The general concept of the term Latosol resembles that of Oxisol in current taxonomy, but the two terms are far from equivalents.

0235

**Cline, M.G.**
Logic of the new system of soil classification. Soil Science.

Vol. 96, No. 1. p 17-22. 1963.

0236

**Cline, M.G.**
Soil classification in the United States Agronomy Mimeo.

No. 79-12. pp. 207. 1979.

Cornell Univerisity, Department of Agronomy.

0237

**Cline, M.G 1985/**
The changing model of soil Soil Science Society of America, Proceedings.

vol. 25, No. 6. p. 442-446. 1961.

0238

**Cline, M.J.**
Threads of soil genesis in the seventh approximation. Soil Science Society of America, Proceedings.

Vol. 27, No. 2. English. pp. 220-222. 1693.

0239

**Cochrane, T.T.**
Manganese and zinc deficiencies in sugarcane grown in Entisols near Santa Cruz, Bolivia. Tropical agriculture.

v 56 (3) English. p 219-224.- ill. July 1979

Guilloford, -IPC Science and Technology Press.

0240

**Coelho, M.A.**
Moisture and temperature of soils of Ceara State, Brazil. I. Red yellow Podzol and the eutrophic equivalent in the Fortaleza area. Ciencia agronomica.

v. 8 (1/2). p. 3-8.- ill. Dec 1978.

Fortaleza, -Centro de Ciencias Agrarizs da Universidade Federal do Ceara.

0241

**Coelho, R.W.**
Potassium nutrition of five species of the tropical legume Stylosanthes in an aeric haplaquod. Proceedings.Soil and Crop Science Society of Florida.

v. 38. English. p. 90-93.- ill. 1979.

n.p., -The Society.

0242

**Coen, G M; Arnold, R W**
Clay mineral genesis of some New York Spodosols. Soil Sci Soc Amer Proc.

Mar/Apr 1972. Vol.36 (2): 342-350. Ref.

0243

**Colbert, F. D.; Volk, V. V.; Appleby, A. P.**
Sorption of atrazine, terbutryn, and GS-14254 on natural and lime-amended soils. Weed Science. Oregon State University, Corvallis, OR 97331, USA.

Vol. 23 5. English. p. 390-394. 1975.

Adsorption of atrazine (2-chloro-4-(ethylamino)-6-(isopropylamino)-s--triazine), terbutryn (2-(tert-butylamino)-4-(ethylamino)-6-(methylthio)-s-triazine), and GS-14254 (2-(sec-butylamino)-4-(ethylamino)-6-methoxy-s--triazine) decreased on natural and limed soils as the soil pH increased to pH 8. More reduction in adsorption occurred with GS-14254 than with the other two herbicides. Increased toxicity to barley from GS-14254 was proportional to decreased adsorption by soils. Adsorption-desorption studies with Chenalis sandy loam (Cumulic Ultic Haploxeroll) indicated that extent and strength of adsorption were equivalent for GS-14254 (pKa 4.36) and terbutryn (pKa 4.32) at a soil pH of 5.20. Two soils, Boyce silt loam (pH 9.6, Cumulic Haplaquoll) and Crooked silt loam (pH 8.5, Xerollic Durorthid), adsorbed the s-triazines readily in contrast to the soils below pH 8. The high adsorption values were substantiated by the GR50 values on barley for atrazine and terbutryn, 10.2 and 13.2 ai/ha, respectively.

0244

**Comanor, P.L.**
Oxygen uptake by big sagebrush (Artemisia tridentata) litter under four temperature-moisture regimes. Soil biology and biochemistry.

v. 10 (6). English. p. 467-470.- ill. 1978.

Oxford.

0245

**Comerma, J A**
La 7a aproximacion y los suelos venezolanos; The 7th Approximation and the soils of Venezuela. Agron Trop (Maracay).

Spanish. Sept 1971. Vol.21 (5): 365-377. map. Eng. sum.

0246

**Comerma, J.; Chirinos, A.**
Characteristics of some soils with and without an argillic horizon in the Eastern Plateaux of Venezuela. Agronomia Tropical. Centro Nacional de Investigaciones Agropecuarias, Maracay, Venezuela.

Vol. 27 2. Spanish. p. 181-206. 1977.

Four representative soils (lHaplustoxs and Paleustults) were studied, with textures varying from sandy to clayey. Their chemical and mineralogical composition were similar, and they differed mainly in the amount of clay accumulation with depth, in the structure of the subsoil, and in the greater water-holding capacity of soils with an argillic horizon.

0247

**Comerma, J.A.**
Low activity clays alfisols and ultisols of Venezuela. Second Internatioanal Soil Classification Workshop, Proceedings.

Vol. 2. Article. 1979.

Soil Survey Division, Land Development Department, Thailand.

0248

**Conea, A.; Vasilescu, P.; Ghinea, P.**
Vertisols of the Western part of the Rumanian Danube Plain. Analele Institutului de Studii si Cercetari Pedologice 1971.

Vol. 39. Rumanian. p. 171-182. 1972.

A detailed comparison of the vertisols from the Danube Plain with other Rumanian vertisols is given. The introduction of a higher category for these soils in the Rumanian classification is proposed.

0249

**Conea, A.**
The classification of chernozems. Comitetul Geologi dari Seama Sedintelor.

Vol. 53. No. Pt. 2A. Rumanian. p. 401-416. map. 1965/66.

0250

**Conea, A.**
American system of classification applied to some soils in Rumania. Stinnta Solului.

Vol. 4. No. 2. Rumanian. p. 62-71. 1966.

0251

**Coninck, F de; Favrot, J C; Tavernier, R; Jamagne, M**
Degradation dans les sols lessives hydromorphes sur materiaux argilo-sableux. Exemple des sols de la nappe detritoque bourbonnaise (France); Degradation in hydromorphic "sols dessives" (Alfisols) on clayey-sandy material. Exampel of the soils developed in the detrital sediment of the Bourbonnais (France). Pedologie.

French. 1976. Vol.26 (2): 105-151. Map. Ref. Eng. sum.

0252

**Coninck, F. de; Righi, D.; Maucorps, J.; Robin, A. M.**
Origin and micromorphological nomenclature of organic matter in sandy spodosols. Kingston, Ontario, Canada; Limestone Press. Geologisch Instituut, State University, Ghent, Belgium.

English. p. 263-280. 1974.

Soil Microscopy (Rutherford, G.K., Editor). A nomenclature based solely on micromorphological features is presented for organic matter in sandy spodosols. A discussion of the genesis of the spodic B horizon led to the conclusion that the activity of the soil fauna in transformation of plant remains and polymorphic organic matter into faecal pellets, aggregates and accumulation is more important in early stages than illuviation through a dispersed phase which produces coatings of monomorphic organic matter. If the latter process predominates, the B horizon may undergo cementation.

0253

**Conry, M J**
Irish Plaggen soils--their distribution, origin, and properties. J Soil Sci

Dec 1971. Vol.22 (4): 401-416. Ref.

0254

**Conry, M J**
The age of Irish plaggen soils. In Paleopedology: Origin, Nature and Dating of Paleosols. Papers.

1971. Vol.p. 129-138. Ref.

0255

**Conry, M. J.; Coninck, F. de; Diamond, J. J.**
Some brown podzolic soils in the west and south-west of Ireland. III. Genesis and classification. Proceedings, Royal Irish Academy, B. National Soil Survey, An Foras Taluntais, Oak Park, Carlow, Irish Republic.

Vol. 72 21. English. p. 393-402. 1972.

On morphological, chemical and genetic grounds these soils are considered to form a subgroup of the Podzol Group. It is suggested that a new subgroup, Ochric Haplorthods, should be created within the US system to accommodate them.

0256

**Conry, M. J.**
Pedological evidence of man's role in soil profile modification in Ireland. Geoderma. An Foras Taluntais, Oak Park, Carlow, Irish Republic.

Vol. 8 2/3. English. p. 139-146. 1972.

The classification of the soils studied has changed as a result of man's influence, from peats (Histosols) and peaty podzolized gleys (Haplaquods) to plaggen soils (Plaggepts). The pH levels have been increased even in the C horizons; where sea sand has been added in large quantities the plaggen soil is strongly calcareous. The organic matter has been considerably reduced and the surface texture was changed from peat to a loamy coarse sand. P, Na and Mg are very low in the undisturbed soil, and very high in the plaggen soils. The suitability of these soils for fertility-demanding crops is discussed.

0257

**Cook, M. G.**
Compositional variations in three typic Hapludults containing mica. Soil Science. North Carolina State University, USA.

Vol. 115 2. English. p. 159-169. 1973.

Analyses of Cecil, Madison and Fannin soils showed that compositional mineralogical and chemical differences present a means of classifying these soils.

0258

**Coover, J R; Bartelli, L J; Lynn, W C**
Application of soil taxonomy in tidal areas of the southeastern United States. Proc Soil Sci Soc Am.

July/Aug 1975. Vol.39 (4): 703-706. Ref.

0259

**Cosper, Harold R.**
Soil taxonomy as a guide to economic feasibility of soil tillage systems in reducing nonpoint pollution.

English. ii, 35 leaves :~ ill., maps.

Washington ~ Natural Resource Economics Division, U.S.D.A., Economics, Statistics, and Cooperatives Service ~ 1979.

0260

**Coultas, C L**
Response of pine seedlings to manipulations of the spodic horizon. Pinus taeda, Pinus elliottii. Proc Soil Crop Sci Soc Fla

1973. Vol.32: 121-125.

0261

**Coultas, C. L.; Calhoun, F. G.**
A toposequence of soils in and adjoining a cypress dome in North Florida. Proceedings. Soil and Crop Science Society of Florida. Department of Soil Science, Florida A & M University, Tallahassee, USA.

Vol. 35. English. p. 186-191. 1976.

Soils through a cypress dome northwest of Gainesville were characterized and classified. All soils were strongly acidic and low in bases. Soils at lowest elevations in the dome had thick A1 horizons, contained the highest organic matter content, and were classified as Umbraquults. Soils at higher elevations had thin A1 horizons, incipient spodic horizons, and were classed as Ochraquults. Soils outside the edge of the dome were Haplaquods. Argillic horizons impeded flow of water through all soils. Quartz was the dominant clay-sized mineral in all surface horizons; however, kaolinite-metahalloysite was dominant in argillic horizons.

0262

**Coultas, C. L.; Clewell, A. F.; Taylor, E. M., Jr.**
An aberrant toposequence of soils through a titi swamp. Soil Science Society of America Journal. Florida A & M University, Tallahassee, Florida, USA.

Vol. 43 2. English. p. 377-383. 1979.

Three Great Groups of soil, Humaquepts Haplaquods, and Psammaquents, were found on a traverse through a titi swamp in north Florida. The Humaquept occurred in the lowest, wettest position and plants of Cyrilla racemiflora and Nyssa biflora were largely restricted to these soils. These soils were extremely acid, low in extractable bases, well supplied with organic C, and highest in clay content. Haplaquods occurred in a higher position with better drainage. On these soils vegetation included Cliftonia monophylla, Magnolia virginiana and Myrica inodora inside the titi swamp, and outside the swamp, species common to the pine flatwoods. These Haplaquods were acid and low in extractable bases. They contained less organic C and clay than the Humaquept. The Psammaquents were the best drained due to their high position and coarse texture. They contained the least organic C. Evidence is presented which indicates that the titi swamp has encroached into areas formerly vegetated with pine flatwoods. This was probably due to recent fire control and wetter soil conditions.

0263

**Coultas, C. L.; Gross, E. R.**
Distribution and properties of some tidal marsh soils of Apalachee Bay, Florida. Soil Science Society of America Proceedings. Florida A & M University, Tallahassee, USA.

Vol. 39 5. English. p. 914-919. 1975.

Three great groups of soils were found in the tidal marshes of Florida's Gulf Coast. These were Sulfaquents, Psammaquents, and Haplaquods. The Sulfaquents occurred at lower elevations while the Psammaquents and Haplaquods were found at higher elevations adjoining the uplands. These soils are saline, near neutral in pH, and shallow over limestone.

0264

**Coultas, C. L.**
Soils of the Apalachicola National Forest wetlands Part 1. Titi swamps and savannahs. Proceedings. Soil and Crop Science Society of Florida. Florida A & M University, Tallahassee, FL, USA.

Vol. 36. English. p. 72-77. 1977.

The soils are classified as Haplaquods at higher elevations in the titi swamps and Humaquepts at lower elevations. Soils of the savannah are classified as Psammaquents (Wakulla County) and as Paleaquults (Liberty County). All the soils were very acidic and low in extractable cations. Total phosphorus, low in all soils, was highest in the surface horizons. Clay-sized particles in the argillic horizon of the Paleaquult were predominantly kaolinite-metahalloysite with quartz and vermiculite intergrades, as the clays in an adjoining upland soil.

0265

**Couteaux, M.**
Pollen analysis at Peyrebielle, Mezillac and Mazan (Ardeche): Holocene evolution of the vegetation and genesis of Podzolic soils with a deep, black horizon. Pollen et spores.

v. 20 (4). FRENCH. p. 485-495.~ ill., map, 2 fold, plates. 1978.

Paris, ~Museum national d'histoire naturelle.

0266

**Couto, W.; Lathwell, D. J.; Bouldin, D. R.**
Sulfate sorption by two oxisols and an alfisol of the Tropics. Soil Science. Cornell Univ., Ithaca, New York 14853, USA

Vol. 127 2. English. p. 108-116. 1979.

The infuence of pH and $SO_4^{2-}$ concentration on the amount of $SO_4^{2-}$ sorbed by tropical soils and on negative charges of the soils was investigated by equilibration procedures, using samples of two Oxisols and one Alfisol of Sao Paulo, Brazil. Significant amounts of $SO_4^{2-}$ were sorbed in subsoil (B2) samples. Sorption decreased as the pH of the equilibrium solution increased with each soil. In the surface horizons with relatively high OM content, the $SO_4^{2-}$ sorption capacity was smaller, and the pH effect was less evident. When $SO_4^{2-}$ sorption occurred, the pH of the equilibrium solution increased, probably partly, as a result of $SO_4^{2-}$ substitution for $OH^-$ on the surface of oxides. Sorbed $SO_4^{2-}$ was desorbed only partially, in some soil samples, while in others $SO_4^{2-}$ was desorbed in larger amounts than were actually sorbed, indicating a release of native $SO_4^{2-}$. Potassium desorption, considered as a measure of CEC, suggested an increase in cation retention sites as a result of increasing levels of sorbed $SO_4^{2-}$.

0267

**Couto, W.**
Soil management in oxisol savannas and ultisol jungles in tropical America. Kuala Lumpur, Malaysia. Malaysian Society for Soil Science. Soil Science Department, North Carolina State University, USA

English. p. 47. undated.

Abstracts of Papers. CLAMATROPS. Conference on Classification and Management of Tropical Soils, Kuala Lumpur, Malaysia, August 1977. Field experiments in sites representing large areas of ultisols and oxisols under jungle and savanna vegetation have identified the main limiting soil factors for agricultural expansion in these areas. The high potential for food production in these areas under suitable soil management is discussed. Production systems at high level of inputs as an alternative to traditional shifting cultivation in jungle areas are presented. Oxisols under savanna vegetation, representing one of the biggest reserves in potentially arable land, show high productivity after correction of nutrient deficiencies and liming.

0268

**Cox, D. N.**
Soil survey of Hidalgo County, New Mexico. Washington, D.C., USA; US Department of Agriculture.

English. p. 90pp. 1973.

Forty-one series (mainly aridisols, entisols and mollisols) are described and mapped at a scale of 1:31 680. Land use and management are recorded. Parent materials include acid igneous rock, alluvium, basic igneous rock and sedimentary rocks.

0269

**Craddock, G. R.; Wells, R. D.**
Entisols--soils that show no profile development. South Coop. Ser. EXP STN.

Mississippi, Agricultural Experiment Station. Arkansas, Agricultural Experiment Station. Louisiana, Agricultural Experiment Station. U.S., Soil Conservation Service. 1973. Vol.174: 24-28.

0270

**Craig, R. M.; McCracken, R. J.; Daniels, R. B.**
Soils of three parent sediments on young hillslopes of the North Carolina Upper Coastal Plain. Soil Science. North Carolina State University, USA

Vol. 114 6. English. p. 486-492. 1972.

Pedogenetic processes and pedochemicae weathering have modified the three parent sediments to produce a relatively moderate degree of soil development on the hillslopes, the resulting soils being typic hapludults. The most significant peodogenetic processes appear to be: (1) clay accumulation in B horizons associated with clay loss in A horizons; (2) Fe release into "free" form with subsequent partial translocation into B horizons; (3) modest accumulations of organic matter in A horizons; (4) selective cation leaching to produce dominance of exchangeable Al, and (5) homogenization of the sedimentary structures of the parent sediments. Pedochemical weathering processes are: (1) production of Al-interlayered 2:1-2:2 intergrade clay minerals with amounts decreasing from A horizons downward; substantial modification of the montmorillonite or illite in the sediments, and (3) the corplex of leaching, plant cycling, and mineral breakdown-release of Al, Ca and Mg that sustains the largest amount of exchangeable bases in the B horizons. (181).

0271

**Crankshaw, W. B.**
The effect of ground cover on the soil moisture regime in a mixed mesophytic woods. Grazing. Ind Acad Sci Proc.

1968 (published 1969). Vol.78: 204-209.

0272

**Croon, F W**
Zero-tillage for rice on Vertisols. World Crops Livest

Jan/Feb 1978. Vol.30 (1) 12-13, 15, 16.

0273

**Cummins, J. F.; Carlson, C. R.; Harms, G. F.; Woodworth, D. K.**
Soil Survey of Steele County, Minnesota. Washington, D.C., USA: US Department of Agriculture

English. p. 102 pp 1973

Forty-five series (alfisols and mollisols) are described and mapped at a scale of 1:20 000. The parent material is mainly glacial drift.

0274

**Dan, J.; Yaalon, D. H.; Koyumdjisky, H.**
Catenary soil relationships in Israel. 2. The Bet Guvrin catena on chalk and nari limestone crust in the Shefela. Israel Journal of Earth Sciences. Volcani Institute of Agricultural Research, Bet Dagan, Israel.

Vol. 21 2. English. p. 99-114. 1972.

The catena on the nari (calcrete) covered northern slope consisted of grumusolic dark brown soil (Haplargids) on the flat hilltops, thick non-calcareous brown rendzina soil (Rendolls) on the moderate slopes, typical brown rendzina on steep slopes, and brown rendzinic colluvial-alluvial soils (Haploxerolls) in narrow gullies. On the soft chalk rock of the southern slope brown rendzina was replaced by pale rendzina, and brown rendzinic colluvial-alluvial soils by highly calcareous colluvial-alluvial soil (Haplorthents). Soil profile descriptions and analytical data are given.

0275

**Daniels, R B; Gamble, E E; Buol, S W; Bailey, H H**
Free iron sources in an aquult-udult sequence from North Carolina Soils. Proc Soil Sci Soc Am.

Mar/Apr 1975. Vol.39 (2). 335-340. Ref.

0276

**Daniels, R. B.; Gamble, E. E.; Buol, S. W.**
Oxygen content in the groundwater of some North Carolina aquults and udults. Special Publication, Soil Science Society of America. US Department of Agriculture, Soil Conservation Service, Raleigh, North Carolina.

Vol. No. 5. English. p. 153-166. 1973.

The oxidation-reduction regimes of aquults and associated udults on a gently undulating tableland were determined by measuring the O2 content of the groundwater. Reducing conditions, defined as the Eh-pH combinations in the Fe2+ stability field, did not always coincide with saturation. The aquults can be saturated to the surface for 4-5 months and the O2 levels in the upper 0.5 m of the soil will remain high enough for oxidizing conditions (Fe(OH)3 stable) to exist. Reducing conditions seldom occur in the upper 2 m of the udults examined even though these horizons may be saturated for several months.

0277

**Daniels, R.B.**
Relation between A2 horizon characteristics and drainage in some fine loamy ultisols. Soil Science.

Vol. 104, No. 5. p. 364-369. 1967.

0278

**Daniels, R.B.**
The edge effect of some ultisols in the North Carolina coastal plain. Geoderma.

Vol. 1, No. 1. p. 117-124. 1967.

0279

**Daniels, R.B.**
Eluvial bodies in B horizons of some ultisols. Soil Science.

Vol. 106, No. 3. p. 200-206, map. 1969.

0280

**Dantzman, C. L.**
Effect of lime levels on calcium and magnesium recovery and yield of Pangola digitgrass. Proceedings, Soil and Crop Science Society of Florida. Agricultural Research Center, Ona 33865, Florida, USA.

Vol. 35. English. p. 143-144. 1976.

Lime was applied to a virgin fine sand

(Spodosol) at rates of 0, 2.24, 4.48, 6.72, and 8.96 mt/ha. One-half was applied as dolomite and one-half as a high calcic lime. After the lime was incorporated into the rooting zone (the surface 0-15 cm of soil), Pangola digitgrass was sprigged into the experimental area. The grass was fertilized initially, and again after each harvest. There were six harvests each year after the initial year for 4 years. Forage yields were significantly greater for the 4-year period for all lime treatments compared to no lime plots. Total Ca and Mg removed from the soil by the forage was significantly greater for the 2.24 through 8.96 mt/ha rates than for control (no lime). The percentages of Ca and Mg in forage were also larger for the lime-treated plots than for the control.

0281

**De Alwis, K.A.**
LAC alfisols and ultisols of Sri Lanka. Second International Soil Classsification Workshop, Proceedings

Vol. 2. p. 119-128. 1979

Soil Surve, Division, Land Development Department, Thailand

0282

**De Camargo, O.A.**
Transport of inorganic phosphorus in an Alfisol (Soil, adsorption and movement under controlled leaching conditions). Journal.Soil Science Society of America

v. 43 (5). English. p. 884-890.- ill. Sept/Oct 1979.

Madison, Wis., -The Society,.

0283

**De Jong, E; MacDonald, K B**
The soil moisture regime under native grassland. Geoderma.

Oct 1975. Vol.14 (3). 207-221. Ref.

0284

**De Kimpe, C R; De Kimpe, C R**
Influence of parent material and moisture regime on soil genesis in the Appalachian Highlands, Quebec. Can J Soil Sci.

Aug 1976. Vol.56 (3): 271-283. Ref.

0285

**De Kimpe, C R; Martel, Y A**
Effects of vegetation on the distribution of carbon, iron, and aluminum in the B horizons of northern Appalachian Spodosols. Proc Soil Sci Soc Am

Jan/Feb 1976. Vol.40 (1). 77-80. Ref.

0286

**De Vos, J H, Virgo, K J**
Soil structure in vertisols of the Blue Nile clay plains. Sudan. J Soil Sci.

Mar 1969. Vol.20(1) 189-206. map.

Bibliography, p. 204-206.

0287

**De, S.**
Effect of different nitrogenous substances on pH (hydrogen-ion concentration) and availability of iron and manganese in some soils under two moisture regimes. Indian agriculturist.

v. 21 (2). English. p. 99-106.- ill. 1977.

Calcutta, -Agricultural Society of India.

0288

**De, S. K.**
Infrared spectra of Indian soils. - Part VII. Infrared spectra of a black soil profile. Indian Journal of Agricultural Chemistry. Allahabad University, India.

Vol. 5 1. English. p. 37-41. 1972.

(145.33:953.561).

0289

**Debnath, N C; Hajra, J N**
Inorganic transformation of added phosphorus in soil in relation to soil characteristics and moisture regime. Indian Soc Soil Sci J.

Dec 1972. Vol.20 (4): 327-335. Ref.

0290

**Dedecek, R. A.; Cabeda, M. S. V.**
Soil-erodibility factor of oxisols in Rio Grande do Sul. Pesquisa Agropecuaria Brasileira. Empresa Brasileira de Pesquisa Agropecuaria (EMBRAPA) Cx. Postal 70/0023 -70.000, Planaltina, DF, Brazil.

Vol. 12 unico. Portuguese. p. 91-95. 1977.

The soil-erodibility factor of oxisols (latosol) in Rio Grande do Sul, was predicted through the stud, of five soil physical parameters. The soil showed low K values and high innerent resistance to rainfall erosion. The intensive erosion observed was due to poor soil management systems, and to climatic and topographic factors.

0291

**Del Valle, R. Jr.**
Response of Irish potatoes to various levels of N (nitrogen) and time of N application in an Ultisol (Tropical soils, cultivars, Puerto Rico). Journal of agriculture of the University of Puerto Rico.Puerto Rico. -University,

v. 63 (3). English. p. 344-355 + 11. July 1979.

Rio Piedras. -Agricultural Experiment Station.

0292

**Del Valle, R., Jr.; Scott, T. W.; Rodriguez, J.; Lugo-Lopez, M. A.**
Response of plantains to banded and broadcast N and to P applications at planting and to residual P on an Ultisol. Journal of Agriculture of the University of Puerto Rico. Agricultural Experiment Station, Mayaguez Campus, University of Puerto Rico, Rio Piedras, Puerto Rico.

Vol. 62 1. English. p. 29-38. 1978.

Two consecutive plantain crops were harvested from an experiment on an Ultisol with high P-fixing capacity. Bunch weight was significantly higher from plants receiving 224 kg/ha of banded N than from plants receiving the same amount of broadcast N. Number of fruits and weight of fingers in the third hand were also significantly higher from the 224 kg/ha banded N treatment than from the 0-N. No differences as to number of fruits per bunch was measured at the same N levels either banded or broadcast. N and Mg deficiencies were observed in plants from the 0-N plots and verified through leaf tissue analysis. Bunch and fruit weights increased with increments in P fertilizer from 0 to 56 kg/ha applied at planting or with 179 kg/ha of residual P. Lack of P reduced weight and pulp content in the fingers of the third hand. Data on the ratoon crop reveal no effect of N on bunch weight and no response to P fertilizer. The ratoon crop yielded only 13% less than the plant crop. Over 300,000 fruits/ha were harvested from the two crops.

0293

**Delaune, D.; Pias, J.**
Characteristics of palaeosols in the Chad basin.

Vol. 1. French. p. 405-412. 1972.

The oldest, ferrallitic soils, are characterised by the presence of dominant gibbsite, and the less old by goethite and hematite and a kaolinitic clay fraction. In these soils the heavy minerals are dominated by zircon-tourmaline-rutile. The young Quaternary sediments are montmorillonitic with some kaolinite, illite and amongst the heavy minerals, hornblende. These soils are less leached tropical ferruginous soils, brown soils, reddish brown soils, sub-arid soils, hydromorphic soils, vertisols, halomorphic soils. The soils formed on later sediments show a less marked evolution and are typically hydromorphic or halomorphic. (144).

0294

**Dement, J.A.**
The role of vertic subgroups in the comprehensive soil classification system. Soil Science Society of America, Proceedings.

Vol. 33, No. 1. p. 129-131. 1969.

0295

**Dennis, E. A.**
Nodulation and nitrogen fixation in legumes in Ghana. Chichester, UK; John Wiley & Sons. Soil Res. Inst., Kwadaso, Ghana.

English. p. 217-232. 1977.

Biological nitrogen fixation in farming systems of the tropics (Ayanaba, A.; Dart, P.J. - editors). Pot experiments under glasshouse conditions studied the nodulation and nitrogen uptake of ten legumes grown twice consecutively in limed and unlimed samples of a eutric nitosol, a gleyic solonchak and a pellic vertisol. Although all legumes except Medicago sativa nodulated in the three soils, there was variability in nodulation. This suggested low numbers and poor effectiveness of specific rhizobial strains in some soils. However, nodulation of Vigna mungo, V.unguiculata and Voandzeia subterranea was good in all three soils. Nodulation of Canavalia ensiformis was effective in the pellic vertisol, but poor and mostly ineffective in the other two soils. V.mungo in the vertisol and V.unguiculata in the eutric nitosol responded to liming. The high N increases in the gleyic solonchak (unlimed especially) and vertisol (limed) soils were largely due to non-symbiotic N fixation and to a lesser extent to symbiotic fixation. The increases in the eutric nitosol, though lower, were attributable to symbiotic fixation. This attained a maximum of 106 kg/ha from growth of V.subterranea.

0296

**Deshpande, S B; Fehrenbacher, J B; Beavers, A H**
Mollisols of Tarai region of Uttar Pradesh, northern India. 1. Morphology and mineralogy. Geoderma.

Nov 1971. Vol.6 (3): 179-193. maps. Ref.

0297

**Deshpande, S B; Fehrenbacher, J B; Ray, B W**
Mollisols of Tarai region of Uttar Pradesh, northern India. 2. Genesis and classification. Geoderma

Nov 1971. Vol 6 (3). 195-201. Ref.

0298

**Deshpande, Sharadchandra Balwant; 1936**
Genesis and classification of six mollisols in the Tarai region near Pantnagar, Uttar Pradesh, India. Urbana.

1969. Vol.154 1. illus.

Thesis - University of Illinois. Authorized facsimile by University Microfilms, Ann Arbor, 1970. Bibliography: leaves 135-140

0299

**Dhillon, K. S.; Sinha, M. K.; Randhawa, N. S.**
Organo-metallic phosphates. V. Complexation of zinc and phosphorus by humic compounds. Plant and Soil. Department of Soils, Punjab Agricultural University, Ludhiana, Punjab, India.

Vol. 43 2. English. p. 317-326. 1975.

Humic and fulvic acids extracted from a mollisol and manure were used to determine their zinc-complexing capacity by an ion-exchange equilibrium method. The simultaneous chelation of phosphorus by organic-matter preparations in the presence of complexed zinc was also studied. The results indicated that phosphorus is bonded to humic and fulvic acids in the presence of complexed zinc. Phosphate ions in such complexes probably act as additional ligands in bridging the organo-metal units. The stability constants of zinc complexes increased whereas the free energy change accompanying their formation recorded lower negative values in the presence of phosphorus and at higher pH. Zinc fulvic salts and complexes being less stable but mobile should enhance the movement of zinc ions to plant roots and yield of crops in deficient soils.

0300

**Dias, A. C. C. P.; Silva, L. F. da**
Soils of the sedimentary basin of the Reconcavo Baiano. Boletim Tenico, CEPLAC, Centro de Pesquisas do Cacau, CEPLAC, Caixa Postal 7, Itabuna, Bahia, Brazil.

Vol. No 16. Portuguese. p. 26 pp. 1972.

The geology, physiography, climate and vegetation of the area (460 km2) are described. Twelve soil mapping units were identified, including alfisols, entisols, inceptisols, oxisols, ultisols and vertisols. Each unit is described in detail and the agricultural potential of the soils, particularly their suitability, for cacao growing, is discussed. (173,81)

0301

**Diedrick, R. T.; Harries, J. C.; Larson, P. L.; Miller, E. L.; Rhyner, A. G.; Murray, J. J.; Sutton, C. K.**
Soil survey of Swift County, Minnesota. Washington, D.C., USA: US Department of Agriculture.

English. p. 116pp. 1973.

Fifty-eight series (mainly mollisols) are described and mapped on a scale of 1:15 840. Land use and management are recorded. Parent materials include glacial till, modified glacial outwash, outwash, lacustrine deposits, loess and alluvium.

0302

**Diedrick, R. T.**
Soil Survey of Pope County, Minnesota. Washington, D.C., USA: United States Department of Agriculture.

English. p. 109pp. 1972.

Fifty-five series (mainly borolls and aquolls) are described and mapped at a scale of 1:20 000. Parent materials are mainly glacial till, outwash, loess and alluvium.

0303

**Digar, S; Haldar, A K; Ds, A L**
Classification of the soils of the Machkund catchment according to U. S. Soil taxonomy. J Indian Soc Soil Sci.

Dec 1973. Vol.21 (4): 491-497.

0304

**Dixit, S P; Gombeer, R; D'Hoore, J**
The electrophoretic mobility of natural clays and their potential mobility within the pedon. Geoderma.

May 1975. Vol.13 (4): 325-330.

0305

**Dixon, M. L.; Dittemore, W. H., Jr.; Hyde, H. W.**
Soil survey of Scurry County, Texas. US Department of Agriculture

English. p. 56pp. 1973.

Twenty six series (mainly mollisols, inceptisols, alfisols, vertisols and entisols) are described and mapped at a scale of 1:24000. Parent materials include residuum, outwash material and eolian and alluvial deposits. The soils are grouped into capability units for farming, range, wildlife and engineering use.

0306

**Dobrovol'skii, V. V.**
Mineralogical and geochemical characteristics of black soils of Kenya, Uganda and Tanzania. Pochvovedenie. Geograficheskii Fakul'tet Moskovskogo Gosudarstvennogo Pedagogicheskogo Instituta Imeni V.I.Lenina, USSR.

Vol. No.8. Russian. p. 14-25. 1973.

(145.33:119). The mineralogical and micro-element composition of black soils (vertisols) is related to that of neighbouring red soils. Calcite is formed during short-term waterlogging and Fe oxide minerals during prolonged waterlogging. Hydromicas, and sometimes palygorskite, are the predominant finely dispersed minerals, and mixed-layered minerals, montmorillonite and meta-halloysite predominate. Black soils may have been formed from the erosion products of the surrounding territory.

0307

**Dolman, J.P.**
A study of organic soils (histosols) in the Tidewater Region of North Carolina. Technical Bulletin.

No. 181. 1967.

North Carolina Agricultural Experiment Station.

0308

**Donahue, Roy Luther; 1908**
Ethiopia; taxonomy, cartography, and ecology of soils. East Lansing, African Studies Center.

1972. Vol.44 p. illus.

Bibliography: p. 39-40.

0309

**Doss, B. D.; Lund, Z. F.**
Subsoil pH effects on growth and yield of cotton. Agronomy Journal. US Department of Agriculture, Auburn, Alabama, USA.

Vol. 67 2. English. p. 193-196. 1975.

Field studies were conducted to determine the effects of subsoil pH on growth and yield of unirrigated and irrigated cotton (Gossypium hirsutum L.) grown on a Rhodic Paleudult and to determine if normal yields could be obtained with a shallow root system when adequate water was supplied in the surface soil by frequent irrigations. The pH ranged from 4.4 to 6.2 in the 15 to 30-cm soil depth. Subsoil pH of about 5.0 was the critical point for affecting root growth and yield on unirrigated cotton. Root growth was deep and yields were normal above pH 5.0, whereas rooting depth and seed cotton yield were progressively reduced with decreasing pH below 5.0. The reduced seed cotton yields, resulting from shallow root systems on acid subsoils, were overcome by frequent irrigation of the surface soil. Rooting depth and pattern were not affected by the irrigation.

0310

**Douglas, C.L.**
The lower boundary of selected mollisols. Soil Science Society of America, Proceedings.

Vol. 31, No. 6. p. 795-800. 1969.

0311

**Douglas, C.L. Jr.**
The lower boundary of selected mollisols. Soil Science Society of America, Proceedings.

Vol. 31, No. 6. p. 795-799. 1967.

0312

**Dubey, H. D.; Fox, R. H.**
Denitrification losses from humid tropical soils of Puerto Rico. Soil Science Society of America Proceedings. University of Puerto Rico.

Vol. 38 6. English. p. 917-920. 1974.

Very little denitrification occurred in two Oxisol and one Ultisol subsoils under waterlogged conditions in the laboratory unless the soil pH and organic matter contents were raised and a denitrifying population added to the soil. Since the surface horizon of these soils is rarely waterlogged, it is concluded that there is little possibility of N losses by denitrification in these humid tropical soils.

0313

**Duchaufour, P.**
Dynamics of organic matter in soils of temperate regions: its action on pedogenesis. Geoderma. Centre de Pedologie biologique, CNRS, Vandoeuvre-les-Nancy, France.

Vol. 15 1. English. p. 31-40. 1976.

During humification in an Atlantic climate, three main types of organo-mineral complexes are formed: humus-$CaCO_3$ in rendzina soils, humus-allophane in andosols, and humus-iron in brown acid soils. These complexes differ both in their biological (ability to withstand biodegradation) and chemical (stability to extractants) properties. The humus-swelling clay complex, occurring in fluctuating pedoclimates, shows a high degree of polymerization of the organic matter (maturation). The temperate humus forms are classified with regard to the kind and degree of transformation of the fresh organic matter into: (1) little-transformed humus (e.g., calcic mull and moder); (2) strongly transformed humified humus (e.g., acid mull, andosol); (3) very highly transformed, mature humus type (e.g., Vertisol, chernozem).

0314

**Duchaufour, P.**
Pedology. Vol. I. Pedogenesis and Classification. Paris, France: Masson. Centre du pedologie, CNRS, Nancy, France.

French. p. 475 pp. 1977.

The topics considered are: weathering and clay formation; the dynamics of the organic matter; transport processes in soil systems; the general principles of soil formation; soil systematics; soils that have evolved only slightly and have a slightly differentiated profile; calcium-magnesium soils; soils with mature humus, isohumic soils, and Vertisols; brown soils; podzolic soils; hydromorphic soils; soils rich in sesquioxides; saline sodium (salsodic) soils.

0316

**Duchaufour, Ph.**
Soil classification. Comparison of the American classification and the French classification. Pedologie.

Vol. XI, No. 1. FRENCH. p. 138-147. 1961.

0315

**Duchaufour, Ph.**
New data on soil classification. Ecole National des Eaux et Forets, Annales.

Vol. 18, No. 4. FRENCH. p. 469-531. 1961.

0317

**Duchaufour, Ph.**
Soil classification: a comparison of the American and French systems. Journal of Soil Science.

Vol. 14, No. 1. p. 149-155. 1963.

0318

**Dungan, N.A.**
The moisture regimes of six soil series of the Central Lowlands of Scotland. The Journal of soil science.

v. 30 (2). English. p. 215-223.- ill. June 1979.

Oxford, -Clarendon Press.

0319

**Dusic, D.**
Intensity of erosion on smonitzas. Arhiv za Poljoprivredne Nauke. Institut za proucavanje zemljista, Belgrade, Yugoslavia.

Vol. 29 107. Serbo-Croat. p. 97-155. 1976.

Monitoring of runoff and sediment in small watersheds indicated a close relation between runoff and erosion intensity. This was incorporated into a mathematical model. Erosion under fallow can be calculated from the model provided that the rainfall intensity and initial moisture content are known. The effect of a plant cover can also be taken into account.

0320

**Edelstein-Helier, D.; Popescu, F.**
Note on the chemical and mineralogical composition of the argillaceous fraction separated from two smolnitza profiles. Studii Technice si Economice, Institutul Geologic, Pedologie, Seria C.

Vol. 20. Rumanian. p. 127-142. 1972.

The clay fraction of two smolnitza profiles (formed from alluvial-proluvial clay deposits) consisted mainly of montmorillonite and illite with a small amount of kaolinite and quartz.

0321

**Edwards, D. G.; Kang, B. T.**
Tolerance of cassava (Maninot esculenta Crantz) to high soil acidity. Field Crops Research. International Inst. of Tropical Agriculture, PMB 5320, Ibadan, Nigeria (B.T.K.).

Vol. 1 4. English. p. 337-346. 1978.

The tolerance to high soil acidity of two cassava cultivars was studied in a pot experiment with an acid ultisol (pH 4.25) and eight lime rates (0 to 6 t/ha). Fresh tuber yields obtained in the absence of lime were 84% in cv. Djukaniye and 79% in Apuwuru of the maximum yields obtained at moderate rates of lime (1 to 1.6 t). Fresh tuber yields were drastically decreased by lime rates above 1.6 t in Djukaniye, and above 2.5 t in Apuwuru. Leaf dry weights were little affected apart from a reduction in cv. Apuwuru at 5 t lime. The reduction in tuber yield at high lime rates was attributed to zinc deficiency. The considerable tolerance to high soil acidity of these two cultivars is discussed.

0322

**Ekambaram, S.; Kothandaraman, G. V.; Krishnamoorthy, K. K.**
Studies on the distribution of different forms of potassium in alluvial and black soils. Madras Agricultural Journal. Department of Soil Science and Agricultural Chemistry, Tamil Nadu Agricultural University, Coimbatore, India.

Vol. 62 5. English. p. 265-269. 1975.

Water-soluble and total K contents decreased with depth in the alluvial soil but not in the black soil. Exchangeable and nonexchangeable K contents generally decreased with depth in both soils.

0323

**El-Swaify, S. A.; Sayegh, A. H.**
Charge characteristics of an Oxisol and an Inceptisol from Hawaii. Soil Science. University of Hawaii, USA.

Vol. 120 1. English. p. 49-56. 1975.

Potentiometric and counter-ion adsorption techniques were used to study the effects of pH, electrolyte concentration, and phosphate treatment on charges associated with a Typic Gibbsihumox and a Typic Hydrandept. The methods did not agree on either the isoelectric points or the net charges associated with the soils. Furthermore, neither method provided data at pH 7 that are close to those obtained during routine cation exchange capacity determinations. The Gibbsihumox fitted the definition of a constant surface potential colloid in terms of the combined Nernstian-Stern theory treatment better than the Hydrandept did. The latter fitted the definition well when its surfaces acquired larger magnitudes of negative charge due to KH2PO4 treatment.

0324

**El-Swaify, S. A.**
Susceptibilities of certain tropical soils to erosion by water. Chichester, UK; New York, USA; Brisbane, Australia; Toronto, Canada; John Wiley & Sons. College of Agriculture, University of Hawaii, Hawaii, USA.

English. p. 71-77. 1975.

Soil Conservation and Management in the Humid Tropics (Greenland, D.J.; Lal, R., Editors). Soil erodibility factors, experimentally obtained by rainfall simulation, were used to evaluate the relative susceptibilities of selected Hawaiin Aridisols, Inceptisols, Oxisols, Ultisols, and Vertisols to erosion. Soil losses from a defined area of 1 ha as a result of a hypothetical 1 hr storm with a uniform intensity of 63.5 mm/hr were predicted by the universal soil loss equation. The susceptibilities of the soils to water erosion varied from very low (less than 14.6 tonnes/ha) to very high (more than 80.7 tonnes/ha). For most soils, susceptibility to erosion depended on the prevailing soil moisture regime. Nevertheless, in general it appeared that the Humoxic Tropohumult was the least, and the Entic Eutrandept the most, susceptible. The parameters and relationships that can be used successfully to predict soil losses from temperate soils were inadequate for these tropical soils.

0325

**Eltz, F L F; Grimm, S S; Fole, D A**
Efeito da calgem e da adubacao fosfatada sobre a produtividade da soja, em oxissolo da unidade de mapeamento Santo Angelo. Effect of lime and phosphate fertilizer on the productivity of soybeans in Oxisol of the Santo Angelo mapping unit. Agron Sulriograndense

Portuguese. 1975. Vol 11 (1). 37-44. Ref. Eng sum

0326

**Enava, S**
The relationship between the moisture potential and the moisture content in leached chernozem-smonitza. Nasterlevdni Nauki. Dpstna Stantsi,a po Polivno Zemledelie, Stara Zagora, Bulgaria

Vol. 13 (6). Bulgarian. p. 61-67. 1976.

In the Stara Zagora irrigation area, the availability of soil moisture between field capacity and the wilting point was indicated by the moisture characteristic. The limiting values for more easily, and more difficult, available moisture are established for the various genetic horizons of the soil

0328

**England, C B**
Moisture retention of cultivated and pastured mollisols and alfisols. Soil Sci Soc Amer Proc.

Jan/Feb 1971. Vol 35 (1). 147-149

0327

**England, C B**
Moisture retention of cultivated and pastured mollisols and alfisols. Soil Sci Soc Amer Proc

Jan/Feb 1971. Vol.35 (1). 147-149.

0329

**Erokhina, A.A.**
Genetical and geographical problems of the new American system of soil classification. Soviet Soil Science.

No. 6. English. p. 579-581. 1965.

Translated from the Russian: Pochvovedeniya, No. 6, p. 20-35, 1964.

0330

**Escolar, R.P.**
The effect of soil pH (hydrogen-ion concentration), and related acidity factors on yield of plantains (bananas) (cv Maricongo) grown on Los Guineos clay, and Ultisol. Journal of agriculture of the University of Puerto RicoPuerto Rico University

v. 63 (1). English. p. 22-26.- 111. Jan 1979.

Rio Piedras

0331

**Espinoza G, W; Riquelme F, E**
Caracterizacion quimica de dos Andepts (Trumaos) de la provincia de Nuble (Chile). Arrayan, Santa Barbara. Chemical characterization of two Andepts (Trumaos) soils of the Nuble Province (Chile). Arrayan and Santa Barbara Properties. Agric Tec

Spanish. Apr/June 1976. Vol.36 (2). 49-58. Ref. Eng sum

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**Espinoza, W; Gast, R G; Adams, R S Jr**
Charge characteristics and nitrate retention by two Andeptsfrom south-central Chile Soils. Proc Soil Sci Soc Am.

Sept/Oct 1975. Vol.39 (5). 842-846. Ref.

0333

**Espinoza, W; Rust, R H; Adams, R S Jr**
Characterization of mineral forms in andepts from Chile. Proc Soil Sci Soc Am.

May/June 1975. Vol.39 (3). 556-561. Ref.

0334

**Eswaran, H; Paramananthan, S; Sooryanarayana, V**
Soil families in peninsular Malaysia. Malays Agric J.

1977. Vol.51 (1): 15-28.

0335

**Eswaran, H.; Stoops, G.; De Paepe, P.**
A contribution to the study of soil formation on Isla Santa Cruz, Galapagos. Pedologie. State University, Rozier 44, B-9000, Ghent, Belgium.

Vol. 23 2. English. p. 100-122. 1973.

The soils have developed on basaltic lava flows and pyroclastic ash deposits. Conditions of soil formation and the genesis of secondary minerals are discussed. Under arid conditions on basaltic lava flows montmorillonite was dominant, with minor amounts of allophane and halloysite, the proportion of the latter increasing in the transition zone. Allophane was dominant in soils of the humid uplands on pyroclastic material. Micromorphological and scanning electron microscopy studies showed that the textural B horizon in the tropudult soil on ash deposits was formed by translocation of both crystalline and amorphous clay.

0338

**Eswaran, H., Sys, C.**
Micromorphological and mineralogical properties of the Quoin Hill toposequence. Pedologie. Geological Institute, Rozier 44, 9000 Gent, Belgium.

Vol. 26, 3. English. p. 289-291. 1976.

The micromorphology and mineology of soils in the Quoin Hill toposequence (Sabah, Malaysia) show variations which can be attributed to differences in weathering and soil formation, and related to the amount of moisture percolation as determined by the slope. The Inceptisol contains halloysite and some allophane which result in a conglic related distribution pattern and an isotic plasma fabric. The Alfisols and Ultisols contain more kaolinite and the NRDF is plasmic with sepic plasmic fabrics. In the Oxisols the clay is kaolinite with iron oxyhydrates, the related distribution is plasmic with strong agglutinic tendencies and the plasmic fabric is argillasepic to isotic.

0339

**Eswaran, H.; Sys, C.**
Physiographic and chemical characterization of the Quoin Hill toposequence (Sabah, Malaysia). Pedologie. Geological Institute, Rozier 44, B-9000 Ghent, Belgium.

Vol. 26, 2. English. p. 152-167. 1976.

The toposequence is formed by seven pedons located on the flanks of a mid-Pleistocene volcano. The soil moisture regime in all the pedons is udic, perhaps perudic in the lower members, and the soil temperature regime is isohyperthermic. On the steepest part, closest to the crater, the pedon is an Eutropept with some andic properties and downslope it is a Tropudalf. On the more undulating landscape of the lahar at the base of the volcano, the pedon has an argillic horizon and the percentage base saturation decreases gradually. On the flat old lava flow all the rain percolates into the soil and highly weathered Acrorthox has formed. Mathematical relationships are presented to show the variations of soil altitude properties with altitude.

0338

**Eswaran, H.**
Argillic horizon in LAC soils: formation and significance to classification. Pedologie.

Vol. 29, No. 2. English. p. 175-190. 1979.

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**Eswaran, H.**
Micromorphology of alfisols and ultisols with low activity clays. Second International Soil Classification Workshop, Proceedings.

Vol. 2. p. 53-76. 1979.

Soil Survey Division, Land Development Department, Proceedings.

0340

**Eswaran, H.**
Micromorphology of oxisols. Second International Soil Classification Workshop, Proceedings.

Vol. 1. p. 61-72. 1979.

Soil Survey Division, Land Development Department, Thailand.

0341

**Eswaran, H.**
Report of the International Comittee on Classification of Oxisols. Second International Soil Classification Workshop, Proceedings.

Vol. 1. p. 85-94. 1979.

Soil Survey Division, Land Development Department, Thailand.

0342

**Evans, C. E.; Wear, J. I.; Hajek, B. F.; Cope, J. T., Jr.**
The relationship of soil zinc removed by three extractants to zinc uptake by corn and sorghum in medium to fine-textured soils. Communications in Soil Science Plant Analysis. Auburn University, Alabama, USA.

Vol. 5, 2. English. p. 105-113. 1974.

and sorghum plants were grown in growth chambers in eleven fine textured soils (Hapludults, Hapludalfs and Paleudults pH 4.8 to 6.4). The pH was raised to 6.5 and nutrients other than Zn were supplied to all pots. Zn was applied at rates of 0 or 5.0 ppm. 0.05 N HCl + 0.025 N H2SO4 and 0.1 N HCl both extracted similar amounts of Zn from soil but DTPA-TEA extracted less. Zn application increased plant

Zn concentration but not plant yields.

0343

**Fadl, A E**
A mineralogical characterization of some Vertisols in the Gezira and the Kenana clay plains of the Sudan. J Soil Sci.

Mar 1971. Vol 22 (1) 129-135

0344

**Fadl, O. A A**
Evapotranspiration measured by a neutron probe on Sudan Gezira vertisols. Experimental Agriculture. Soil Science Section, Gezira Res Station, Wad Medani, Sudan

Vol 14 4 English p 341-347 1978

Daily measurements of moisture by neutron probe in a grass lawn (about 90% S.nodon dactylon) showed an erratic pattern of ET in the Sudan Gezira, attributed to the redistribution of water and development of cracks in a drying profile. However, dividing an irrigation cycle into periods of 3-5 days revealed a unique trend of ET that was consistent: low in the early period, increased to a maximum in the middle, and fell off at the end. Roots suffer from anaerobic conditions for about 5 days after flooding but subsequent drying and cracking improves soil aeration, this leads to final depletion of profile moisture and depression of ET.

0345

**Fairbourn, M. L., Gardner, H. R.**
Water-repellent soil clods and pellets as mulch. Agronom. Journal. US Department of Agriculture, Agricultural Research Service, Fort Collins, Colorado, USA

Vol 67 3 English p 377-380. 1975.

Water-repellent clods and pellets of a Mollisol soil (Nunn cla, loam) were tested in laboratory and field experiments to determine the potential for reducing soil water evaporation. Solutions of dialkyl quaternar, ammonium chloride (Arquad), and sodium methyl silanolate (R-20), were used either as a dip for soil clods and pellets or for mixing with the soil to form pellets. Seven treatments were tested by the wet sieve, alternate freezing and thawing, and alternate wetting and drying methods. The treatments were also exposed to the ambient climate. The most stable treatments, R-20 dipped clods, R-20 mixed pellets, and Arquad mixed pellets, were compared with treatments of gravel and bare soil in evaporation tests. The three soil clod and pellet treatments were durable for over 1 year, and each reduced cumulative evaporation with time compared with a bare soil. The R-20 mixed pellet mulch reduce the soil water evaporation rate with nearly the same efficiency as gravel and could save about 30% more precipitation for plant use than a bare soil.

0346

**Falayi, O; Bouma, J**
Relationships between the hydraulic conductance of surface crusts and soil management in a typic Hapludalf. Proc Soil Sci Soc Am.

Sept/Oct 1975 Vol 39 (5) 957-963. Ref

0347

**Falci, S. C.; Teixeira Mendes, A. C.**
Identification of cutans in an oxisol and an alfisol. Anais da Escola Superior de Agricultura "Luiz de Queiroz". E.S.A "Luiz de Queiroz", Universidade de São Paulo, Brazil.

Vol 30 Portuguese p 49-70. 1973.

Examination of thin sections of two oxisols and two alfisols revealed the presence of illuvial cutans in the B21 horizons of the oxisols, in the B1 and in part of the B21 horizons of one of the alfisols, and in the B21 and B22 horizons of the other alfisols.

0348

**Fanning, D.S.**
Theories of genesis and classification of highly man-influenced soils. International Congress of Soil Science, Transactions, 11th.

Vol. 1. p. 283-284. 1978.

(Abstract only).

0349

**Fares, F., Fardeau, J. C.; Jacquin, F.**
Quantitative survey of organic phosphorus in different soil types. Phosphorus in Agriculture. Centre d'Etudes Nucleaires, Cadarache, France.

Vol No 63. English. p. 25-40. 1974.

The organic P contents of an andosol, a humic ferruginous podzol, a brown leached soil, a vertisol, a brown calcareous soil, eutrophic mull and calcic mull were determined by the Saunders and Williams method (1955), the Mayaudon and Simonart method (1964) and the Bremner method (1962) as modified by Dormaar (1968). All three methods gave similar results. High organic P content was associated with high organic matter content. The organic P/organic C ratio was less than 10 except in the Ap horizon of the cultivated brown calcareous soil.

Organic P was mainly associated with the fulvic fraction and, except in the andosol, the humin fraction contained no organic P.

0350

**Farnham, R.S.**
Classification and properties of organic soils. Advances in Agronomy.

Vol. 17. English. p. 115-162. 1965.

0351

**Fassbender, H. W.**
Forms and content of arsenic in some tropical soils. Turrialba. Institute of Soils and Forest Nutrition, Gottingen University, German Federal Republic.

Vol. 25 1. Spanish. p. 11-17. 1975.

The volcanic ash soils of Colombia and Costa Rica contained an average of 5.1 and 7.0 ppm As. In some oxisols and ultisols from Puerto Rico the average content was 10.0 ppm. In two other Puerto Rican soils As reached exceptionally high values (over 100 ppm) probably due to precipitation from sea water in contact with carbonate and calcareous sediments. In a Costa Rican soil where As compounds were used to control coffee diseases, As increased in the upper horizon from 10.6 to 49.0 opm. The Fe- As-fraction represented the most important transformation product of applied arsenate.

0352

**Fehrenbacher, J B; Kleiss, H J; Sharma, A K; Jones, B A**
Gypsum improves corn yields on natric soils by removing sodium. Ill Res. EXP STN.

Spring 1972. Vol.14 (2): 3-4.

0353

**Fernandez Caldas, E; Cabezas-Viano, D; Tejedor-Salguero, M L; Rodriguez-Pascual, C**
Caracteristicas mineralogicas de la fraccion inferior a 2micras en Vitrandepts evolucionados. III; Mineralogical characteristics of the clay fraction (less than 2 microns) of developed Vitrandepts. III. Canary Islands. An Edafol Agrobiol.

Spanish. May/June 1977. Vol.36 (5/6): 449-468. Eng. sum.

0354

**Fernandez Caldas, E; Quantin, P; Rodriguez Pascual, C; Tejedor Salguero, M L**
Andosoles canarios. X. Vitrandepts. Caracteristicas mineralogicas. Interpretacion y clasificacion; Andosols of the Canary Islands. X. Vitrandepts. Mineralogical characteristics. Their interpretation and classification. An Edafol Agribiol.

Spanish. May/June 1975. Vol.34 (5/6): 395-405. Ref. Eng. sum.

0355

**Fernandez Caldas, E; Tejedor Salguero, M L; Hernandez Moreno, J**
Andosoles canarios. IX. Vitrandepts. Caracteristicas morfologicas y quimicas; Andosols of the Canary Islands. IX. Vitrandepts. Morphological and chemical characteristics. An Edafol Agribiol.

Spanish. May/June 1975. Vol.34 (5/6): 383-394. Ref. Eng. sum.

0356

**Fernandez Caldas, E.; Gutierrez Jerez, F.; Perez Mendez, J. A.**
Organic phosphorus in noncultivated soils of Tenerife. Anales de Edafologia y Agrobiologia. Centro de Edafologia y Biologia Aplicada de Tenerife, Canary Islands.

Vol. 34 11/12. Spanish. p. 883-902. 1975.

The P contents in fulvic acids, humic acids and humin, and the relations between C, N, total P and organic P were determined in samples of andosols, alfisols, vertisols, and andosol/oligotrophic brown earth intergrades.

0357

**Fernandez Caldas, E.; Hernandez Moreno, J.; Borges Perez A.**
The Q/I relationship for potassium in soils of different types of the Island of Tenerife. Potash Review. Centro de Edafologia de Tenerife, Santa Cruz, Tenerife, Canary Islands.

Vol. 4/58 4. English. p. 8 pp. 1975.

The Q/I relationships for potassium have been studied for the different soil types in the island of Tenerife. These curves are found to fall into groups according to the soil type, for the more developed horizons. The slopes of the 'quantity/potential' (Q/RT in ARK) curves, at ARKO, show a close correlation with the reserves of labile potassium in these soils. Only the soils of the vertisol group showed similar values for their exchange constants.

0358

**Fernandez Caldas, E.**
Microstructure of some Dystrandept (soils) on the island of Tenerife (Canary Islands). Anales de edafologia y agrobiologia.

v. 37 (3/4). Spanish. p. 303-313. - ill. Mar/Apr 1978

Madrid. -Instituto Nacional de Edafologia y Agrobiologia

0359

**Fernandez Caldas, E.; Rodriguez Hernandez, C. M.**
Vertisols developed on volcanic materials (Canary Islands). I. General characteristics. Anuario. Centro de Edafologia y Biologia Aplicada del C.S.I.C., Instituto de Orientacion y Asistencia Tecnica del Oeste, Salamanca, 1976. Centro de Edafologia y Biologia Aplicada, C.S.I.C., Tenerife, Canary Islands.

Spanish. p. 89-105. 1977.

The morphological, physical, chemical and mineralogical characteristics of these soils are described, with details on climatic and ecological conditions. Maps show the distribution of soil types, including vertisols, in Tenerife, La Palma and Gomera.

0360

**Fernandez Caldas, J.; Hernandez Moreno, J.; Borges Perez, A.; Trujillo, I.**
Parametros C/I de potasio en diferentes tipos de andepts de las Islas Canarias. Parameters of quantity to intensity in different types of andepts of the Canary Islands. Agrochimica.

Spanish. Jul, Sept 1976. vol. 20 (4/5). 364-372. Eng. sum.

0361

**Fernandez, C.; Szabo, I. M.**
Composition and properties of the actinomycete flora in a ferralitic tropical soil (Oxisol)-sugar cane ecological system. Zentralblatt fur Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene, II. Department of Microbiology, Biological School, University of Havanna, Cuba.

Vol. 133. 1. English. p. 34-44. 1978.

Streptomycetes constituted 46-48 per cent of the total aerobic microflora in the cultivated horizon of a Cuban ferralitic tropical soil under sugar cane. This streptomycete microflora consisted of 13 or more species. None of these organisms occurred on the root surface of sugar cane. The streptomycetes in the rhizoplane represented about 5% of the total bacterial flora there and consisted of two species.

0362

**Fernandez, J.; Iniguez, J.; Aguilar, J.**
Study of soils developed on cristalline rocks. I. Ojen-Mijas Area. II. Antequera Area. Anales de Edafologia y Agrobiologia.

Vol. 33. 11/12. Spanish. p. 1092-1107. 1974.

In the Ojen-Mijas Area morphological, micromorphological, mineralogical and chemical analysis showed that the soils are Haplustolls developing to Haplustalf, or Argiustolls. In the Antequera Area the soils are Entisols and Inceptisols. The clay mineralogy of all soils developed on serpentine rock in the Malaga regions is discussed.

0363

**Fernandez, J.; Iniguez, J.; Aguilar, J.**
Mineralogical study of the clay fraction of soils developed on cristalline rocks in the Cabo de Gata Area. Anales de Edafologia y Agrobiologia. Facultad de Farmacia de Granada, Granada, Spain.

Vol. 35. 11/12. Spanish. p. 1057-1066. 1976.

Illite and montmorillonite were the dominant clay minerals in the Entisols, Vertisols and Andisols of the area studied, and kaolinite and allophanes were also present in the Mollisols and Inceptisols.

0364

**Fey, M. V.; Roux, J. Le**
Properties and quantitative estimation of poorly crystalline components in sesquioxide soil clays. Clays and Clay Minerals. Dep. of Soil Science, Univ. of Natal, Pietermaritzburg, South Africa.

Vol. 25. 4. English. p. 285-294. 1977.

Sesquioxide soil clays from Oxisols in South Africa, Australia and Brazil, and two clays from Andosols in Japan and New Zealand, were investigated by selective dissolution techniques. Acid ammonium oxalate (pH 3) was superior to currently popular alkaline reagents for extracting amorphous aluminosilicates and alumina from these clays. Boiling 0.5 N NaOH dissolved large amounts of finely-divided kaolinite and halloysite, while hot 5% Na2CO3 reaction was too slow and insufficiently selective. On the other hand, synthetic gels (molar silica/alumina ranging from 0.91 to 2.55) dissolved completely after 2 hr shaking in the dark with 0.2 M acid ammonium oxalate. Specificity of oxalate for natural allophane was indicated by removal of similar quantities of silica and alumina using different clay:solution ratios. Oxalate extraction data indicated that allophane is absent in Oxisol

clays. Allophane was determined quantitatively in volcanic-ash soil clays by allocating hydroxyl water content to oxalate-soluble silica plus alumina on the basis of an ignition weight loss-chemical composition function for synthetic amorphous alumino-silicates. Parameters of chemical reactivity and distribution of electric charges following various chemical pretreatments of allophane corresponded closely with those predicted from synthetic gel behaviour. Results for Oxisol clays suggested that the role of amorphous alumina in governing physicochemical properties is generally less than that of the poorly-crystalline, Al-substituted iron oxide component which is removed by deferration with citrate-dithionite-bicarbonate.

0365

**Fierotti, G.**
The vertisols of Sicily. Quaderni di Agronomia.

No. 4. Italian. p. 117-163, map. 1967.

0366

**Fierotti, G.**
Uptake of nitrogen, phosphorus and potassium by lucerne under dry cultivation and different pedo-climatic environments. Quaderni di Agronomia. Istituto di Agronomia Generale e Coltivazione Erbacee dell' Universita di Palermo, Sicily, Italy.

Vol. No.7. Italian. p. 187-205. 1972.

In a four-year experiment, the respective N, P and K contents of 22 varieties of lucerne on a vertisol and a brown soil in the interior of Sicily did not vary much at a particular cutting date and on a particular soil, but the composition of a particular variety varied with cutting date. The N, P and particularly the K contents were higher on the vertisol than on the brown soil. Removal of N, P and K (kg/ha) by the crop was higher on the brown soil than on the vertisol. Average nutrient uptake per quintal of dry matter was 3.8 kg N, 0.6 kg P2O5 and 5.8 kg K2O. (331:221.03).

0367

**Fierotti, G.**
The utilization of slow-acting and traditional nitrogen fertilizers in clayey soils. Agrochimica. Istituto di Agronomia Generale, Palermo, Sicily, Italy.

Vol. 18 1-2. Italian. p. 69-78. 1974.

In a pot experiment, the total green yield of Italian ryegrass on soil from the ploughed layer of a vertisol was greater with Ca(NO3)2 and particularly with (NH4)2SO4, NH4NO3 or urea than it was with nitroform, uramite or floramide. The four mineral fertilizers increased the average percentage content of dry matter in the plants, but the three organic fertilizers did not. Utilization of the applied N averaged 27% for the organic and 65% for the mineral fertilizers. The amounts of fertilizer N removed by leaching were similar for all the fertilizers, but were nevertheless greatest for NH4NO3 and floramide. The N balance of the soil was negative in unfertilized soil and in soil to which mineral N was applied but was positive when organic N was applied.

0368

**Figarella, J.; Abruna, F.; Vicente-Chandler, J.**
Effect of five nitrogen sources applied at four rates to pangola grass sod under humid tropical conditions. Journal of Agriculture of the University of Puerto Rico. Soil and Water Conservation Research Division, US Department of Agriculture, Rio Piedras, Puerto Rico.

Vol. 56 4. English. p. 410-416. 1972.

Ammonium sulphate, urea, ammonium nitrate, urea + CaCO3 and calcium ammonium nitrate were applied at 0, 170, 340 and 510 lb N/acre to grass growing on an Ultisol under humid tropical conditions. Ammonium sulphate was the most efficient source of nitrogen and urea the least. Phosphorus, potassium, calcium and magnesium contents of Pangola grass were not affected by treatments. Exchangeable aluminium was increased and pH and exchangeable base content of the soil were decreased by ammonium sulphate and to a lesser extent by urea and ammonium nitrate.

0369

**Filho, W. M.; Buol, S. W.; Kamprath, E. J.**
Latosol roxo (Eutrustox) in Brazil. Phosphate reactions. Experientiae. North Carolina State University, Raleigh, USA.

Vol. 13 7. English. p. 235-247. 1972.

P sorption capacity and availability of sorbed P in the soil were investigated. Small aggregates and crushed samples had higher P sorption and availability. Most of the P was in a reductant soluble form. Free Fe oxides appeared to be a significant component in the sorption of P by the clays.

0370

**Filho, W. M.; Buol, S. W.**
Latosol roxo (Eutrustox) in Brazil. Clay mineralogy. Experientiae. North Carolina State University, Raleigh, USA.

Vol. 13 7. English. p. 218-234. 1972.

The soil clays were composed of >40% kaolinite and 20% Fe oxides. The differences between water dispersible and water stable clays are discussed. Kaolinite particles were smaller in

the water dispersible clay fraction.

0371

**Filipovski, G.**
Pedoturbation in some smolnitzas of Yugoslavia. Soviet Soil Science. Academ. of Sciences of Macedonia, Yugoslavia.

Vol. 6 3. English. p. 301-310. 1974.

Translated from Pochvovedenie (1974) No.6, 28-38. See also Soils and Fertilizers Volume 37, Abstract 3838.

0372

**Filipovski, G.**
Pedoturbation in some Yugoslav smonitzas. Pochvovedenie. Macedonian Academ. of Sciences, Yugoslavia.

Vol. No. 6. Russian. p. 28-38. 1974.

Pedoturbation is well marked in Macedonian smonitzas formed on carbonate lacustrine clays slightly permeable to water and rich in montmorillonite.

0373

**Fisher, R. F.**
Spodosol development and nutrient distribution under Hydnaceae fungal mats. Soil Science Society of America Proceedings. Illinois U. ersity, Urbana-Champaign, USA.

Vol. 36 3. English. p. 492-495. 1972.

Morphological and chemical properties of a sand soil (entic haplorthod) were determined under hyphal mats of Hydnellum sclerodontium in a 60-year-old jack pine stand. The hyphal mats occurred at the base of the O horizon and were approximately 1 m in diameter, 1-2 cm thick and occupied 1% of the land area. The O horizon was thinner above the fungal mats than in control soil and the colour of the A2 horizon under fungal mats was higher in value and lower in chroma. The B2 horizon under fungal mats contained less organic C and more extractable Fe and Al and the ratio of extractable C, Fe and Al to clay was greater than in control soils. In the A2 and B2 horizons below fungal mats total N was lower and extractable N higher than in surrounding soil. Extractable P, K, Ca and Mg were higher in the B2 horizons under fungal mats than in control soils.

0374

**Fisher, R.F.**
Juglone (produced by black walnut, Juglans nigra) inhibits pine (Pinus resinosa, Pinus strobus) growth under certain moisture regimes (Phytotoxicit,). Soil Science Society of America journalSoil Science Societ, of America.

v. 42 (5). English. p. 801-803. - ill. Sept/Oct 1978.

Madison, Wis., -The Societ,.

0375

**Fiskell, J G A; Mansell, R S**
Dependence of P phosphorus sorption in a Spodosol soil upon P rate, contact time, and deep tillage. Proc Soil Crop Sci Soc Fla.

1975. Vol.34. 34-38. Ref.

0376

**Fiskell, J G A; Reneau, R B**
Sodium and calcium selectivity in a spodosol. Soil Crop Sci Soc Fla Proc.

1970 (pub. 1971). Vol.30th: 158-166. Ref.

0377

**Fiskell, J. G. A.; Calvert, D. V.; Ford, H. W.; Rogers, J. S.**
Chemical composition and properties of discharge waters from jet cleaning tile-drain lines in a spodosol modified by tillage. Proceedings, Soil and Crop Science Society of Florida. Soil Science Department, University of Florida, Gainesville, USA.

Vol. 33. English. p. 150-154. 1974.

Water discharged from drains in surface tillage treatments was lowest in total solids and had highest redox values. Water from unlimed deep-tilled treatments was usually lower in total solids, organic matter, and $Fe^{2+}$ than water from limed deep-tilled treatments. Amounts of sludge removed by jet cleaning were quite small, indicating that any restriction to drainage was probably not in the drain itself.

0378

**Fiskell, J. G. A.; Calvert, D. V.; Sartain, J. B.**
Induced effects of flooding and nitrate addition on soil properties at various depths in a modified Spodosol. Proceedings, Soil and Crop Science Society of Florida. Soil Science Department, University of Florida, Gainesville, FL 32611, USA.

Vol. 35. English. p. 164-168. 1976.

Nitrate persistence and redox reactions were measured after flooding under laboratory conditions. A large number of soil cores were taken at five 15-cm intervals to 105-cm depth in a citrus experimental site to assess the effects of deep-tillage soil modifications with submerged or open-end tile drains. A comparison was made between sampling at the dripline and that between the beds. Despite differences in both texture and organic matter content, sample depths showed similar degrees of NO3-N recovery and variability of redox potential (Eh) although significant differences in pH, extractable Fe2+ and sum of extractable Ca2+, Mg2s and K+ were found. Nitrate addition resulted in higher Eh after 3 weeks of submergence. Between tillage treatments, profiles of deep-tilled soil had lower pH and higher Eh than those without deep tillage or with deep lime incorporation and NO3-N recoveries average 71.5, 61.4 and 64.7%, respectively. Significant but smaller differences were obtained for type of drain tile and sampling relative to the trees. Predicted log (NO3) values using Eh and pH in the thermodynamic equations for denitrification to N2, N2O, or NH4-N showed that all three pathways were probable and that most of the differences in predicted values were attributable to soil modifications like the above effects found for NO3-N recoveries. Although NO3-N was persistent over a 3-week period, denitrification proceeded at all depths sampled.

0379

**Fiskell, J. G. A.; Calvert, D. V.**
Effects of deep tillage, lime incorporation and drainage on chemical properties of spodosol profiles. Soil Science. Soil Science Department, University of Florida, Gainesville, Fort Pierce, Florida, USA.

Vol. 120 2. English. p. 132-139. 1975.

An experiment on a Spodosol (Alfic Haplaquods) was begun for a citrus scion-root-stock trial with three main soil treatments each one hectare in size, namely: shallow tillage (ST), deep tillage to 110 cm by a trenching machine (DT), and similar deep tillage with incorporation of 56 mt/ha of coarse dolomitic limestone applied on the surface. Soil samples were taken from narrow profiles of unmixed and those of deep-tilled soil on a DTL area upon opening of tenches for tile-drain installation. Saturated soil extracts were obtained from freshly taken samples and after incubation of subsamples with NH4-N. At depths below 10 cm, shallow lime incorporation resulted in different patterns of NO3 distribution, pH, soluble Ca and Mg, and in nitrification efficiency than in corresponding DTL soil. Nitrification resulted in large increases in acidity, amounts of Ca and Mg in solution, and loss of pH-dependent cation exchange. Another set of soil profile samples was taken from the main treatments 2 years after deep tillage. Redistribution of organic matter in A1 and Bh horizons in deep tilled profiles was within 25 percent variability of the expected mean values. Increase in P sorption capacity from near nil in A1 and A2 horizons of ST soil to mean values of 0.38 on 0.43 mM/100 g in DT and DTL soil was attributed mainly to Fe and Al incorporated with the clay from the B21 horizon. Cation exchange capacity was nearly doubled in all depths of DTL soil compared to those in DT soil. About 25 percent of the applied dolomite was unreacted, 40 percent was present as exchangeable Ca and Mg, and 35 percent not accounted for, presumably lost by leaching and outflow in 2 years. Recycling of drainage water by irrigation use is suggested to increase nutrient use efficiency and reduce ground water enrichment.

0380

**Fiskell, J. G. A.**
The effects of deep mixing and liming on cation selectivities of a spodosol. Proceedings, Soil and Crop Science Society of Florida. Soil Science Department, Florida University, Gainesville, USA.

Vol. 31. English. p. 223-228. 1971.

laboratory experiments the effects of addition of Na, K, Ca or Cu salt solutions on the cation selectivity of samples of surface soil, spodic horizons and soil tilled to 105 cm depth with or without the incorporation of lime were studied.

0381

**Fiskell, J.G.A.**
Effective cation selectivity by organic matter in spodosols. International Congress of Soil Science, Transactions, 11th.

Vol. 1. p. 201-202. 1978.

(Abstract only).

0382

**Fitzpatrick, R. W.; Le Roux, J.**
Mineralogy and chemistry of a Transvaal black clay toposequence. Journal of Soil Science. Department of Soil Science, University of Natal, Pietermaritzburg, Natal, South Africa.

Vol. 28 1. English. p. 165-179. 1977.

Margalitic soils (vertic and non-vertic black clays) were sampled along a 200 m toposequence in the Transvaal Highveld, South Africa. The Milkwood soil on the upper part of the margalitic toposequence has an A1 horizon which lacks both slickensides and self-mulching properties but has strong blocky structure, the others are all self-mulching (i.e. Vertisols). The Vertisols differ in some morphological properties such as the absence (Mngazi series) and presence (Arcadia series) of pedogenic

calcite accumulation, both overlying decomposed dolerite, whereas the third member from a red-black catenary sequence is calcareous with a gleyed subsoil horizon. Chemical and XRD analysis suggest that the clays of the Vertisols comprise mainly a partly chloritized iron-rich smectite with Fe + Mg + Al in the octahedral layer (and interlayer positions), while in the upland Milkwood soil intergradient halloysitic clay occurs in addition to a more 'open' structured chloritized iron smectite. The mineralo-chemical results and the geomorphic data suggest that the genesis of these soils is controlled primarily by the internal soil water regime.

0383

**Flach, K.W.**
Soil investigations and the seventh approximation. Soil Science Society of America, Proceedings

Vol. 27, No. 2, p. 226-228. 1963.

0384

**Flach, K.W.**
Classification of ash derived soils in the United States of America. World Soil Resource Reports.

No. 14. English. p. 111-114. 1965.

0385

**Florea, N., Edelstein-Heller, D.; Muntoanu, I.; Opris, M.; Popescu, F.; Cicotti, M.**
The compact chernozems of Northern Moldavia. Analele Institutului de Studii si Cercetari Pedologice 1971.

Vol. 39. Rumanian. p. 201-228. 1972.

Pedological, chemical and mineralogical data are presented for a compact chernozem than possesses vertisolic features but has a higher humus content than true vertisols.

0386

**Florea, N.**
Additions and changes of the 7th approximation. Stiinta Solului

Vol. 4, No. 2. Rumanian. p. 54-61. 1966.

0387

**Flores P., S.; Alvarado, A.; Bornemisza, E.**
Characterization and classification of some forest soils of the Amazon Basin, Iquitos, Peru. Turrialba. Univ. Amazonia Peruana, Iquitos, Peru.

Vol. 28 2. Spanish. p. 99-103. 1978.

Eleven soil profiles were studied from the Iquitos area in the upper Amazon Basin of Peru. Detailed information is given on three profiles representing the principal physiographic types (concave, convex and intermediate). The characteristic vegetation was mixed perennial forest, of a common type on the first soil, a 'varilla' type on the second, and intermediate on the third. Soils from the concave areas were Ultisols or Nitosols, while those from the convex areas were Spodosols or Podzols, with poor drainage. All soils were sandy, with low CEC, acidity and K content.

0388

**Folster, H.; Christen, H. Von**
The influence of quaternary uplift on the altitude zonation of mountain soils on diabase and volcanic ash in humid parts of the Colombian Andes. Catena. Inst. fur Bodenkunde und Waldernahrung, 34 Gottingen, Busgenweg 2, German Federal Republic

Vol. 3 3/4. English. p. 233-263. 1977.

Results are presented of a pedogeographic study of a humid tropical mountainous region (1000-4000 m) around Cali, Colombia. Parent materials are volcanic ash, ferrallitic and fersiallitic weathering products of diabase and mixtures of the latter in slope sediments. Stratigraphic and mineralogical studies of these slope sediments revealed a depositional sequence which could be related to climatic and ash-induced phases of geomorphic activity for which radiocarbon ages of the ash provided a chronological frame. The submontane and lower montane zones are characterized by extensive deep alterites and old piedmont sediments which were preserved on plateaus and benches during the geologically recent uplift. The clayey ferrallitic material strongly influences the character and zonation of soils, though due to the widespread admixture of allophanic material few of the soils qualify as Oxisols. The soils above 1000 m are humic, acid and cryptopodzolic. Humus accumulation and acidification increase with altitude. Allophane increases the humus content, reduces the exchangeable Al and favours non-crystalline Al accumulation in the subsoil. Free iron oxide tends to crystallize or recrystallize as goethite; its translocation occurs only in conjunction with hydromorphism. The Holocene soils are compared with Middle Pleniglacial paleosols, mainly Placaquepts, and differences in their pedogenesis and environment are discussed.

0389

**Ford, H W**
Biochemical and physical factors contributing to resistance in drain outflow in a modified Spodosol soil. Proc Soil Crop Sci Soc Fla.

1975. Vol.34 11-15. Ref.

0390

**Fox, R L**
Chemistry and management of soils dominated by amorphous colloids andepts. Proc Soil Crop Sci Soc Fla

1974. Vol 33 112-119. Ref.

0391

**Fox, R. H.; Badillo, J.; Del Valle, R.; Scott, T. W.**
Response of corn to phosphorus fertilization in greenhouse, sunken drums and field experiments. Journal of Agriculture of the University of Puerto Rico. Department of Agronomy, Cornell University, Ithaca, New York, USA.

Vol 60 1 English. p. 88-92 1976

Samples of the subsoil and surface soil of an Ultisol (Orthoxic Palehumult) low in available P were placed in sunken drums and planted to corn with and without added P. P response experiments also were carried out with the same soil in the field and in pots in the greenhouse. There was a significant yield and P uptake response to added P in the drum and pot experiments but not in the field, indicating that neither sunken drum experiments nor greenhouse pot tests substitute for field tests in determining response to P by corn.

0392

**Fox, R. H.; Talleyrand, H.; Bouldin, D. R.**
Nitrogen fertilization of corn and sorghum grown in oxisols and ultisols in Puerto Rico. Agronomy Journal Department of Agronomy, Cornell University, Ithaca, N.Y., USA

Vol. 66 4 English p. 534-540 1974.

Post plant applications of fertilizer N resulted in higher yields and higher plant recovery of fertilizer N than did preplant applications. Near maximum maize grain yields were obtained with 67 kg/ha of post plant applied N. Sulphur-coated urea was no more effective than urea in increasing yields or N recovery. The soil inorganic N content was not generally a good index of soil N supplying power in these soils.

0393

**Fox, R. L.; Nishimoto, R. K.; Thompson, R. S.; De la Pena, R. S.**
Comparative external phosphorus requirements of plants growing in tropical soils. Transactions, 10th International Congress of Soil Science, IV. College of Tropical Agriculture, University of Hawaii, USA.

English. p. 232-239. 1974.

The P requirements for adjusting soil solutions to 0.2 ppm were 0, 400, 900 and 2500 ppm for a Haplustoll, a Eutrustox, a Gibbsihumox and a Hydrandept. Yield curves for maize were similar for the different soils when relative yields were plotted against P concentration in soil solutions. Yields were 95% at 0.06 ppm P. The external P requirement was 0.003 and 0.1 ppm P in solution for 75% and 95% yield of sweet potato and was 0.4 ppm for 95% lettuce yields. Residual efficiencies of P following maize ranged from 65% for gel-like, Si depleted soil (Hydrandept) to 100% for a 2:1 clay rich in soluble Si.

0394

**Fox, R. L.**
Examples of anion and cation adsorption by soils of tropical America. Tropical Agriculture. University of Hawaii, Honolulu, USA.

Vol. 51 2. English. p. 200-210. 1974.

Phosphate, sulphate, potassium and calcium adsorption were studied in volcanic ash and ash derived soils from Costa Rica, soils from Colombia, a terra roxa from Brazil and a Nipe soil (highly weathered oxisol) from Puerto Rico. The cation adsorption curves indicate that small additions of K and Ca would raise the levels of these nutrients to suitable levels for plants in the case of the oxisols but the cation supplying capacity of the soils is low in general and particularly low in the case of the Columbian soils.

0395

**Franco, A. A.; Perez, J. R. R.; Nery, M.**
The use of Azotobacter paspali N2-ase (C2H2-reduction activity) to measure molybdenum deficiency in soils. Plant and Soil. EMBRAPA, Uepae de Itaguai, Km 47, 23460 Seropedica, Rio de Janeiro, Brazil.

Vol. 50 1. English. p. 1-11. 1978.

A microbiological test was developed to detect Mo deficiency in soils, based on the percentage increase in acetylene reduction activity of Azotobacter paspali growing in a defined medium with small amounts of soil. 36 out of 41 soils collected in Rio de Janeiro State showed a significant response to added Mo. Centrosema pubescens was grown in 16 of these soils. There was a positive correlation between the increase

in total plant N and the Azotobacter test in Ultisols and Oxisols but not in Entisols. A significant but less close correlatic. was found between Ammonium oxalate-extractable Mo and results of the Azotobacter test in 28 soils from Sao Paulo State.

0396

**Franzle, O.**
A morphodynamic model of savannah and rainforest regions. Zeitschrift fur Geomorphologie

Vol. Suppl.24. German. p. 177-184. 1976

Two specific morphodynamic models relative to tropical regions of low tectogenic and volcanogenic relief energ, are derived from a canonical geosystem model. (1) Due to low infiltration and high field capacities, luvisols and vertisols of savanna sites with a minor interception storage are characterised by a tendency for planation processes. (2) On porous varieties of ferralsols, acrisols and luvisols and on podzols of tropical and subtropical rain forest sites, streamflow erosion and piping are of primary importance, due to high infiltration but low field capacity. Localised planation processes are, as a rule, confined to plastic varieties of the above soil groups. The validit, of these models is tested by analysing formation and spatial structure of Swaziland soil associations, and is further corroborated by observations from other parts of South Africa and Brazil.

0397

**Franzmeier, D.P.**
Use of amorphous material to identify spodic horizons. Soil Science Society of America, Proceedings.

Vol. 29, No. 6. p. 737-743. 1965.

0398

**Frazier, B E; Lee, G B**
Characteristics and classification of three Wisconsin histosols. Soil Sci Soc Amer Proc.

Sept/Oct 1971. Vol.35 (5). 776-780. Ref.

0399

**Frei, E**
Andepts in some high mountains of East Africa. Geoderma.

Oct 1978. Vol.21 (2): 119-131. Ref.

0400

**Fridland, V.M.**
The logic of the new American system of soil classification. Soviet Soil Science.

NO. 6. English. p. 576-579. 1965.

Translated from the Russian. Pochvovedeniya, No.6,p.20-21,1964

0401

**Friesen, D.K.**
Lime-phosphorus-zinc interactions in two Nigerian ultisols. International Congress of Soil Science, Transactions, 11th.

Vol. 1. p. 378-379. 1978.

(Abstract only.)

0402

**Furtado, A. F. A. S.**
Mineralogy of vertisols derived from rocks of the Lisbon basaltic complex. Anais do Instituto Superior de Agronomia. Instituto Superior de Agronomia, Lisbon, Portugal.

Vol. 33. Portuguese. p. 125-136. 1972.

The coarse sand fraction consisted mostly of augite and opaque iron minerals. The fine sand fraction was dominated by aggregates and/or pseudomorphs and, in some profiles, by significant amounts of quartz. The presence of quartz, rutile, tourmaline and zircon indicated some contamination by foreign material. Plagioclase, augite, and saponite-like material were identified in the silt fraction. The clay fraction was dominated by a mineral belonging to the iron montmorillonite group, but small amounts of kaolinite and mica-like minerals were also present.

0403

**Gaikawad, S. T.; Goel, S. K.**
Statistical characterisation of soil profile trends. Journal of the Indian Society of Soil Science. Div. of Soil Science and Agric. Chemistry, Indian Agric. Res. Inst., New Delhi, (S.K.G.).

Vol. 25 3. English. p. 298-302. 1977.

Profile trends for sand, silt, clay, iron oxide, and organic C contents at two or three depths in the profile were established for ten Vertisol profiles belonging to the same soil series in Nagpur district, Maharashtra. Equations describing these changes with depth were developed and tested. Values for lime content and pH showed no clear depth trends. Variation due to site was generally nonsignificant.

0404

**Galeva, V.**
Similarity of hydro-physical properties of smonitza, meadow smonitza and cinnamonic-like smonitza soils. Pochvoznanie i Agrokhimiya. Institut po Pochvoznanie "N.Pushkarov", Sofia, Bulgaria.

Vol. 10 2. Bulgarian. p. 10-16. 1975.

The similarity of these three soil types manifests itself in their heavy texture - they all have equally high clay content in the root zone. The water holding capacity in the one-metre-deep soil layer is high (370-454 mm), but only 127-149 mm of it is available for plants. The permeability is in most cases low to very low ((1.4 X 10-4 cm/s.) and results from the very small or small volume of draining pores ((10 per cent) in the subsoil. Soil air relations are considered to be unfavourable.

0405

**Gallaher, R. N.; Perkins, H. F.**
Chemical and mineralogical changes in glaebules and enclosing soil with depth in a plinthic soil. Soil Science. University of Georgia, Athens, Georgia, USA.

Vol. 117 6. English. p. 336-342. 1974.

glaebules and soil in the surface horizon of a plinthic paleudult were both formed from material similar to subsurface material. The glaebules were formed by laterization while the soil horizons developed by podzolization. The differences between glaebules and soil thus increased towards the surface.

0406

**Gallaher, R. N.**
Soil water use and yield of corn and soybeans no-till planted in rye. Georgia Agricultural Research. Department of Agronomy, Georgia Experiment Station, Experiment, Georgia 30212, USA.

Vol. 19 1. English. p. 14-17. 1977.

In a one-year experiment on Typic Hapludult maize and soya bean which had been no-till planted in killed rye for mulch gave 45.6 and 30.3% greater yields respectively than when no-till planted in killed rye stubble following rye removal.

0407

**Gallali, T.; Guckert, A.; Jacquin, F.**
Distribution of amino sugars in soil organic matter. Bulletin de l'Ecole Nationale Superieure d'Agronomie et des Industries Alimentaires. ENSAIA, Nancy, France.

Vol. 17 1-2. French. p. 53-59. 1975.

In the range of soils studied it was possible, from the concentration of osamines present, to classify humus according to the biological activity and base saturation of the soil. A relationship was observed between the content of amino sugars and the presence of swelling or partially swelling clays (vertisol, pelosol), or the abundance of Ca2+ (chernozem, rendzina). From the percentage of N of amino sugars to total N, humus could be arranged into three categories: mor and moder 3.3-3.8%; mull of acid brown soils 6-7%; mull of saturated or isohumic soils 7-10%. The distribution of amino sugars between the various humified fractions showed significant variations between different soils. In all soils however, a preferential localization of osamines in the non-extractible or humin fractions was observed, with the proportions depending on the biological and physico-chemical characteristics of the soil and reaching 80 and 88% respectively in chernozem and pelosol.

0408

**Gallez, A.; Herbillon, A. J.; Juo, A. S. R.**
Characteristics of silica sorption and solubility as parameters to evaluate the surface properties of tropical soils: I. The index of silica reactivity. Soil Science Society of America Journal. International Inst. of Tropical Agriculture, Ibadan, Nigeria.

Vol. 41 6. English. p. 1146-1150. 1977.

A parameter derived from silica sorption capacity was used to describe the surface properties of southern Nigerian Alfisols and Ultisols. The index of silica reactivity (ISR) is ruled by the partial specific surface area due to iron oxides, and is highly correlated with the total BET-surface area for most of the soils studied. As a comparative index however, ISR suffers from its simultaneous dependence on both the magnitude and the nature of the sorbing surface.

0409

**Gallez, A.; Juo, A. S. R.; Herbillon, A. J.**
Surface and charge characteristics of selected soils in the tropics. Soil Science Society of America Journal. International Institute of Tropical Agriculture, Ibadan, Nigeria.

Vol. 40 4. English. p. 601-608. 1976.

The surface charge-pH curves of some Alfisols and Ultisols, an Inceptisol and a Vertisol from Nigeria, derived from gneiss, amphibolite, basalt, sandstone, alluvium and coastal sediments, follow the constant potential model with PZC values ranging from 3.0 to 3.9. Specific surface area measured by ethylene glycol retention was 2 to 3 times greater than that measured by N2 adsorption for both surface and subsoil samples.

0410

**Gallup, D.L.**
A new general soil map of the United States: a progress report. Soil Science Society of America, Proceedings.

Vol. 30, No. 2. p. 253-255. 1966.

0411

**Galzovsakaya, M.A.**
Application of the new American system of soil classification in Australia. Soviet Soil Science.

No. 6. English. p. 587-592. 1965.

Translated from the Russian: Pochvovedeniya, No.6,p.31-36,1964.

0412

**Gamble, E. E.; Daniels, R. B.**
Iron and silica in water, acid ammonium oxalate, and dithionite extracts of some North Carolina coastal plain soils. Soil Science Society of America Proceedings. Soil Conservation Service, US Department of Agriculture, Raleigh, North Carolina.

Vol. 36 6. English. p. 939-943. 1972.

The ratios of oxalate extractable iron to dithionite extractable iron from two Paleudults suggested that there was little accumulation of amorphous iron and that goethite may be the main iron oxide mineral. In the Paleaquult the active iron ratio of the grey matrix showed that the common fine yellow or brown flecks and mottles contained a high proportion of amorphous iron compounds. Water table level may be associated with the amorphous deposits.

0413

**Gammon, N Jr; Hal, N G**
Conditions favoring movement and surface accumulation of manganese in Haplaquods Soil. Proc Soil Crop Sci Soc Fla. OTHER US.

1978. Vol.37: 195-197.

0414

**Gammon, N., Jr.**
Zinc and manganese levels in successive saturated soil solution extracts from a Zn or Mn-treated Leon fine sand. Proceedings, Soil and Crop Science Society of Florida, University of Florida, Soil Science Department, Gainesville, FL 32611, USA.

Vol. 35. English. p. 98-101. 1976.

Soil samples from field plots on Leon fine sand (Aeric Haplaquod) previously fertilized with three Zn or five Mn sources were placed in Nalgene plastic filter units (0.2 mu ), deionized water was added to form a saturated soil paste, and after 24 hours the saturation extract was removed by vacuum filtration. Additions of more water and repeated filtrations were used to study the effect of successive replacements of the soil solutions. Frequent replacements resulted in decreasing quantities of Zn or Mn in the saturation extract. After the sixth replacement, the concentration of Zn in succeeding soil extracts was frequently below the detectable limit of 0.001 ppm. A delay of 2 or more days in making a successive extract increased the quantity in the soil extract. A 0.1 N HCl extract following a succession of saturation extracts removed almost as much Zn as could be removed by a similar extraction prior to the saturation extracts. The fact that Zn and Mn in the soil do not quickly dissolve to bring their concentrations back to the original levels in the saturated soil solution extract decreases potential leaching losses from excessive rainfall, but at the same time may limit the resupply of these nutrients to the plant root.

0415

**Gangopadhyaya, K.; Gupta, R. K.**
Distribution of wheat roots in deep vertisol at different stages of crop growth. JNKVV Jawaharlal Nehru Krishi Vishwa Vidyalaya Research Journal. Department of Soil Science & Agricultural Chemistry, J.N.Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh, India.

Vol. 8 3/4. English. p. 210-214. 1974.

About 53-59% of the roots of wheat var. Kalyansona were present in the top 10 cm of an irrigated deep clay vertisol. Root density at a given depth and root penetration increased up to the dough stage; root growth then ceased. The root-shoot ratio decreased as growth progressed.

0416

**Gantzer, C. J.; Blake, G. R.**
Physical characteristics of LeSueur clay loam soil following no-till and conventional tillage. Agronomy Journal. Minnesota Agric.Exp.Sta., Univ. of Minnesota, St.Paul, 55108, USA.

Vol. 70 5. English. p. 853-857. 1978.

In order to compare the effects of no-till with conventional fall plow tillage on a Minnesota clay loam soil (Aquic Argiudoll), some soil physical properties were measured 6 years after beginning a field experiment with corn. Soil under no-till had significantly greater bulk density in the surface 30 cm; lower air-filled porosities of surface samples at all potentials measured; and greater volumetric water-contents. Mean number of channels 1 mm

and greater created by earthworms and decomposed rootlets were significantly greater for no-till. Saturated hydraulic conductivities of spring surface samples were lower under no-till than conventional tillage. Generally, differences between treatments were smaller for samples collected in fall before harvest, than for spring samples. Significant differences for tillage treatments were not found below 30 cm depth.

0417

**Garber, M. C.**
Soil survey of Lee County, Mississippi. Washington, D.C., USA; US Department of Agriculture.

English. p. 72pp. 1973.

Twenty-six series (mainly ultisols, inceptisols, alfisols and entisols) are described and mapped on a scale of 1:20 000. Land use and management are recorded. Parent materials include marine deposits, alluvium and loess.

0418

**Garcia Burciaga, Gabriel**
El empleo del radiotrazador 65 Zn en el estudio de los compuestos organicos del zinc en la gallinaza y sus transformaciones al ser incorporada a un suelo arenoso (Vitrandept.) ... /; Gabriel Garcia Burciaga. --; The use of radioisotope traces 65 Zn in the study of Zn organic compounds in chicken's ordures and their transformation when incorporated in a sandy soil. Chapingo : Escuela Nacional de Agricultura, Colegio de Postgraduados.

Spanish. 1976. Vol.xv. 93 leaves : ill. -.

Bibliography: leaves 88 -93. RESPUESTA DE CINCO HIBRIDOS DE CACAO (THEOBROMA CACAO L.) A TOXICIDAD CAUSADA POR ALUMINIO EN SOLUCION NUTRITIVA Y EN UN OXISOL DE LOS LLANOS ORIENTALES

0419

**Garcia O. A.**
Response of five hybrids of cacao (Theobroma cacao L.) to toxicity caused by aluminum in a nutrient solution on an Oxisol of the eastern plains (Chemical composition, growth and nutrition of cacao, effects of fertilizers, Colombia). Revista Instituto Colombiano Agropecuario.

v. 13 (2). Spanish. p. 219-227.- ill. June 1978.

Bogota, -El Instituto.

0420

**Garcia, A.; Aguilar, J.; Delgado, M.**
Micromorphological study of soils developed on serpentine rock from Sierra de Carratraca (Malaga, Spain). Kingston, Ontario, Canada; Limestone Press. Department of Pedology, University of Granada, Spain.

English. p. 396-407. 1974.

Soil Microscopy (Rutherford, G.K., Editor). Profile morphology, micromorphology, particle-size distribution, physical and chemical properties and clay mineralogy were studied in four soils on serpentine representing various stages in development. Results indicated that development in the direction Entisols 'right arrow' Inceptisols 'right arrow' Mollisols was associated with increasing humification, with development of the cambric B horizon, and with formation of montmorillonite.

0421

**Garman, M; Hesse, P R**
Cation exchange capacity of gypsic soils. Plant Soil.

Apr 1975. Vol.42 (2): 477-480.

0422

**Garner, D. E.; Reeder, N. E.; Ernst, J. E.; Lerch, N. K.**
Soil survey of Warren County, Ohio. Washington, D.C. USA; US Department of Agriculture.

English. p. 115 pp. 1973.

Forty-six series (entisols, alfisols and mollisols) are described and mapped at a scale of 1:20 000, and engineering and land-use interpretations are given. Parent materials include limestones, shales, glacial deposits, lacustrine deposits and loess.

0423

**Gavaud, M.; Boulet, R.; Leveque, A.**
Soils of the Sudan-Saheli zone in the Lake Chad region of Senegal and principles of their characterization and interpretation. Transactions, 10th International Congress of Soil Science, VIII.

French. p. 123-130. 1974.

The most complete toposequences of the region show a regular succession of strongly indurated ferruginous soils, vertisols and planosolic soils. These toposequences are interpreted in terms of zonality, geomorphology and catenary effects.

0424

**Gawande, S. P.; Biswas, T. D.**
Characterisation and classification of black soils developed on basalt in relation to micro-relief. Journal of the Indian Society of Soil Science. Div. of Soil Science and Agric. Chemistry, Indian Agric. Res. Inst., New Delhi.

Vol. 25 3. English. p. 233-238. 1977.

Three soil profiles at Amaravati (Maharashtra) are described which show the typical characteristics of Indian black soils. Their position on a gentle slope had sufficient influence on depth of solum, colour, reaction, texture and lime content to allow different classification of the three profiles.

0425

**Gelderman, F W; Parsons, R B**
Argixerolls on late Pleistocene surfaces in northwestern Oregon. Soil Sci Soc Amer Proc.

Mar/Apr 1972. Vol.36 (2): 335-341. Ref.

0426

**Gentzsch, E P; Runge, E C A; Peck, T R**
Nitrate occurrence in some soils with and without natric horizons. Water pollution. J Environ Qual.

Jan/Mar 1974. Vol.3 (1): 89-94. Ref.

0427

**Gerard, C J; Reeves, S A**
Influence of climatic conditions and moisture levels on earliness and yields of different cotton cultivars on irrigated vertisols. Proc Beltwide Cotton Prod Res Conf.

1975. Vol.p. 76-78.

0428

**Gerard, C J; Reeves, S A**
Influences of N nitrogen and plant population on earliness and yields of early manuring cotton cultivars grown on irrigated vertisols. Proc Beltwide Cotton Prod Res Conf.

1975. Vol.p. 78-85. Ref.

0429

**Gerasimov, I.P.**
Application of the new American system of soil classification in western Europe. Soviet Soil Science.

No. 6. English. p. 586-587. 1965.

Translated from the Russian: Pochvovedeniya, No.6,p.30-31,1964.

0430

**Gerasimov, I.P.**
In the Scientific Council on Theoretical Problems of Soil Science: Discussion of the new American system of soil Classification. Soviet Soil Science.

No.6. English. p. 572-575. 1965.

Translated from the Russian: Pochvovedenie, No.6, p. 14-20, 1965.

0431

**Gerasimov, I.P.**
Summary judgement of the new American system of soil classification. Soviet Soil Science.

No. 6. English. p. 603. 1965.

Translated from the Russian: Pochvovedeniya, No.6, p.48, 1964.

0432

**Gerasimov, I.P.**
The new American soil classification. Soviet Soil Science.

No. 6. English. p. 572-575. 1965.

Translated from the Russian: Pochvovedenie,No.6,p.34-46, 1962.

0433

**Gersmehl, P J**
Soil taxonomy and mapping. Ann Assoc Am Geogr. OTHER US.

Sept 1977. Vol.67 (3): 419-428. Maps.

0434

**Ghitulescu, N.**
Diagnostic horizons. Stinnta Solului.

Vol. 4. No. 2. Rumanian. p. 48-53. 1966.

0435

**Ghitulescu, N.**
Considerations regarding the smolnitzas of the western part of the Rumanian Danube plain. Analele Institutului de Studii si Cercetari Pedologice 1971.

Vol. 39. Rumanian. p. 159-170. 1972.

Representative soil profiles of a typical smolnitza, a pseudogleyed smolnitza and a planosol with a dark coloured B-horizon are described and their morphological, physico-chemical and micromorphological properties are given.

0436

**Giddens, J.; Perkins, H. F.**
Essentiality of molybdenum for alfalfa on highly oxidized Piedmont soils. Agronomy Journal. College of Agriculture, Georgia University, Athens, USA.

Vol. 64 6. English. p. 819-820. 1972.

Field experiments on two highly oxidized udults in Georgia revealed that neither N at 67 kg/ha, nor lime at an initial rate of 11 200 kg/ha or annual application of 2240 kg/ha replaced the Mo requirement of lucerne. N increased crabgrass competition, resulting in less lucerne forage. Ca from CaSO4 with or without Mo did not maintain lucerne. MgCO3 and CaCO3 applied at equivalent rates were equally effective as liming materials. An initial lime treatment of 11 200 kg/ha produced yields equal to that obtained by annual applications of the same total amount of lime over a 5-yr period.

0437

**Gifford, G; Hancock, V B; Coltharp, G B**
Effects of gully plugs and contour furrows on the soil moisture regime in the Cisco Basin, Utah. J Range Manage. USDA.

July 1978. Vol.31 (4). 293-295.

0438

**Gil, J. R. V.; Scoppa, C. O.; Iniguez, A. M.**
Genesis of the soils of the northern part of the Samborombon Bay. Revista de Investigaciones Agropecuarias,3.

Vol. 9 1. Spanish. p. 29-52. 1972.

The soils were studied in relation to the geology and geomorphology of the area, and their clay mineralogy was compared with that of the parent materials. Four representative profiles are described and classified as vertisols, mollisols and alfisols.

0439

**Gile, L. H.**
Causes of soil boundaries in an arid region: II. Dissection, moisture, and faunal activity. Soil Science Society of America Proceedings. Texas Technical University, Lubbock, USA.

Vol. 39 2. English. p. 324-330. 1975.

In an area of southern New Mexico, differences in moisture movement have caused deep pipes of argillic horizon material that extend through petrocalcic horizons, resulting in boundaries between Typic Haplargids in the pipes and Petrocalcic Paleargids adjacent to the pipes. Runoff from fan-piedmonts increases vegetation and organic carbon in and along the margins of basin floors. This and associated increases in clay commonly result in a boundary between Typic Haplargids on the fan-piedmonts and Ustollic Haplargids on basin floors and adjacent toeslopes. Mixing by soil fauna has obliterated argillic horizons in some areas, resulting in a boundary between Argids and Orthids.

0440

**Gile, L.A.**
Morphology of the argillic horizon in desert soils of New Mexico. Soil Science.

Vol. 106, No. 1. p. 6-15. 1968.

0441

**Gile, L.H.**
Cambic and certain noncambic horizons in desert soils of southern New Mexico. Soil Science Society of America, Proceedings.

Vol. 30, No. 6. p. 773-781. 1966.

0442

**Giordano, P. M.; Mortvedt, J. J.**
Response of corn to Zn in ortho- and pyrophosphate fertilizers, as affected by soil temperature and moisture. Agronomy Journal. National Fertilizer Development Center, TVA, Muscle Shoals, AL 35660, USA.

Vol. 70 4. English. p. 531-534. 1978.

A study was made of the effects of soil temp. and moisture regimes on the uptake of Zn and P by maize from ZnSO4 granulated with ammonium ortho- and polyphosphate fertilizers and applied to Nolichucky scl (pH 7.6), a Typic Paleudult soil. In a series of glasshouse experiments, maize grown under various soil temp. (16 deg to 32 deg C) and moisture regimes (0.3 to 0.15 atm) showed a marked reduction in DM yield as well as in Zn and P uptake at low temp., but varying soil moisture levels had

little effect. Uptake of Zn was greater when triammonium pyrophosphate rather than monoammonium phosphate was the source of applied P, but uptake of P from the two P sources was comparable. Although lower Zn uptake appeared to be a function of depressed growth under cool soil conditions, it was likely that deficiency arose because early Zn requirements could not be met when the available Zn supply was low. Uptake and yield results further suggested that early growth retardation sometimes attributed to Zn deficiency during cool springs could also be related to suppression of P uptake.

0443

**Giskin, M; Levin, I**
Alternate drying and rewetting effects on chemical and physical properties and moisture-salinity relationships of a Histosol Soils. Agron J. OTHER US.

May/June 1978. Vol.70 (3): 445-447.

0444

**Glintic, M.; Perkovic, M; Stojanovic, Z.; Kovacevic-Tatic, R.**
Study of the amount and the form of phosphates in smonitsa soil of Serbia. Arhiv za Poljoprivredne Nauke. Soil Science Institute, Belgrade, Yugoslavia.

Vol. 26 93. Serbo-Croat. p. 129-139. 1973.

The pH, organic matter contents, texture, total P, Al-, Fe-, Ca- and available-P contents are given for the 0-20, 20-40 and 40-60cm depths of smonitsas from 14 sites. Mineral, organic, active, occluded and residual P contents and P soluble under reducing conditions are also given for 6 of the samples.

0445

**Glocker, C. L.**
Soil survey of Green County, Wisconsin. Washington, D.C., USA; US Department of Agriculture.

English. p. 161pp. 1974.

Seventy-eight series (mainly alfisols, mollisols and entisols) are described and mapped at a scale of 1:15 840. Land use and management of the soils are recorded. Parent materials include loess, glacial till, acid and calcareous outwash, dolomite, sandstone, and lacustrine and alluvial outwash.

0446

**Glokhuis, W A; Pape, T; Slager, S**
Morphology and distribution of pedogenic carbonate in some vertisols of the Sudan. Geoderma.

May 1969. Vol.2 (3): 173-200.

Bibliography: p. 199-200.

0447

**Godfrey-Sam-Aggrey, W.**
Effects of cutting lengths on sweet potato yields in Sierra Leone. Experimental Agriculture. Department of Agronomy, Njala University College, University of Sierra Leone.

Vol. 10 1. English. p. 33-37. 1974.

On gravelly oxisols of pH 4-4.8 cuttings 61 cm long gave the highest tuber yields of sweet potatoes when fertilized with 336 kg $(NH_4)_2SO_4$, 112 kg basic slag, 448 kg $K_2SO_4$, 841 kg lime and 340 kg Mg $SO_4$/ha, applied in two split applications at one month interval. Highest vine production was obtained with a total of about 200 kg $(NH_4)_2SO_4$/ha given in four equal split applications to 61 cm long cuttings.

0448

**Godfrey, C L; McKee, G**
Aridisols: light-colored soils of the desert shrub areas and desert grasslands. South Coop Ser. EXP STN.

Mississippi, Agricultural Experiment Station Arkansas, Agricultural Experiment Station Louisiana, Agricultural Experiment Station U.S., Soil Conservation Service. 1973. Vol.174: 42-45. Ref.

0449

**Godse, N. G.; Gopalakrishnappa, S.**
Studies on different forms of potassium in some black and red soils of Bellary. Bulletin, Indian Society of Soil Science. All India Soil and Land Use Survey, Bangalore, Karnataka, India.

Vol. No.10. English. p. 52-55. 1976.

Exchangeable, fixed, water soluble and HCl soluble potassium contents of vertisols and vertic soils are generally higher than those of alfisols and related soils. Potassium fixation capacity of soils was dependent upon the type of clay mineral present.

0450

**Goedert, W. J.; Beatty, M. T.**
Properties of grumusols in south-west Rio Grande do Sul. I. Adverse physical characteristics. Pesquisa Agropecuaria Brasileira. Institute de Pesquisas e Experimentacao Agropecuarias do Sul, Pelotas, Brazil.

Vol. 6. Portuguese. p. 91-102. 1971.

The soils studied occur on silt and clay in the central depression of Rio Grande do Sul. The physical characteristics of soils from 5 mapping units (Bage, Sao Gabriel, Acegua, Hulha Negra and Pirai) are described. All the soils showed high plasticity, high bulk density, low porosity, high volumetric expansion and high clay content. Cultivation problems are discussed, with some practical recommendations.

0451

**Goedert, W. J.; Beatty, M. T.**
Properties of grumusols in south-west Rio Grande do Sul. II. Mineralogy and pedogenesis. Pesquisa Agropecuaria Brasileira. Instituto de Pesquisas e Experimentacao Agropecuarias do Sul, Pelotas, Brazil.

Vol. 6. Portuguese. p. 183-193. 1971.

The mineralogical composition of the silt and clay fractions of 2 mapping units (Bage and Acegua) is tabulated. Montmorillonite was the predominant clay mineral. Large quantities of feldspars, quartz and micas occurred in various states of weathering in the different horizons. The tendency was towards the formation of the 2:1 type of clay minerals. Pedogenesis in both soils was highly associated with geomorphology, climate, and mineralogical composition of the parent material.

0452

**Goedert, W. J.; Beatty, M. T.**
Properties of grumusols in south-west Rio Grande do Sul. III. Morphology and classification. Pesquisa Agropecuaria Brasileira. Instituto de Pesquisas e Experimentacao Agropecuarias do Sul, Pelotas, Brazil.

Vol. 6. Portuguese. p. 243-251. 1971.

The morphological characteristics of soils from the 5 mapping units are described and their classification is discussed. In the American 7th Approximation system, The Acegua soil is classified as a Vertisol, and the other 4 soils as Mollisols. Five representative profiles are described.

0453

**Goedert, W. J.**
Cation equilibria in soils of Rio Grande do Sul, Brazil. Potash Review.

Vol. 5/37 2. English. p. 2pp. 1975.

Equilibration with 0.001 M SrCl2 solution is proposed for the estimation of the availability indices of K, Ca and Mg in weathered ultisols and oxisols.

0454

**Gomes, A. S.; Cabeda, M. S. V.**
Consistency of dark clayey soils from Rio Grande do Sul. Agricultural significance. Campinas, Brazil; Brazilian Society of Soil Science. Universidade Federal de Pelotas, Brazil.

Portuguese. p. 31-34. 1976.

Annals of the Fifteenth Brazilian Congress of Soil Science. The moisture content of 3 montmorillonitic soils (one vertisol and two mollisols) corresponding to their plastic limit(PL) varied from 2.1 to 30.7%. In each soil, increase in PL was associated with increase in organic matter content. The effects on root development, infiltration and cultural practices are briefly discussed.

0455

**Gonzalez E, E; Wolf, J M; Naderman, G; Soares, W V; Galrao, E Z**
Relacoes entre toxidez de aluminio, desenvolvimento de raizes, absorcao de agua e producao de milho num Oxisol (Latosol vermelho escuro) do Distrito Federal; Relations between aluminun toxicity, root development, water absorption and corn production in an Oxisol (Latosol vermelho escuro) of the Federal District. Cienc Cult Soc Bras Para Progr Cienc.

Portuguese. Feb 1976. Vol.28 (2): 181-182. Eng. sum.

0456

**Gonzalez Martinez, S P; Besoain Monasterio, E**
Minerales 2:1 y 2:2 en suelos volcanicos de Chile. 1. Andepts; 2:1 and 2:2 type minerals in volcanic soils of Chile. 1. Andepts. Cienc Invest Agrar.

Spanish. July/Dec 1975. Vol.2 (3/4): 169-178. Ref. Eng. sum.

0457

**Gonzalez-Molina, C.; Perez, M.; Ramirez-Oliveras, G.**
Performance of commercial sugarcane varieties in the Aguirre cla, soil of the Lajas Valle, Journal of Agriculture of the University of Puerto Rico. Agric. Exp. Station, Mayaguez Campus. Univ. of Puerto Rico, Rio Piedras

Vol. 61 2. English. p. 126-136. 1977

The data recorded during a plant cane crop and the first ratoon of an irrigated experiment established on Aguirre cla,, a vertisol of the Lajas Valley,, indicate that NCo 310, PR 980 and PR 1013 performed better than the other commercial varieties based on sugar production. Agronomic characteristics, such as germination and ratooning ability,, number of stalks per linear foot, and resistance to deterioration, were also determined.

0458

**Goodland, R.**
The cerrado oxisols of the Triangulo Mineiro, Central Brazil. Acad Brasil Cienc An.

June 30, 1971. Vol.42 (2). 407-414. Ref.

0459

**Gorbunov, N. I.; Abrukova, L. P.**
Rheological properties and mineral composition of compact soils. Soviet Soil Science. V. V. Dokuchayev Soil Institute. USSR

Vol. 6 4. English. p. 481-492. 1974.

Translated from Pochvovedenie (1974) No 8, 74-85. See also Soils and Fertilizers Volume 38. Abstract 2619

0460

**Gorbunov, N. I.; Abrukova, L. P.**
Rheological properties and the mineralogical composition of compact soils. Pochvovedenie Pochvenn,t Institut Im. V. V. Dokuchaeva, USSR

Vol. No 8. Russian. p. 74-85. 1974

Compact chernozems from the Krasnodar region and Bulgarian smonitzas are rheologicall, almost identical, and have a predominantl, thixotropic structure. The factors responsible for the formation of a thixotropic structure are discussed.

0461

**Goswami, K. P.; Green, R. E.**
Microbial degradation of ametryn in Hawaiian Torrox and Hydrandept surface soils. Soil Science Societ, of America Proceedings. Universit, of Hawaii, Honolulu, USA.

Vol. 39 4. English. p. 669-673. 1975

Degradation of ring-14C ametryn in two autoclaved and inoculated surface soils with added C and N sources was measured for 60 days in a 14C balance stud,. Ametryn degradation in these tropical soils was found to be predominantl, a nonpreferential microbiological process, with rapid accumulation of polar products from ametryn and slow decomposition to CO2. Ametryn disappearance was more rapid in Hilo (Typic Hydrandept) soil than in Molokai (Typic Torrox) soil.

0462

**Gowaikar, A. S.; Datta, N. P.**
Influence of moisture regime on the genesis of laterite soils in South India. I. Morphology and chemistry of the soils. Indian Soc Soil Sci J.

Sept 1971. Vol.19 (3). 279-291. Ref.

0463

**Gowaikar, A. S.**
Influence of moisture regime on the genesis of laterite soils in south India. II. Clay composition and mineralogy. Indian Soc Soil Sci J.

Mar 1972. Vol.20 (1). 59-66. Ref.

0464

**Gowaikar, A. S.**
Influence of moisture regime on the genesis of laterite soils in South India. III. Soil classification. Journal of the Indian Society of Soil Science. Indian Agricultural Research Institute, New Delhi, India.

Vol. 21 3. English. p. 343-347. 1973.

Alfisols, inceptisols and ultisols occur respectively under low rainfall conditions, high and excessive rainfall with continuous dry period of five months, and prolonged high rains and continuous dry period of three months.

0465

**Gray, F; Otsuki, H**
Mollisols: dark-colored soils of the grasslands. South Coop Ser. Exp STN

Mississippi, Agricultural Experiment Station
Arkansas, Agricultural Experiment Station
Louisiana, Agricultural Experiment Station
U.S., Soil Conservation Service. 1973. Vol.174 46-51. Ref.

0466

**Gray, F., Nance, E.**
Modern detailed soil survey, Lake Carl Blackwell experimental range area. Research Report, Agricultural Experiment Station, Oklahoma State University, Oklahoma State University, USA

Vol. P-763. English. p. 40 pp. 1978

The soils of the 486 acre area are on alluvium shales with siltstone lenses and sandstone. Soils are classified as Typic Natrustolls, Vertic Haplustalfs, Udertic Paleustolls, Udic Ustochrepts, Pachic Argiustolls, Udic Argiustolls, Cumulic Haplustolls, Typic Ustifluvents and Udic Haplustolls. Typical samples are described and analyses are given.

0467

**Gray, F.; Nance, E.**
Modern detailed soil survey, Environmental Research watershed, Noble County. Research Report, Agricultural Experimental Station, Oklahoma State University, Oklahoma State University, USA

Vol. P-764. English. p. 34 pp. 1978

The soils of the 137 acre area are classified as Udertic Paleustalfs, Udic Ustochrepts, Vertic Haplustalfs, Typic Haplustolls, Udertic Paleustolls and Ultic Haplustalfs. Typical samples are described and analyses are given.

0468

**Gray, F.**
Characteristics of a new classification of key soils developed in the old reddish chestnut zone of Oklahoma. Technical Bulletin.

No. T-122. pp. 48. 1968

Oklahoma Agricultural Experiment Station.

0469

**Grossman, R.B; Fehrenbacher, J.B**
Distribution of moved clay in four loess-derived Alfisols that occur in southern Illinois. Soil Sci Soc Amer Proc.

Nov/Dec 1971. Vol 35 (6). 948-951. Ref.

0470

**Grube, W. E.; Smith, R. M.; Singh, R. N.**
Interpretation of mottled profiles in surficial Ultisols and fine-grained Pennsylvanian age sandstones. "Pseudogley and Gley" Transactions of Commissions V and VI of the International Society of Soil Science. West Virginia University, Morgantown, USA

English. p. 255-262. 1973.

High chroma mottling on sediment sandstone parent rock underlying the soil profiles originated from oxidation of authigenic pyrite observable in low chroma sandstone below about six metres depth. Low chroma "bleached" streaks in the lower Bx and C soil horizons are zones of intense leaching of ped and rock faces. The soil clay mineralogy reflects the clay mineralogy of the underlying sandstone parent material. Locally significant variations in the properties of the Lower Mahoning sandstone account for the development of three different Great Groups of soils (Dystrochrepts, Fragiudults, Hapludults).

0471

**Guedez, J. E., Langohr, R.**
Some characteristics of pseudo-silts in a soil-toposequence of the Llanos Orientales (Venezuela). Pedologie. Ministerio del Ambiente y de los Recursos Naturales Renovables, Callejon Cantarrana, 16, Las Delicias, Maracay, Venezuela.

Vol. 28 1. English. p. 118-131. 1978.

After routine dispersion with Na metaphosphate without preliminary extraction of Fe, Al or Si, the B horizons of a toposequence that consists of Ultisols, Oxisols and Entisols and that was formed in fairly sandy sediments deposited in the Early Pleistocene by the river Orinoco contain appreciable amounts of pseudosilt (aggregates). The highest percentage content of pseudosilt occurs in the argillic horizon, less occurs in the oxic horizon, and much less in the coloured B horizon. In the argillic horizon the pseudosilt consists mainly of strongly birefringent fragments of clay cutans; in the oxic and coloured B horizon the aggregates are more heterogeneous and less birefringent. The 15-bar moisture content suggests that the pseudosilt behaves mainly as silt particles and would thus have little effect on the water-holding capacity of the soil.

0472

**Guerra, A; Benayas, J**
Phenomena of iron mobilization overlying buried alfisols in some soils of Central Spain. In Paleopedology: Origin, Nature and Dating of Paleosols. Papers.

1971. Vol.p. 283-292.

0473

**Guerrero, G.**
Report on a "state of the art" (SOTA) stud, on soil taxonomy in the tropics. First International Soil Classification Workshop. Proceedings.

p. 64-686. 1978. EMBRAPA-Servicio Nacional de Levantamento e Conservacao de Solos, Brazil

0474

**Guerrero, R.**
Soil taxonomy in tropical America. Second International Soil Classification Workshop. Proceedings

Vol. 2. p. 185-199. 1979.

Soil Survey Division, Land Development Department, Thailand.

0475

**Guillet, B.; Rouiller, J.; Souchier, B.**
Podzolization and clay migration in spodosols of eastern France. Geoderma. Centre de Pedologie, C.N.R.S., Vandoeuvre-les-Nancy, France.

Vol. 14 3. English. p. 223-245. 1975.

An iron podzol developed under forest (I) and an iron-humus podzol developed under forest followed by health vegetation (II) were studied. For (I) the data support the hypothesis of illuviation of fine micaceous clays (vermiculite), especially of ferriargillans in the Bh horizon. Consequently the illuviation of the greatest part of clays promoted differentiation of podzol horizons. In (II) the identified clay minerals were the same as in (I) but the pedological features in the Bh horizon corresponded to those of classic spodic horizons, and podzolization was geochemically strongly subtractive. It was concluded that the first phase of forest soil genesis was regulated by the double process of clay illuviation and redistributive podzolization. The following degradation phase, related to the heath vegetation and to abundant chelating organic compounds, induced the disruption of ferriargillans previously formed in the Bh horizon, the formation of an agglomero-plasmic fabric microstructure, and the elimination of hydrolyzed products of minerals from the profile. During this last phase, a strongly subtractive podzolization prevailed over clay illuviation.

0476

**Gumbs, F. A.; Byam, L.**
Prediction of soil water content changes in Pangola grass pastures. Tropical Agriculture. Department of Soil Science, University of the West Indies, St. Augustine, Trinidad.

Vol. 53 1. English. p. 31-40. 1976.

A simple method is used to predict soil water content changes in irrigated and non-irrigated Pangola grass (Digitaria decumbens Stent.) pastures on Piarco fine sand soil series (Aquoxic Tropudults). Soil water content changes were determined by adding the effective rainfall and the amount of irrigation applied to the initial or previously calculated soil water content and subtracting the soil water depletion (SWD) calculated from the regression of SWD and total open pan evaporation. Soil water content changes over 3-, 4-, 5- and 7-day intervals were predicted from data measured over the corresponding time intervals. All predictions were good but predictions over 4-day intervals gave the highest correlation coefficients and the best coincidence with measured values. Soil water content changes were also accurately estimated over 7-day intervals using total open pan evaporation from a location about 9 km away, and using evaporation from an open water surface calculated by the method of Penman. The method and equations proposed can therefore be used to schedule irrigation of Pangola grass on this soil type

0477

**Gupta, G. P.; Singh, D.**
The response of wheat to soil application of zinc and copper on the black cotton soils of Madhya Pradesh. Indian Journal of Agricultural Chemistry. Agriculture Research Institute, Gwalior, India.

Vol. 5 2. English. p. 93-97. 1972.

was treated in field trials with 4.48-13.44 kg/ha Zn and Cu as sulphates. Grain yields were increased by 4.48 kg Zn and by 8.96 kg Cu; higher rates were toxic and depressed yields. Cu and Zn also increased the crude protein content of the grain.

0478

**Gupta, J P; Abrol, I P**
A study of the effect of soil compaction and moisture regimes on the growth and chemical composition of maize plants. Indian Soc Soil Sci J.

Dec 1970. Vol.18 (4). 397-403. Ref.

0479

**Gupta, R. K.; Bhatia, S. C.**
Dependence of air permeability of black cla, soil on moisture content and bulk density. Journal of the Indian Society of Soil Science. Department of Soil Science and Agricultural Chemistr,, J.N. Agricultural University, Jabalpur, Madhya Pradesh, India

Vol. 23 3. English. p. 280-285. 1975

Air permeability of a black cla, soil was determined on artificially packed soil cores following in the bulk density and moisture content ranges of 1.25 to 1.45 g/cm3 and 10 to 45% by volume, respectively. The air permeability values were within 12 x 10-8cm2. Air permeability decreased nonlinearly, with moisture content at relatively low bulk densities and with bulk density at moisture contents below 36%. The most rapid decline was observed in the moisture content range of 22 to 36%. The behaviour of air permeability at various combinations of moisture content and bulk density was attributed to (a) reduction in air-filled porosity, with increase in moisture content coupled with swelling of the solid phase at the expense of void space, (b) maximum swelling effects in the moisture content range of 22 to 36% by volume at relatively low bulk densities and (c) change in pore size distribution on compaction of the soil.

0480

**Gupta, R. K.; Jaggi, I. K.**
Seasonal water flux below the root zone of wheat as influenced by frequency of irrigation. Indian Journal of Agricultural Sciences. J. N. Krishi Vishwa Vidyalaya, Jabalpur 482 004, M. P., India

Vol. 48 1. English. p. 34-37. 1978

Wheat cv. Kalyan Sona was grown on a deep black vertisol and received 1, 3 or 4 irrigations. Downward moisture flux prevailed for 57, 58 and 87 days after sowing under 1, 3 and 4 irrigations resp., but the integrated seasonal flux was negligible with 1 and 3 irrigations. With 4 irrigations the wheat crop lost 5.7 cm of water (equivalent to 1 irrigation) across the lower root zone in the 110-day growing season. Water-use efficiency and grain yield were 92.8, 94.1, and 94.2% and 3.30, 4.08 and 4.05 t/ha for 1, 3 and 4 irrigations resp. Study of water movement below the root zone and the prevailing soil moisture regime was found to be necessary before scheduling irrigation.

0481

**Gupta, R. P.; Mishra, B.**
Phosphorus availability from rock phosphate as influenced by pyrites, wheat straw and superphosphate to maize-clover on a mollisol. Acta Agronomica Academiae Scientiarum Hungaricae. Dep. of Soil Sci., G.B. Pant Univ. of Agric. and Tech., Pantnagar 263 145, U.P., India

Vol. 27 1/2. English. p. 126-132. 1978.

In glasshouse pot experiments with Mussoorie rock phosphate and maize and berseem as test plants, the addition of low-grade pyrites or wheat straw (as sources of acid) brought about only modest improvement in efficiency over a range of P levels. Rock phosphate alone, rock phosphate with pyrites (1:5) or rock phosphate with wheat straw were less efficient than superphosphate alone at the same levels of total P. A 1:1 rock phosphate.superphosphate mixture was also less effective than superphosphate at the same P level. Uptake of Ca by berseem was closely correlated with the uptake of P (r = 0.83). Residual values of P, determined as extractable P in 0.5 M NaHCO3, after the harvesting of maize plants, were closely related to the subsequent P uptake by berseem.

0482

**Gupta, U S; Gupta, R K**
Influence of soil moisture regimes and soil fertility levels on water use by summer fodder maize. Mysore J Agric Sci.

1975. Vol.9 (3). 408-414. Ref.

0483

**Guthrie, R. L.; Hajek, B. F.**
Morphology and water regime of a Dothan soil. Soil Science Society of America Journal. USDA Conserv. Serv., Auburn, Alabama, USA.

Vol. 43 1. English. p. 142-144. 1979.

The water regime in a Dothan soil was characterized by installing piezometers at 137-, 183-, and 285-cm depths. Monthly water table measurements differed for each piezometer throughout a 4-year study period, indicating a perched water table. There was a water table at the greatest depth on only five occasions during the study period. On all but a few occasions, a water table was encountered at the two shallower depths. Morphological properties and seasonal precipitation were related to the water regime. The perched water table fluctuated in a continuous zone of saturation in the B horizon above the horizons containing appreciable amounts of plinthite. A discontinuous zone of saturation is bounded on the bottom by the B3 horizon. The piezometer that had perforations in the C horizon showed no water table, which indicated that a "dry"

zone exists between the perched and regional ground-water tables. Fluctuations in the depth to perched water corresponded to seasonal precipitation patterns.

0484

**Guzel, N.; Kapur, S.**
Soil-geomorphology relationships on the terraces of the Ceyhan River. Ziraat Fakultesi Yilligi, Cukurova Universitesi, Dep. of Soil Science, Fac. of Agriculture, Univ. of Cukurova, Turkey.

Vol. 7 2. English. p. 117-143. 1976.

Physical and chemical properties of seven distinct profile types formed on alluvial deposits of the Ceyhan River terraces are presented. Differences in profile development are largely attributable to time. The major pedogenetic processes appear to be dissolution of calcium carbonate in the upper layers and accumulation of organic matter. Some of the profiles show a self-mulching effect which probably results from abundant montmorillonitic clay, together with organic matter and free calcium carbonate. These factors have retarded profile development to the extent that there is no recognisable B horizon in the Vertisols.

0485

**Gyurov, G.; Petkov, I.**
Mineral composition of leached chernozems in north-western Bulgaria. Kolarov Institute of Agriculture, Plovdiv, Bulgaria.

Bulgarian. p. 389-393. 1972.

Pervi Natsionalen Kongres po Pochvoznanie, Bulgaria, 1969. In heavy chernozems and leached smonitzas developed over Pliocene material, SiO2 contents decreased, and R2O3 K, Ca and Mg increased with decreasing particle-size. The fine-sand fractions were richest in organic matter, and the silt fractions contained predominantly montmorillonites with slight admixtures of hydromicas and kaolinite. The chemical and mineralogical composition of these soil types was similar and both showed relatively slight weathering.

0486

**Haantjens, H.**
Use of the 7th approximation in the soil classification of the Safia-Pongani area. Commonwealth Scientific and Industrial Research Organization, Land Research Series.

No. 17. p. 194-197. 1967.

0487

**Haantjens, H. A.**
Lands of the Aitape-Ambunti Area, Papua New Guinea. Land Research Series. CSIRO Australia.

Vol. No.30. English. p. 243 pp. 1972.

Sixty-five land systems and vegetational units are described and mapped at a scale of 1:250 000. Soil associations (43 units representing histosols, aquents, udents, umbrepts, aquepts, ochrepts, rendolls, udolls, udalfs, ochrults, aquults and argox) and land use capability categories (16) are mapped at a scale of 1:500 000.

0488

**Haberman, R. L.; Dodge, D. A.; Baumann, J. B.**
Soil Survey of Hodgeman County, Kansas. Washington, D.C., USA; US Department of Agriculture.

English. p. 56 pp. 1973.

Eighteen series (mainly mollisols and entisols) are described and mapped at a scale of 1:24 000. Parent materials include loess, outwash material and alluvium.

0489

**Hadas, A.; Wolf, D.; Meirson, I.**
Tillage implements - soil structure relationships and their effects on crop stands. Soil Science Society of America Journal. Division of Soil Physics, Institute of Soils and Water, The Volcani Center, Bet Dagan, Box 6, Israel.

Vol. 42 4. English. p. 632-637. 1978.

As a result of various cultivation measures (ranging from shallow ploughing to deep ploughing and subsoiling) on fine loams to silty loams of aeolian origin and on brown vertisols of alluvial origin (Israeli coastal plain) it was concluded that the mean aggregate size distribution could be used to help correlate tillage effects on soil structure with the energy expenditure. Stand differences as a result of seedbed tillage operations did not seem sufficient to affect yields significantly. It therefore appears that seedbed tillage could be restricted to the rows to be planted, which may represent only 10% of the total area in the case of cotton and sorghum.

0490

**Haidar, M.**
Influence of soil moisture regimes and organic matter application on the extractable Zn (zinc) and Cu (copper) content in rice soils. Plant and soil.

v. 53 (1/2). English. p. 203-213.- 111. Oct 1979.

The Hague. -Nijhoff.

0491

**Hall, R. L.**
Soil Survey of Worcester County, Maryland. Washington, D.C., USA; US Department of Agriculture.

English. p. 78 pp. 1973

Sixteen series (ultisols, entisols, spodosols and inceptisols) are described and mapped at a scale of 1:15 840, and engineering and land-use interpretations are given. Parent materials include glacial and marine deposits and alluvium.

0492

**Halvorson, A. D.; Black, A. L.**
Saline-seep development in dryland soils of northeastern Montana. Journal of Soil and Water Conservation. Department of Agriculture Research Service, Sidne,, Montana, 59270, USA.

Vol. 29 2. English. p. 77-81. 1974

A saline-seep in a Typic Argiboroll on Wisconsin glacial till overlying soft shale sediments of the Tongue River formation is described and the electrical conductivity, pH, soluble salts and SAR of surface soils and groundwater of 12 similar seeps of up to 15 acres are given. When precipitation exceeded recharge, water percolating below the crop root zone accumulated above a layer of nearly impermeable dense clay. The perched groundwater was conducted laterally by permeable layers of degraded sandstone, siltstone and lignite to a point where the water-conducting layers were truncated by glacial till of lower permeability. Evaporation at this point deposited Na, Mg and Ca sulphates on the soil surface. Intensive cropping systems using small grains, grasses and deep-rooted crops, with minimum summer fallow in flexible rotations are needed to prevent deep percolation and to alleviate saline-seep development.

0493

**Hamdi, H; Labib, T**
Classification of some arid soils in the western desert intothe Seventh Approximation. Leipzig Karl Marx Univ Beitr Trop Subtrop Landwirt Tropenvet.

1969. Vol.7 (1): 11-17.

Bibliography: p. 16.

0494

**Hamdi, H.**
The classification of soils of the Mediterranean coastal littoral of the UAR in the 7th approximation. Agrochimica.

Vol. 12, No. 4. English. p. 332-340. 1968.

0495

**Hameed Khan, H.**
Placement of the black soils of Tamil Nadu in the comprehensive system of soil classification-soil taxonomy. Madras agricultural journal.

v. 64 (11). English. p. 723-732.- 111. Nov 1977.

Coimbatore. -Agricultural College and Research Institute.

0496

**Hamid, K. S.; Mustafa, M. A.**
Diffusion as an index of relative hydraulic conductivity in salt-affected soils of the Sudan. Geoderma. Department of Biochemistry and Soil Science, Khartoum University, Khartoum, Sudan.

Vol. 14 2. English. p. 107-114. 1975.

The effects of exchangeable sodium percentage (ESP) and electrolyte concentration (C) on the relative hydraulic conductivity (RHC) and dispersion index (DI) of two soil samples selected from a Vertisol and an Aridisol were investigated in the laboratory. For the two soil samples RHC increased whereas DI decreased as ESP decreased and C increased. DI was found to account for over 80% (r0.001 = 0.62) of the variability of RHC of a salt-affected sample. DI could thus be used for predicting RHC. ESP-threshold concentration relationships indicated that a saturated gypsum solution could be initially effective in a disturbed soil column taken from a Gezira Vertisol of ESP 19 and a montmorillonitic Aridisol of ESP 16. Dispersion indices that can be used as a guide for improving irrigation water quality were suggested.

0497

**Hammond, L. C.; Carlisle, V. W.; Rogers, J. S.**
Physical and mineralogical characteristics of soils in the SWAP experimental site at Fort Pierce, Florida. Proceedings, Soil and Crop Science Society of Florida. Soil Science Department, Florida University, Gainesville, USA.

Vol. 31. English. p. 210-214. 1971.

sandy soil was classified as an Alfic Arenic

Haplaquod.

0498

**Handy, R.I.**
Particle size and mineralogy in soil taxonomy. Transportation Research Record.

No. 642. p. 13-19. 1977.

National Academy of Sciences, Transportation Research Board.

0499

**Handy, R.L.**
The seventh approximation: a new pedological scheme of soil classification. Iowa State University, EES, Soil Research Lab., Screenings.

Vol. 5, No. 4. p. 4. 1961.

0500

**Hanna, F. S.; Beckmann, H.**
Clay minerals of some soils of the Nile Valley in Egypt. Geoderma. National Research Centre, Dokki, Cairo, Egypt.

Vol. 14 2. English. p. 159-170. 1975.

The mineralogical composition of clay fractions of thirteen profiles, representing the soils of four transects across the Nile Valley, were studied. The soils represent Torrerts and Torrifluvents. The dominant mineral in the fractions is montmorillonite. Kaolinite is present in small amounts. Illite and chlorite are found in trace amounts. Traces of calcite, feldspar and goethite were also indicated in most of the samples. The mineralogical composition of the clay fractions is nearly the same. There is no significant difference in the clay mineral composition between Torrerts and Torrifluvents. The mineral composition of the clay fractions in soils across the transects from west to east and from south to north does not differ significantly.

0501

**Hanson, R. G.**
Effect upon soybean cultivar Bragg, when P is band-concentrated upon variable soil-available P. Agronomy Journal. Department of Agronomy, University of Missouri, Columbia, MO 65211,USA.

Vol. 71 2. English. p. 267-271. 1979.

Results from trials on a Paleudult in Brazil suggest that banding P near the seed increased P uptake vs. broadcast and incorporation of P, but did not provide highest yields. The plant-soil growth factors obtained from broadcasting P resulted in the highest return from P inputs.

0502

**Haque, I.; Walmsley, D.**
Movement of sulphate in two Caribbean soils. Plant and Soil. Department of Soil Science, University of the West Indies, Trinidad.

Vol. 40 1. English. p. 145-152. 1974.

In a volcanic sandy loam soil (Andept) of high organic matter content, most of the SO4 from applied K2SO4 was retained in the top 15 cm when 20 cm of water was applied. When the same rate of water was applied to a clay soil (Mollisol derived from glauconitic sandstone), SO4 accumulated in the lower end of the column (45 cm) and some appeared in the leachate despite the high content of free Fe2O3 and Al2O3 in the soil. These differences between the two soils were attributed to different SO4 retentive properties.

0503

**Harding, J.; Lugo-Lopez, M. A.; Perez-Escolar, R.**
Promiscuous root nodulation of winged beans on an oxisol in Puerto Rico. Tropical Agriculture. Mayaguez Inst. of Trop. Agric., USDA, Mayaguez, Puerto Rico 00708.

Vol. 55 4. English. p. 315-324. 1978.

Roots of winged beans (Psophocarpus tetragonolobus) possessed greater numbers of nodules and heavier dry wt. of nodules than other legumes when not inoculated and grown in an oxisol with no previous history of legume cultivation. Promiscuous nodulation of winged beans appears to follow an exponential growth pattern for nodule dry wt. and a linear growth pattern for nodule number. Promiscuous nodulation was much greater on some genotypes than on others when genotypic means are compared. On an individual plant basis, heritabilities for promiscuous nodulation are very low.

0504

**Hargrove, W. L.; Kissel, D. E.; Fenn, L. B.**
Field measurements of ammonia volatilization from surface applications of ammonium salts to a calcareous soil. Agronomy Journal. Texas Agricultural Experiment Station, PO Box 748, Temple, TX 76501, USA.

Vol. 69 3. English. p. 473-476. 1977.

The objective of this study was to evaluate ammonia volatilization in the field from ammonium sulfate and ammonium nitrate applied to the surface of a calcareous soil, Houston Black Clay, that belongs to the fine, montmorillonitic, thermic family of Udic

Pellusterts. Volatilization was evaluated indirectly by measuring N uptake by Coastal Bermudagrass (Cynodon dactylon L.) and directly by measuring ammonia as it volatilized. In the field plot study, estimated losses ranged from 3 to 10% of the applied N for ammonium nitrate, from 36 to 45% of the applied N for pelleted ammonium sulfate, and from 25 to 55% of the applied N for liquid ammonium sulfate at rates of 140 and 280 kg N/ha. Direct measurements of ammonia losses from pelleted ammonium sulfate were 47, 43, 59, and 50% of the applied N in late summer, 1975, and 39, 30, 27, and 35% of the applied N in spring, 1976, at rates of 33, 66, 140, and 280 kg N/ha. The lower loss of ammonia in the spring was apparently in response to lower soil temperatures at that time. Consistent diurnal fluctuations in ammonia losses occurred at both times. These fluctuations corresponded closely with daily fluctuations in the atmospheric relative humidity. These results agree with earlier laboratory studies in that ammonium sulfate loses considerably more ammonia than ammonium nitrate when applied to the surface of a calcareous clay soil.

0505

**Harpstead, M. I.**
The classification of some Nigerian soils. Soil Science. University of Wisconsin, Stevens Point, USA.

Vol. 116 6. English. p. 437-443. 1973.

Soil data from eleven sites in south west and north Nigeria are given. Many of the Nigerian soils are probably Alfisols with Oxisols being formed on siliceous sedimentary materials and on ultrabasic rocks where colloidal materials with low cation exchange capacities occur. Inceptisols are found on aeolian and water-deposited sediments.

0506

**Harris, S. A.**
Annual soil moisture regimes in the rooting zone across the prairie-forest boundary of south-west Alberta. J. Soil Sci.

Dec 1974. Vol 25 (4): 448-460. Map. Ref.

0507

**Harris, S. A.**
Bulk density and weathering rates in soils. Great Plains-Rocky Mountain Geographical Journal.

Vol. 2. English. p. 33-39. 1973.

Bulk density of soils in the humid tropics is shown to be of the order of 0.3 to 1.2 g/cc and is closely related to soil order. Spodosols show the lowest values. Field moisture content in the rainy season usually greatly exceeds the moisture content at field capacity, but there is still adequate so air. The dense soils should weather at a ate about 36 times slower than the Spodosols under identical conditions, although in the field the moisture balance will accentuate this difference. Similarly, deterioration in natural fertility will be 36 times faster on the least dense soils.

0508

**Harrison, E. T.; McCreary, F. R.; Nelson, F. L.**
Soil Survey of Columbia County Area, Washington. Washington, D.C., USA; US Department of Agriculture.

English. p. 88 pp. 1973.

Thirty-one series (mainly mollisols) are described and mapped at a scale of 1:20 000. Parent materials include Pleistocene periglacial sediments, Miocene volcanic rocks, and alluvium.

0509

**Hassett, J. J.; Gregg, D. W.; Fehrenbacher, J. B.**
Formation of calcium carbonate concretions in natric horizons of Illinois soils. Soil Sci. OTHER US.

Oct 1976. Vol 122 (4): 202-205.

0510

**Hatfield, W. F.; Warner, J. W.**
Soil Survey of Jefferson County, West Virginia. Washington, D.C., USA; US Department of Agriculture.

English. p. 81 pp. 1973.

Twenty-one series (alfisols, inceptisols, ultisols and mollisols) are described and mapped at a scale of 1:20 000, and engineering and land-use interpretations are given. Parent materials include sandstones, shales, limestones and alluvial deposits.

0511

**Hawes, R. L.; Sims, J. L.; Wells, K. L.**
Molybdenum concentration of certain crop species as influenced by previous applications of molybdenum fertilizer. Agronomy Journal. Department of Agronomy, University of Kentucky, Lexington, KY 40506, USA.

Vol. 68 2. English. p. 217-218. 1976.

Excessive Mo concentrations in forage crops have been reported to cause toxicity in livestock. Since forage crops often are grown following crops fertilized with Mo, a study was

conducted to determine the effect of previous applications of Mo on Mo concentration and yield of dry matter of certain crop species. Five different crops were grown on Maur, (Typic Paloudult; clayey, mixed, mesic) soil (pH 6.4) fertilized the previous year with six levels of Mo (0, 0.22, 0.44, 0.88, 1.32, and 2.64 kg Mo/ha). The above-ground plant parts were sampled at one or more dates, weighed, dried, and ground for Mo analysis. Generally, concentration of Mo increased as the level of Mo applied previously increased in all crops sampled and at most sampling dates. For crops sampled at two maturity dates, Mo concentrations were higher in plants sampled at the earlier date than when plants were mature. The lower values at mature harvest may be attributed to dilution by dry matter. Although concentrations increased with level of Mo applied, the highest concentration found (3.89 mg Mo/g dry weight) was judged unlikely to cause toxicity in livestock. Mo fertilization at recommended rates of soils with low-to-average Mo levels should not subsequently result in forage with Mo concentrations that are toxic to livestock. Mo fertilization had little effect on dry matter yields.

0512

**Hayhurst, E. N.; Rubel, T. N.; Kelley, G. E.; Beining, P.**
Soil Survey of Monroe County, Ohio. Washington, D.C., USA: US Department of Agriculture.

English. p. 123 pp. 1974.

Twenty-nine series (mainly alfisols, inceptisols, ultisols and mollisols) are described and mapped at a scale of 1:15,840. Parent materials include sandstones, shales, limestone and alluvium.

0513

**Hellman, P. E.; Gass, C. R.**
Parent materials and chemical properties of mineral soils in southeast Alaska. Soil Science. Washington State University Research Centre, Puyallup, 98371, USA.

Vol. 117:1. English. p. 21-27. 1974.

N, C, free Fe and available P contents, pH, exchangeable cations, cation exchange capacity, and base saturation were determined for seven spodosols developed on phyllite, granodiorite, basalt, limestone, volcanic ash and gravelly till at similar elevations, forest vegetation and topography. The soils all had similar properties in the upper horizons. Shallow rooting combined with high rainfall apparently limit the influence of the lower horizons and parent material on properties of the upper horizons.

0514

**Heller, J.L.**
The nomenclature of soils, or what's in a name. Soil Science Society of America, Proceedings.

Vol. 27, No. 2, p. 216-220. 1963.

0515

**Hendershot, W. H.; Singleton, G. A.; Lavkulich, L. M.**
Variation in surface charge characteristics in a soil chronosequence. Soil Science Society of America Journal. Department of Soil Science, Univ. of British Columbia, Vancouver, B.C., Canada.

Vol. 43:2. English. p. 387-389. 1979.

The surface charge characteristics of the B horizons of seven soils in a chronosequence developed on sand, beach material were studied. The soils range in age from 127 to 550 years and exhibit morphological and chemical characteristics ranging from Typic Udipsamment to Aquic Haplorthod. The difference between the zero point of charge (ZPC) and the pH of the soil decreased as the age of the soils increased, from a maximum value at the youngest site of 0.72 to a minimum value at the oldest site of 0.11. The decrease in this DELTA pHzpc value is interpreted as indicating that the soils are approaching a steady-state with time. The DELTA pHzpc value is presented as a measure of pedogenic development.

0516

**Herbel, C. H.; Gile, L. H.**
Field moisture regimes and morphology of some arid-land soils in New Mexico. Special Publication, Soil Science Society of America. US Department of Agriculture, Jornada Experimental Range, Las Cruces, New Mexico.

Vol. No. 5. English. p. 119-152. 1973.

The number of days/year when soil moisture potential at various depths was between 0 and -15 bars was determined over a 10-year period at two basin floor sites (typic haplargid and a petrocalcic paleargid) and two fan-piedmont sites with appreciable soil water movement, two basin floor sites (ustollic haplargid and ustollic calciorthid) with only localized water movement and a playa site (typic calciorthid). Average annual precipitation was 22 cm, highly variable with an average of 13 cm falling in July-September and average annual pan evaporation was 225 cm. Soil texture, landscape position and micro-relief all had a significant effect on soil moisture. Detailed descriptions of the soils are given and the relationship of the soil moisture data to the US Soil Classification System is discussed.

0517

**Herbillon, A. J., Gallez, A., Juo, A. S. R.**
Characteristics of silica sorption and solubility, as parameters to evaluate the surface properties of tropical soils. II. The index of silica saturation. Soil Science Societ, of America Journal. Section de Physico-chimie Minerale du Musee Royal de l'Afrique Centrale, Place Croix du Sud 1, B-1348 Louvain-la Neuve, Belgium.

Vol. 41 6. English. p. 1151-1154. 1977.

Silica solubility of some Alfisols and Ultisols from Southern Nigeria was studied. The concentration of soluble silica obtained after a 3-da, contact with NaCl solution appears to be controlled by the most soluble silicate minera. present in the clay fraction. The index of silica saturation (ISS) is defined as the ratio of the amount of silica potentiall, soluble and the amount of silica potentiall, sorbed by a given sample. ISS reveals surface characteristics of the soils due to silication and desilication processes taking place within profiles and along slopes. ISS could become a useful criterion in taxonomy, particularly, for the low activity clay soils.

0518

**Hergert, G. W., Reuss, J. C.**
Sprinkler application of P and Zn fertilizers. Agronomy Journal. Colorado State University, Fort Collins, USA.

Vol. 68 1. English. p. 5-8. 1976.

In 1968 and 1969 preplant P treatments produced a significantly higher dry matter yield of maize during the first 5 weeks of the growing season. No significant difference existed between P treatments after this time. In 1969 plants which received preplant P and Zn contained slightly higher concentrations of P and Zn than the plants which received sprinkler P and Zn. Grain yields were significantly increased by Zn in 1968 but not in 1969. In 1968 on a clay loam soil (Aridic Argiustoll) the sprinkler-applied P did not move below 4-5 cm depth. On a loamy sand (Pachic Argiustoll) in 1969 sprinkler-applied P moved to a depth of approximately 18 cm. Sprinkler-applied Zn moved to a maximum depth of 5 cm on both soils.

0519

**Hernandez-Medina, E.**
Further evidence on the need of magnesium for pineapple in oxisols. P. R. Univ. J. Agr.

Oct 1963. Vol.53 (4). 357-368.

Bibliography. p. 367-369.

0520

**Hernandez-Moreno, J; Fernandez Caldas, E; Rodriguez-Pascual, C; Cabezas Viano, D.**
Caracteristics mineralogicas de la fraccion inferior a 2 micras en Vitrandepts. IV; Mineralogical characteristics of the clay fraction (less than 2 microns) of Vitrandepts. IV. Canary Islands. An Edafol Agrobiol.

Spanish. May, June 1977. Vol.36 (5/6). 469-486. Ref. Eng. sum.

0521

**Hesse, P. R.**
Particle size distribution in gypsic soils. Plant Soil.

Feb 1976. Vol.44 (1): 241-247.

0522

**Hipp, B. W.; Gerard, C. J.**
Influence of cropping system on salt distribution in an irrigated vertisol. Agronomy Journal. Texas A & M University Agricultural Research and Extension Center, Weslaco, USA.

Vol. 65 1. English. p. 97-99. 1973.

The electrical conductivity of saturated pastes of root-zone soil (pH 8.2; CEC approx 40 meq/100g ; clay content 60%, mainly montmorillonite) ranged from 2.6 to 4.8 mmhos/cm after four years of Sorghum bicolor, and from 4 to 7.6 mmhos/cm after four years of cotton (Gossypium hirsutum). Corresponding Cl-concentrations at 0-90 cm depth were 9-12 and 18-30 meq/l. The differences in salt concentration were mainly attributable to higher water infiltration rate after sorghum (5.81 cm/h) than after cotton (1.23 cm/h). Cropping practice may be an important factor in salt accumulation and so alternation of crops is advisable.

0523

**Hobbs, J. A; Thompson, C. A.**
Effect of cultivation on the nitrogen and organic carbon contents of a Kansas Argiustoll (Chernozem). Agron. J.

Jan/Feb 1971. Vol.63 (1): 66-68.

0524

**Holzhey, C S; Yeck, R D; Nettleton, W D**
Microfabric of some argillic horizons in udic, xeric and torric soil environments of the United States. In Soil Microscop, Proceedings of the International Working Meeting on Soil Micromorpholog,

1973 (pub. 1974). Vol. 4th. 747-762.

0525

**Holzhey, Charles Steven, 1936**
Epipedon morpholog, of xeralfs and some associated chaparralsoils in southern California. Riverside.

1968. Vol. 255 p. illus.

Thesis - University of California. Authorized facsimile b, University Microfilms, Ann Arbor, 1970. Bibliography, leaves 252-255.

0526

**Hortenstine, C C; Forbes, R B**
Concentrations of nitrogen, phosphorus, potassium, and total soluble salts in soil solution samples from fertilizerd and unfertilized h stosols. Florida. J Environ Qual.

Oct-Dec. 1972. Vol. 1 (4). 446-449.

0527

**Hortenstine, C C**
Removal of phosphorus from sewage effluent b, a typic quartzipsamment soil. Proc Soil Crop Sci Soc Fla. OTHER US.

1978. Vol. 37. 139-142. Ref.

0528

**Hortenstine, C. C**
Chemical changes in the soil solution from a Spodosol irrigated with secondary-treated sewage effluent. Journal of Environmental Qualit, Soil Science Department, Florida Agricultural Experimental Station, Gainsville, FL 32611, USA

Vol. 5 3. English. p. 335-338. 1976.

Irrigation with secondary-treated sewage effluent at 5 cm/week was initiated in July 1972 in an attempt to determine the renovative capability of Spodosols. The soil solution was monitored chemically by drawing samples through porous ceramic cups placed at 60-, 90-, and 120-cm depths in the soil profile. Phosphorus content increased from 0.03 ppm at all depths in the fall/winter of 1971/1972 to 1.25 ppm at 60 cm, 1.00 ppm at 90 cm, and 0.85 ppm at 120 cm b, fall 1974. During the same period, K increased from 0.05 ppm at all three depths to 14 ppm, however, NO3-N was consistentl, below 1.0 ppm. The effluent contained an average of 2.2 ppm NO3-N, 14 ppm Kjeldahl N, 2.8 ppm P, and 16 ppm K. Laboratory tests of the soil indicated satisfactory nitrification; however, adverse conditions in the field probabl, curtailed the nitrifying process.

0529

**Howeler, R. H.; Flor, C. A.; Gonsalez, C. A.**
Diagnosis and correction of B deficiency in beans and mungbeans in a Mollisol from the Cauca Valle, of Colombia. Agronom, Journal. CIAT, Cali, Colombia.

Vol. 70 3. English. p. 493-497. 1978.

In field trials seed yield of beans (Phaseolus vulgaris) cv. Tui (black-seeded) and Calima (red-seeded) grown on soil containing 0.11 p.p.m. water extractable B given 1 kg B/ha as borax or Solubor at sowing was about 70 and 25% higher, resp., than that of plants not given B. Higher B rates gave no further response in the 1st crop, but initial applications of 2 and 4 kg B/ha were needed to give good yields from 2nd and 3rd crops, resp. Seed yield was significantl, lower with B broadcast in sol. or placed between rows than when placed 10 cm deep at the side of rows or under seeds and decreased progressively as application was delayed for 7-37 days after sowing. Foliar sprays containing 0.2-0.4% B resulted in B toxicity. Critical B levels for yield and toxic levels were 22-24 and 40-45 p.p.m. leaves and 0.65 and 1.3-1.9 p.p.m. water extractable B in soils, resp. In another trial, added B increased seed yield in 11 black bean cv. more than it did in 2 red bean cv. and decreased yield in mung beans (Vigna radiata). Correlation between leaf Ca/B ratio and seed yield was high and negative in black beans, positive in mung beans and not significant in red beans.

0530

**Howeler, R. H.**
Iron-induced oranging disease of rice in relation to physico-chemical changes in a flooded oxisol. Soil Science Society of America Proceedings. Centro Internacional de Agricultura Tropical, Cali, Columbia.

Vol. 37 6. English. p. 898-903. 1973.

conditions associated with the occurrence of a nutritional disorders which produces oranging of rice (Oryza sativa) leaves grown under flooded conditions in an oxisol were studied by measuring changes in pH, Eh, and Fe and Mn concentrations in soil solution after flooding. The disorder was attributed to Fe-induced deficiencies of mainly P, K, Ca, and Mg.

0531

**Hoyos, A.; Palomar, L.; Hernando, J.**
Soil development over calcareous parent material in a humid climate. Agrochimica. Instituto de Edafologia y Biologia, Vegetal, Madrid, Spain.

Vol. 20 4/5. Spanish. p. 288-293. 1976.

Two profiles are described, representative of a soil developed over calcareous parent material in the Sierra de Aralar (Spain) under a humid Mediterranean climate (rainfall: 1600-1800 mm). Based on the exchangeable bases content, base saturation, characteristics of the organic matter, and free Fe content, the soil is classified as "rendollic eutrochrept".

0532

**Hoyum, R. A.; Hajek, B. F.**
A lithosequence in coastal plain sediments in Alabama. Soil Science Society of America Journal. Dep. of Agron. and Soils, Auburn Univ., Auburn, Alabama 36830, USA.

Vol. 43 1. English. p. 151-156. 1979.

A lithosequence was used to explain the morphology and genesis of soils from the Tuscahoma Sand Formation in Crenshaw County, Alabama. Position-slope-geology computer displays were used for sampling and determining the distribution and extent of soils in the analysis area. The Tuscahoma Sand Formation has a locally distinctive topography and suite of soils that are closely related to the characteristics of three outcrop beds on 8-12% side-slopes. The lower stratum, exposed farthest inland, is dominated by clayey soils. In argillic horizons the CEC ranges from 5.4 to 17.2 meq/100 g even though smectites dominate in one profile. Fine-loamy soils with siliceous mineralogy dominate the middle stratum. The youngest sediments, superpositioned above the middle stratum, are clayey with mixed mineralogy. The pH of argillic horizons ranged from 4.9 to 5.2. All clayey soils were Hapludults while the fine-loamy soils are now classified Paleudults; however, morphological properties suggest that all soils studied may be Hapludults. With all other soil-forming factors relatively constant, the differences encountered in soils across the study area relate directly to parent material.

0533

**Hubert, G, Gonzalez, A**
Extraction des acides fulviques d'un horizon spodique par une resine echangeuse d'ions de type H positif; Extraction of fulvic acid from a spodic horizon by resin and exchange of H postive ions. Can J Soil Sci.

French. June 1971. Vol.51 (2): 143-155.

0534

**Hudelson, G. W.**
Soil survey of Logan County, Illinois. Washington, D.C., USA: US Department of Agriculture.

English. p. 99pp. 1974.

Forty-seven series (mainly mollisols and alfisols) are described and mapped on a scale of 1:15 840. Land use and management are recorded. Parent materials include loess, aeolian sand, alluvium, glacial outwash and glacial till.

0535

**Huffman, K. K.**
Soil survey of Delaware County, Indiana. Washington, D.C., USA, US Department of Agriculture.

English. p. 66pp. 1972.

Twenty series (aquepts, ochrepts, aquolls, udolls, aqualfs, udalfs, saprists) are described and mapped at a scale of 1: 15 840; their engineering properties and their suitability for maize, wheat, soya beans and lucerne-grass mixtures are indicated. Parent materials consist of glacial till, of outwash gravel and sand and of alluvial deposits.

0536

**Humphrey, M. E.; Anderson, F. L.; Hayes, R. A.; Sims, J. D.**
Soil survey of Calloway and Marshall Counties, Kentucky. Washington, D.C., USA; US Department of Agriculture.

English. p. 82pp. 1973.

Twenty-seven series (mainly entisols, alfisols and ultisols) are described and mapped at a scale of 1:15 840. Land use and management are recorded. Parent materials include loess, alluvium, cherty limestone residuum, and gravelly and loamy Coastal Plain material.

0537

**Hunt, C.B.**
Soil - a dirty four letter word. Geotimes.

Vol. 19, No. 9. p. 31-32. 1974.

0538

**Hyde, H. W.; Conner, N. R.; Stoner, H. R.**
Soil survey of Midland County, Texas. US Department of Agriculture.

English. p. 40pp. 1973.

Twenty two series (mainly aridisols, mollisols, alfisols, vertisols and inceptisols) are described and mapped at a scale of 1:31 680. Parent materials include sand, and loam, outwash deposits. Soils are grouped in capability classes according to their suitability for agricultural and engineering uses.

0539

**Ikawa, H.**
The oxisols of Hawaii. Second International Soil Classification Workshop, Proceedings.

Vol. 1. p. 210-220. 1979.

Soil Survey Division, Land Development Department, Thailand.

0540

**Impithuksa, V.**
Fertilizer nitrogen utilization by three warm-season grasses (Cynodon nlemfuensis, Digitaria decumbens, Paspalum notatum) on an alfic haplaquod as indicated by nitrogen-15 (isotope). Proceedings Soil and Crop Science Society of Florida.

v. 38. English. p. 93-97. ill. 1979.

r. p. . The Society.

0541

**Ireland, W. Jr.; Matthews, E. D.**
Soil Survey of Sussex County, Delaware. Washington, D.C., USA, US Department of Agriculture.

English. p. 74 pp. 1974.

Twenty-one series (mainly spodosols, ultisols, entisols and inceptisols) are described and mapped at a scale of 1:20 000, and engineering and land use interpretations are given. Parent materials are sediments of sand, silt and clay.

0542

**Irizarry, H.; Capiul, M.; Acosta-Matienzo, A.**
Yield of twelve tanier cultivars grown with and without irrigation in east-central Puerto Rico. Journal of Agriculture of the University of Puerto Rico. ARS, USDA, Rio Piedras, Puerto Rico.

Vol. 61:1. English. p. 100-105. 1977.

Marketable yields of 12 cv. of Xanthosoma sagittifolium were 7.8-19.9 and 10.5-17.8 t/ha under non-irrigated and irrigated conditions, resp. on a mollisol of pH 5.5. Av. yields of cv. Blanca del Pais, Rascana and Viequera increased by 37% under irrigation, although overall the yield increases were not significant due to a wet and short growing season.

0543

**Isbell, R.F.**
Low activity clay alfisols, ultisols, and oxisols in tropical Australia and New Guinea. Second International Soil Classification Workshop, Proceedings.

Vol. 1. p. 123-154. 1979.

Soil Survey Division, Land Development Department, Thailand.

0544

**Isirimah, N.O.; Keeney, D.R.**
Nitrogen transformations in aerobic and waterlogged histosols. Soil chemistry. Soil Sci.

Feb. 1973. Vol. 115 (2). 123-129. Ref.

0545

**Itnal, C. J.; Radder, G. D.; Patil, S. V.**
Effect of fertilizer application on the yield of Jayadhar cotton (Gossypium herbacium) in dry tract of Saundatti. Research Series, University of Agricultural Sciences, Hebbal, Agricultural College, Dharwar, India.

Vol. No. 14. English. p. 65-69. 1972.

In a 5-year experiment on medium black soil, N at 20 and 40 lb/acre increased cotton yield by 19 and 40% respectively. Response to N was particularly good during the years of well-distributed rainfall. Adding 15 lb/acre P to each of the N treatments increased yields by 40 and 78% over the no-fertilizer treatment. Applications of P or K alone had no effect on yield.

0546

**Ivanova, E.N.**
Application of the new American system to the correlation and mapping of soils. Soviet Soil Science.

No. 6. English. p. 577-579. 1965.

Translated from the Russian: Pochvovedeniya.

No.6,p21-23,1964.

0547

**Ives, D. W.; Furkert, R. J.; Searle, P. L.; Daly, B. K.; Whitton, J. S.**
Soil studies from Indonesia. 2. A soil sequence developed over coral limestone on the uplifted coastal terraces of Sumba, East Nusa Tenggara. New Zealand Journal of Science. Soil Bureau, Department of Scientific and Inoustrial Research, Private Bag, Lower Hutt, New Zealand.

Vol. 19 1. English. p. 101-113. 1976.

The island of Sumba, Indonesia, is fringed on the west, north and east by 3 uplifted coastal terraces. A sequence of 4 soils was examined on the middle terrace. It appears that this succession of soils is similar to the range of soils likely to be encountered on all 3 terraces. Lithosols (Calcaric Lithosols and Rendzinas) grade into Rendzinas (Calcaric Phaeozems and Rendzinas) and then into Yellowish Red Mediterranean Soils (Chromic Cambisols) in freely drained sites and Black Grumusols (Pellic Vertisols) in low lying, imperfectly drained sites. Chemical, total element, mineralogical and physical analyses are used in support of the development sequence outlined. The depth of solum developed is related to the physical nature of the coralline material from which the soils are formed. Lithosols form over hard coral limestones. Yellowish Red Mediterranean Soils form over unconsolidated coral sand and coarse coral rubble. Accretion of andesitic ash has influenced the mineralogy and elemental composition of some soils. The Black Grumusols have been most affected as these soils are formed from the redeposited erosion products of adjacent soils.

0548

**Ives, D. W.; Searle, P. L.; Daly, B. K.; Whitton, J. S.; Furkert, R. J.**
Soil studies from Indonesia. 1. Terrace surfaces and related soils in the Enrekang District, South Sulawesi (Celebes). New Zealand Journal of Science. Soil Bureau, Department of Scientific and Industrial Research, Private Bag, Lower Hutt, New Zealand.

Vol. 19 1. English. p. 91-99. 1976.

In the southern part of the Enrekang District, central South Sulawesi, Indonesia, 4 separate and distinct soils are found on 4 separate alluvial terraces. These surfaces and the soils formed on them provide an insight into the quaternary sedimentary history of this region. The highest terrace is characterised by strongly eroded, morphologically youthful, yet strongly leached soils classified as intergrades between Brown Regosols and Greyish Brown Podzolics (Dystric Cambisols). These soils are formed in old high level alluvial gravels. Dark Grey Alluvial Soils and Low Humic Gleys (Eutric Fluvisols) occur on the 2 lowest terraces. These soils are formed from recent alluvium which is derived, in part, from erosion of the high level gravels; they overlie what are probably lacustrine sediments, the parent material of Dark Grey Grumusols (Chromic Vertisols) which occur on the second highest terrace. Results of chemical, mineralogical and physical analyses show the relationships between the soils on the various surfaces and indicate a probable lacustrine origin for the parent material of the soils on the second highest terrace. It is suggested that an extensive lake system probably occupied a large area on the southern edge and to the south of the Enrekang district. This large lake, which was fed initially by the River Sadang, which now flows to the west of the area, is now represented by the 2 shallow lakes, Sidenreng and Tempe.

0549

**Ives, D. W.**
Reconnaisance Soil Survey of Southeast Pahang. Malayan Soil Survey Report.

Vol. No.4/1967. English. p. 100pp. 1967.

Thirty-three series (mainly oxisols, ultisols and entisols) and five miscellaneous land types are described and mapped as 27 units at a scale of 1:253 440. Parent materials include igneous rocks, sandstones, siltstones, shales and alluvial deposits. A soil suitability classification is presented.

0550

**Jacomine, P. K. T. et al.**
Exploratory soil survey. Reconnaissance survey of soils on the right bank of the Sao Francisco River, Bahia. Campinas, Brazil; Brazilian Society of Soil Science.

Portuguese. p. 321-324. 1976.

Annals of the Fifteenth Brazilian Congress of Soil Science. A preliminary survey of an area covering approximately 389 179 km2 east of the Sao Francisco River is described and the main soils identified are listed. These include latosols, red-yellow podzolic soils, planosols, lithosols, sandy soils, cambisols, brunizems, vertisols and regosols.

0551

**Jacquin, F.; Ailliot, B.; Cros, P.**
Comparison between the drainage efficiency of a leached pseudogley soil and a pelosol. London, UK; Chapman and Hall. Ecole Nationale Superieure Agronomique, 30 bix, Rue Sainte Catherine, Nancy, France.

English. p. 181-185. 1973.

Ecological Studies. IV. Physical Aspects of Soil Water and Salts in Ecosystems. (Hadas, A.;

Swartzendruber, D., Rijtema, P.E., Fuchs, M., Yaron, B. - Editors). Water discharge and pezometric measurements indicated the presence of a water table in both soils between 0 and 1m. In the pseudoglay, there was a perched water table due to a textural discontinuity in the profile. However, in the pelosols, cracks caused by shrinkage during dry periods acted as reservoirs of ensuing rainwater which caused soil clays to swell and decrease permeability and macroporosity and impede downward flow.

0552

**Jacquin, F.; Florentin, L.**
Drainage in heavy soils of Lorraine: effect of trenching in a pelosol. Comptes Rendus des Seances de l'Academie d'Agriculture de France.

Vol. 63 13. French. p. 907-914. 1977.

The deep cracking that occurs in the pelosols of Lorraine during dry weather allows read drainage of water into deeper layers. However, during prolonged wet weather swelling of the subsoil leads to impermeability. Under these conditions, the mixed layer filling the trench above the drainpipe is a very important route for percolation. Below the Ap horizon, the mixed soil in the trenches shows a higher C level, a better structure, greater rooting, higher porosity and much higher permeability compared with adjacent in situ soil layers.

0553

**Jaggi, I. K.; Gupta, R. K.; Russel, M. B.**
Field water balance in a vertisol under fallow and cropped conditions. Indian Journal of Agricultural Sciences. Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur 482 004, India.

Vol. 47 12. English. p. 617-621. 1977.

Hydraulic gradient and soil water flux as a function of depth and time were computed from field measurements of hydraulic head under fallow and under irrigated and rainfed wheat during the 1972/3 and 1973/4 winter seasons. The moisture depletion and flux data were used to calculate evaporation and evapotranspiration. About 11-13% of seasonal water use by rainfed wheat was contributed by deep soil layers (100-150 cm).

0554

**James, D. W.; Doney, D. L.; Theurer, J. C.; Hurst, R. L.**
Sugar beet genotype, N, and soil moisture availability interactions in components of beet yield and quality. Agronomy Journal. Utah Agric. Exp. Sta., Logan, UT 84322, USA.

Vol. 70 4. English. p. 525-531. 1978.

Studies were conducted to investigate the genotype X soil N and genotype X soil water interaction in sugar beet from a broad genetic base. A series of 20 genetically different genotypes differing in yield, percentage sugar, and impurity index potential were field tested near Farmington, Utah in 1974 at 0, 84, 210 and 525 kg N/ha. In 1975, eight genetically diverse genotypes were field tested at 5 N levels and 4 irrigation levels. The soil type was a coarse, loam, mixed mesic family of calcic haploxerolls. Analyses of data were for root yield, sucrose percentage, gross sugar, and impurity index. Highly significant main effects due to N in 1974 and 1975 and water in 1975 were observed for all measured parameters. A significant genotype X N interaction was obtained in 1974 for all parameters. There was an apparent genotype X water interaction in 1975, however, unbiased statistical inferences could not be made because of the experimental design. These interactions indicate that genetic variation exists such that new cv. may be developed that give high sugar production at low N levels or are not affected adversely in quality at a high N level.

0555

**Jansen, I. J.; Turgeon, A. J.**
Indirect effects of a thatch-inducing herbicide on soil physical properties under turf. Agronomy Journal. Department of Agronomy, University of Illinois, Urbana, USA.

Vol. 69 1. English. p. 67-70. 1977.

An Aquic Argiudoll soil under Kentucky bluegrass (Poa pratensis) turf had been treated annually for four years with Ca3(As04)2 which induced a layer of thatch 2 to 3 cm thick. Infiltration rate and hydraulic conductivity were lower for Ca3(As04)2 treated soils than for untreated soils. Treated soils had a higher bulk density, stored less water in the 0 to 1 bar tension range, and were lower in organic matter than the untreated soils. The results are discussed in relation to the known effects of Ca3(As04)2 on earthworms and plant rooting.

0556

**Jewitt, T.N.**
Vertisol soils of the tropics and sub-tropics (especially in Africa): their management and use. Outlook on agriculture.

v. 10 (1). English. p. 33-40.- ill. 1979.

Berkshire, -Imperial Chemical Industries.

0557

**Jit Sai, L.**
Alfisols and ultisols with low activity clays in Malaysia. Second International Soil Classification Workshop, Proceedings.

Vol. 2. p. 107. 1979.

Soil Survey Division, Land Development Department, Thailand

0558

**Johnson, D. W.; Breuer, D. W.; Cole, D. W.**
The influence of anion mobility on ionic retention in waste water-irrigated soils. Journal of Environmental Quality, College of Forest Resources, University of Washington, Seattle, WA 98195, USA

Vol. 8 2. English. p. 246-250. 1979

Below a depth of 10 cm in a gravelly loam, sand (Typic Haploorthod) under various types of vegetation and sprayed with waste water, the soil solution showed a large decrease in bicarbonate alkalinity, and phosphate concentration, a lesser decrease in sulphate concentration, and a large increase in nitrate concentration as the waste water percolated downwards. The retention of phosphate and sulphate in the soil was greater in the field than it was in a laboratory experiment in which unirrigated soil was leached with solutions containing the Na salts of dihydrogen phosphate, sulphate, chloride or nitrate. The greater retention in the field is attributed to increased chemical fixation with time. The decrease in bicarbonate concentrations as water percolated through the field was due to decreases in pH and consequent loss of CO2 from solution.

0559

**Johnson, W. F.; Kirk, J. E., Miller, K.; Murphy, G. E.**
Soil Survey of Davison County, South Dakota Washington, D. C., USA, US Department of Agriculture

English. p. 70 pp. 1974

Twenty-three series (mainly mollisols and entisols) are described and mapped at a scale of 1:20 000. Parent materials include glacial till, glacial melt-water deposits, Niobrara siltstone, and alluvium.

0560

**Johnson, W.M.; Relation of the new comprehensive soil classification to soil mapping.**
Soil Science.

Vol. 96, No. 1. p. 31-33. 1963.

0561

**Johnson, W.M.**
Mineralogy and soil classification. International Congress of Soil Science, Transactions, 7th.

Vol. 4. p. 532-533. 1960.

0562

**Johnson, W.M.**
The pedon and the polypedon. Soil science Society of America. Proceedings.

Vol. 27, No. 2. p. 212-215. 1963.

0563

**Jones, J. P.; Benson, J. A.**
Phosphate sorption isotherms for fertilizer P needs of sweet corn (Zea mays) grown on a high phosphorus fixing soil. Communications in Soil Science and Plant Analysis, Department of Plant and Soil Sciences, University of Idaho, Moscow, Idaho 83843, USA.

Vol. 6 5. English. p. 465-477. 1975.

Phosphorus sorption isotherms were used to estimate phosphorus fertilizer rates on a phosphorus fixing (Alfic Fragiorthod) soil. Five rates ranging from 0-584 kg/ha corresponded to sorption equilibrium solution levels from 0.06 to 0.20 ppm P. Yields of maize grown two successive years were related to the sorption equilibrium solution P level. Whole plant weight, weight of ears, number of ears, and ear size approached maximum when the sorption equilibrium solution P level was near 0.13 ppm. The P content of leaves at the early tassel stage increased with increasing sorption equilibrium solution P in a nearly straight line relationship. The leaves contained 0.27% P when the sorption equilibrium solution P was 0.13 ppm, the level producing maximum yield. The 0.20 ppm P level resulted in 0.41% P in the leaves.

0564

**Jones, J. P.; Fox, R. L.**
Phosphorus nutrition of plants influenced by manganese and aluminum uptake from an Oxisol. Soil Science. Univ. of Idaho, Moscow, USA.

Vol. 126 4. English. p. 230-236. 1978.

The objectives of this study were to evaluate the effect of changes in soil pH on the plant availability of soil P and the interaction between Mn and Al accumulation and P response of tomato and corn plants. Yield response of tomato plants in pots to the level of soil P was affected by soil pH. Plants in soils with pH values of 6.3, 6.7 or 7.2 produced maximum

growth if the soil solution P level had been adjusted to 0.2 ppm. At pH values of 5.1, 5.3 and 5.7, yield increased up to 0.8 ppm, the highest P level used, this yield was still below that for higher pH values. By contrast, the effect of P fertilizer or corn hardi, varied at different pH levels. Evidence for Mn and/or Al toxicity on tomatoes is presented. Apparent toxicity was lessened by high levels of P. A threshold toxicity level of 450 ppm Mn in tomato tops is proposed. Soil P solubility, as measured by phosphate sorption isotherms did not change over a range of soil pH between 5.1 and 7.2.

0565

**Jongerius, A.**
The morphology of humic gley soils (orthic haplaquolls) under different land uses. International Working Meeting on Soil Micromorphology, Proceedings.

p. 491-502. 1964

0566

**Jordan, D. H.; Bramlett, G. L.; Gaither, G. A.; Tate, R. J.; Blevins, M. M.; Murphy, J. D.**
Soil survey of Cherokee, Gilmer, and Pickens Counties, Georgia. Washington, D.C., USA, US Department of Agriculture.

English. p. 73pp. 1973.

Twenty-six series (mainly ultisols, entisols and inceptisols) are described and mapped on a scale of 1:20,000. Land use and management are recorded. Parent materials include biotite gneiss, schist, mica, quartzite, phyllite, argillite and slate.

0567

**Jovanovic, Z.; Corovic, R.**
Effect of sand addition on the physical properties of smonitsa. Arhiv za Poljoprivredne Nauke. International Centre for Advanced Mediterranean Agronomic Studies, Bari, Italy.

Vol. 28 102. Serbo-Croat. p. 57-65. 1975.

Incorporation of sand to a depth of 40 cm improved soil texture, decreased total porosity, increased the proportion of large pores (diameters between 30 and 60 mu and > 60 mu ) and correspondingly decreased the proportion of smaller pores.

0568

**Jung, Y. T.; No, Y. P.; Park, R. K.**
Studies on the expansion of arable land in Yeongnam district. II. A study on the characteristics of a reclaimable soil (Maesan series) could be classified into Vertic Hapludults developed on the tertiary rolling area of Yeongil-gun. Res. Rep. Off. Rural Dev. (Soil Sci. Fert. Plant Prot. Micrology) Korea (Repub.).

Korean. Dec. 1977. Vol. 19. 151-158. Ref. Eng. sum.

0569

**Jungerius, P. D.; Mucher, H. J.**
The micromorphology of fossil soils in the Cypress Hills, Alberta, Canada. Zeszyty Problemowe Postepow Nauk Rolniczych. Laboratory of Physical Geography and Soil Science, Amsterdam University, Netherlands.

Vol. 122. English. p. 617-627. 1972.

The palaeosols of the area ranged in age from the Upper Cretaceous to the Mid-Holocene. The profiles described include fossil soil remnants in modern chernozemic soils, buried soils in alluvial fans formed under a more humid climate about 4000 years B.P., interglacial soils, a semi-terrestrial soil in Palaeocene formations and an Upper Cretaceous vertisol-like soil.

0570

**Juo, A. S. R.; Lal, R.**
The effect of fallow and continuous cultivation of maize and soybean on the chemical and physical properties of an alfisol in western Nigeria. Plant Soil.

Aug. 1977. Vol.47 (3). 567-584. Ref.

0571

**Juo, A. S. R.; Ballaux, J. C.**
Retention and leaching of nutrients in a limed Ultisol under cropping. Soil Science Society of America Journal. International Inst. of Trop. Agriculture, PMB 5320, Ibadan, Nigeria.

Vol. 41 4. English. p. 757-761. 1977.

Liming and leaching experiments in the greenhouse with an Ultisol from Nigeria showed that the largest growth response of maize occurred when the soil pH was increased from 4.3 to 5.0 by liming; the highest yield was obtained at a pH of 5.5-6. Substantial downward movement of Ca from the limed surface layer was observed. The vertical distribution of Ca in the limed soils followed a similar pattern to pH, and was inversely related to exchangeable Al. Leaching losses of applied Ca, Mg, K and

NO3 during the 10-week cropping period were relatively small

0572

**Juo, A. S. R.; Fox, R. L.**
Phosphate sorption characteristics of some bench-mark soils of West Africa. Soil Science International Institute of Tropical Agriculture, PMB 5320, Ibadan, Nigeria.

Vol. 124 6. English. p. 370-376. 1977

Phosphate sorption characteristics of soil material from selected soil profiles of West Africa were studied. These soils represent a wide range of parent materials and agroclimatic conditions. Phosphate concentration in soil solutions was almost invariant, low in comparison with the requirements for most crops. In comparison with many soils of the humid tropics, the surface horizons have low to medium standard P requirements (or the amounts of P required to attain 0.2 ppm P in solution). Phosphorus sorption capacity, is mainly related to soil mineralogy, which in turn is related to soil parent materials, BET-surface area, and free Fe oxide content of the soils. Of the profiles studied, Alfisols and Ultisols derived from basalts have the highest standard P requirement. Ultisols have higher standard P requirements than Alfisols

0573

**Juo, A. S. R.; Kamprath, E. J.**
Copper chloride as an extractant for estimating the reactive aluminium pool in acid soils. Soil Science Society of America Journal. North Carolina Agric. Exp. Sta., Raleigh, North Carolina 27650, USA

Vol. 43 1. English. p. 35-38. 1979

The reactive Al pool in selected Ultisols, Oxisols, and Histosols from Africa, South America, and North Carolina was estimated by extraction with 1N CuCl2. Al-saturated clay minerals with and without interlayered hydroxy Al were used to compare the extractability of Al by 1N CuCl2 and 1N KCl. The 1N solutions of KCl and CuCl2 were equally effective in extracting exchangeable Al from an Al-saturates montmorillonite. The 1N CuCl2 solution, however, extracted almost twice as much Al from an Al-saturated vermiculite containing a hydroxy Al interlayer as did 1N KCl. Generally, more than twice as much Al was extracted from acid surface soils (pH 5) by 1N CuCl2 than by 1N KCl suggesting that Al bound by organic matter was being extracted by the CuCl2

0574

**Juo, A. S. R.; Kang, B. T.**
Availability and transformation of rock phosphates in three forest soils from southern Nigeria. Rock phosphate as P source for plant. Communications in Soil Science and Plant Analysis. International Institute of Tropical Agriculture, PMB 5320, Ibadan, Nigeria.

Vol. 9 6. English. p. 493-505. 1978.

The initial effectiveness of two rock phosphate samples from Morocco (MRP) and North Carolina (NCRP) was compared with concentrated superphosphate (CSP) in greenhouse using two Alfisols and one Ultisol from southern Nigeria. Under similar pH (pH 6), the two rock phosphates were more effective P sources for maize plant grown on the two Alfisols than on the limed Ultisol. The relative effectiveness of the three P sources followed the order: CSP)NCRP)MRP. A larger portion of rock P (Ca-P) applied to soils was transformed into Al-P and Fe-P from NCRP source than from MRP source after 90 days.

0575

**Juo, A. S. R.; Kang, B. T.**
Effect of liming on the availability of three rock phosphate sources in two West African Ultisols. Communications in Soil Science and Plant Analysis. International Inst. of Tropical Agriculture, PMB 5320, Ibadan, Nigeria.

Vol. 10 7. English. p. 993-1003. 1979.

The effectiveness of Morocco rock phosphate (MR) and Togo rock phosphate (TR) in increasing maize yield was compared with the more reactive North Carolina rock phosphate (NCR) and with triple superphosphate (TSP) in the greenhouse using two strongly acidic Ultisols from southern Nigeria with and without application of lime. Without liming, the relative effectiveness was in the order NCR ) TSP ) MR ) TR; with liming, the sequence became TSP more than or equal to NCR ) MR ) TR. Liming soils to pH near 5.5 depressed P uptake by maize from the rock P sources but increased uptake from TSP.

0576

**Juo, A. S. R.; Madukor, H. O.**
Phosphate sorption of some Nigerian soils and its effect on cation exchange capacity. Communications in Soil Science and Plant Analysis. International Institute of Tropical Agriculture, Ibadan, Nigeria.

Vol. 5 6. English. p. 479-497. 1974.

Phosphate sorption capacity of the soils studied followed the order: Alfisols from basalts ) Ultisols from sandstone ) Alfisols from basement complex rocks (gneisses) approx equal to Alfisols from coastal sediments approx equal to Alfisols from eolian drift. Sandy

forest soils derived from basement complex rocks and from coastal sediments in south-western Nigeria require relatively low amounts of phosphate for maximum crop yield as determined by the Langmuir isotherm. Phosphate sorption increases CEC by 17%-370% in the soils studied.

0577

**Juo, A. S. R.; Uzu, F. O.**
Liming and nutrient interactions in two Ultisols from southern Nigeria. Plant and Soil. IITA, Ibadan, Nigeria.

vol. 47 2. English. p. 419-430. 1977.

A short-term pot experiment was conducted to study the effects of liming on nutrient availability to maize plants grown in 2 acid Ultisols (Ustoxic Paleustult and Oxic Paleudult). Optimum P availability occurred between pH 5 and 6. Liming depressed uptake of Mg, Mn, and Zn by the plants. Maize grown in the Ustoxic Paleustult showed severe Mn deficiency when the soil was limed to near neutrality even though a moderate amount of Mn was applied. A laboratory incubation experiment showed that liming resulted in sharp decreases in soluble Mg, Mn and Zn in the soil, whereas the soluble K level was only slightly affected. Inadequate Ca supply appeared to be a more important factor affecting plant growth and nutrient uptake than Al toxicity in the coarse-textured Ultisols.

0578

**Juo, A. S. R.**
Soluble and exchangeable aluminum in Ultisols and Alfisols in West Africa. Communications in Soil Science and Plant Analysis. International Institute of Tropical Agriculture, PMB 5320, Ibadan, Nigeria.

Vol. 8 1. English. p. 17-35. 1977.

Aluminium in soil saturation extracts and exchangeable Al determined by N KCl extraction were studied using a large number of Ultisol and Alfisol samples from West Africa. The concentration of soil solution Al ranged from 0.05 to 4.5 ppm. Solution Al content was generally higher in the surface horizon (Ap and A1) than in the lower horizons within the same profile; whereas the reverse was true for exchangeable Al. For subsoil samples, the percentage exchangeable Al saturation was highly correlated with soil pH measured both in water and in N KCl. For surface soil samples, the correlations were poor.

0579

**Juo, A.S.R.**
Nutrient profile in a tropical Alfisol under conventional and no-till systems. Soil science.

v. 127 (3). English. p. 168-173.- ill. Mar 1979.

Baltimore.

0580

**Juo, A.S.R.**
Effect of liming on the availability of three rock phosphate sources (Morocco rock, Togo rock, North Carolina rock) in two West African ultisols. Communications in soil science and plant analysis.

v. 10 (7). English. p. 993-1003.- ill. 1979.

New York, -Dekker.

0581

**Kabakchiev, I.; Bonveva, K.**
Investigation of iron-manganese concretions in smonitzas. Pochvoznanie i Agrokhimiya. Institut po Pochvoznanie "N. Pushkarov", Sofia, Bulgaria.

Vol. 7 6. Bulgarian. p. 3-12. 1972.

concretions with a high Mn content were found in all the horizons of the smonitzas studied.s.

0582

**Kabakchiev, I.; Galeva, V.**
Comparative micromorphological investigation of chernozem-smonitzas and chernozems. Pochvoznanie i Agrokhimiya. Institut po Pochvoznanie "N. Pushkarov", Sofia, Bulgaria.

Vol. 8 4. Bulgarian. p. 11-24. 1973.

The compact structure, the presence of black humus dots, and the typical Fe-Mn concretions in all horizons, as well as the optical orientation of plasma in the chernozem-smonitzas indicates conditions of excessive moisture in the initial period of their formation. These factors and the presence of montmorillonite type clay minerals indicates that these soils are hydrogenic and topogenic formations and it is suggested that the name "chernozem-smonitza" be replaced by "smonitza".

0583

**Kabakchiev, I.**
Characteristics of shallow smonitzas formed on andesite rocks. Pochvoznanie i Agrokhimiya. Institut po Pochvoznanie i Agrokhimiya "N. Pushkarov", Sofia, Bulgaria.

Vol. 10 4. Bulgarian. p. 3-12. 1975.

0584

**Kacar, B.; Amin, S. M. R.**
Effect of different amounts of sulphur on the uptake of phosphorus by lucerne. Yilligi, Ziraat Fakultesi, Ankara Universitesi. A. U. Ziraat Fakultesi Bitki Besleme Kursusu Ogretim Uyesi, Turkey.

Vol. 22 3-4. Tu. p. 579-605. 1973.

In pot experiments on representative soils of the Meric river basin (vertisols, non-calcareous brown soils, alluvial soils) receiving basal P and K, sulphur treatments significantly increased the P percentage and the phosphorus yield of lucerne. 40 ppm S gave the optimum P percentage, and 20 ppm the greatest phosphorus yield (of the second and third cuttings). At the first and second cuttings, the P uptake of the plants increased with increasing S up to a certain level, beyond which a decrease occurred. At the 3rd cutting however no unfavourable effects of the higher rates of S on P uptake were apparent.

0585

**Kalbande, A. R.; Swamynatha, R.**
Characterisation of potassium in black soils developed on different parent materials in Tungabhadra catchment. Journal of the Indian Society of Soil Science. All India Soil and Land Use Surve,, Nagpur, Maharashtra, India.

Vol. 24 3. English. p. 290-296. 1976.

Sixteen profiles representing eleven series of black soils were sampled in the Tungabhadra catchment in Karnataka. The content and distribution of K was not related to K content of the parent materials, and total K was unrelated to other K fractions. However, nitric acid-soluble, exchangeable, citric acid-soluble and water-soluble fractions were intercorrelated, and the exchangeable and citric acid-soluble fractions were correlated with silt, clay, and organic matter contents, pH and CEC.

0586

**Kaloga, B.**
Etude pedologique des bassins versants des voltas Blanche et Rouge. 3. Sols associes aux vertisols, sols bruns eutrophes et sols halomorphes; Soil study of the basins of the Red and White Voltas. 3. Soils associated with Vertisols: eutrophic Brown soils and halomorphic soils. France Office Recn Sci Tech Outre-mer Cah Orstom Pedol.

French. 1970. Vol.8 (2). 187-218.

English summary. Bibliography. p. 218.

0587

**Kalpage, F. S. C. P.; Wong, H. H.**
Studies on phosphorus in Malaysian soils I. Characterization of soil P. Malaysian Applied Biology. Fac. of Agric., Univ. of Malaya.

Vol. 7 1. English. p. 73-80. 1978.

Total, inorganic and organic P in top soil (0-15 cm) and subsoil (15-90 cm) samples were determined on eighteen uncultivated soils from four soil Orders in the wet humid tropics of West Malaysia. Total P varied from 49 ppm to 888 ppm with an overall mean of 366 ppm. Mean values for different Orders were: Oxisols (611 ppm) ) Entisols (348 ppm) ) Inceptisols (286 ppm) ) Ultisols (201 ppm). Inorganic P and organic P were generally greater in Oxisols than in all other soil Orders and were more in surface soil than in subsoil. Iron phosphates were predominant in all soils. Occluded iron and aluminium phosphates showed a very high degree of correlation with free iron. Multiple regression analyses indicated that total P and inorganic P were significantly correlated with clay content, pH and organic carbon, while organic P gave significant regression coefficients with clay content and organic carbon.

0588

**Kang, B. T.; Donkoh, F.; Moody, K.**
Soil fertility management investigations on benchmark soils in the humid low altitude tropics of West Africa: investigations on Egbeda soil series Alfisol, corn and sweetpotato yields, fertilizers. Agron J. UTHER US.

Jul/Aug 1977. Vol.69 (4): 651-656. Ref.

0589

**Kang, B. T.; Okoro, E. G.**
Response of flooded rice grown on a vertisol from northern Nigeria to zinc sources and methods of application. Plant and Soil. International Institute of Tropical Agriculture, Ibadan, Nigeria.

Vol. 44 1. English. p. 15-25. 1976.

Greenhouse and laboratory studies were conducted to study the effect of zinc sources and methods of application on correcting zinc deficiency in flooded rice grown on Vertisol from Ngala, northern Nigeria, using the variety IR-20. Plant dry matter yield was similar for ZnSO4, ZnEDTA, metallic Zn and fritted Zn with mixed soil application. Zinc uptake was affected in the following order: ZnSO4 ) ZnEDTA ) metallic Zn ) fritted Zn. Comparable dry matter yield and zinc uptake were obtained with mixing, surface broadcasting and banding of ZnEDTA. Mixing the fritted Zn gave higher dry matter yield and zinc uptake than broadcasting or banding. Seed soaking with a suspension of fritted Zn resulted in higher dry matter yield and zinc uptake than with ZnEDTA solution. Seed soaking for 24 hours with fritted Zn suspension at a concentration of about 0.5 per cent Zn appeared to be a suitable method for applying zinc with direct seeded rice.

0590

**Kang, B.T.**
Phosphorus response of maize grown on Alfisols of southern Nigeria. Agronomy journal.American Society of Agronomy.

v. 71 (5). English. p. 873-877.- ill. Sept/Oct 1979.

Madison, -The Society

0591

**Kanno, I**
A brief critique on the 7th Approximation of Soil Classification. Pedologist.

Japanese. June 1971. Vol.15 (1): 43-49. Ref.

0592

**Kao, C W; Blanchar, R W**
Distribution and chemistry of phosphorus in an albaqualf soil after 82 years of phosphate fertilization. Missouri. J Environ Qual.

Apr/June 1973. Vol.2 (2): 237-240. Ref.

0593

**Kar, S; Varade, S B; Subramanyam, T K; Ghildyal, B P**
Soil physical conditions affecting rice root growth: bulk density and submerged soil temperature regime effects. Agron J.

Jan/Feb 1976. Vol.68 (1): 23-26. Ref.

0594

**Kato, Y.; Matsui, T.**
Some applications of paleopedology in Japan. Geoderma. Fac. of Agriculture, Shizuoka Univ., Oya, Shizuoka, Japan.

Vol. 22 1. English. p. 45-60. 1979.

Paleosols in Japan consist of buried soils and relict soils. The former occur primarily in tephra deposit, whereas the latter occupy old land surfaces in various parts of the country. The buried soils affect construction of highways and urban development; the relict soils pose problems in forestry. The paleosols formed in tephra and buried by subsequent volcanic eruptions are chiefly Andosols with low bulk densities, low solid ratios, high specific surfaces and high water losses. These characteristics are responsible for poor engineering performance. Some buried soils in tephra are exceptions to the general rule and have desirable properties for construction. These have clay fractions low in allophane and high in layer-silicate minerals. The buried soils have provided approximate ages of human artifacts through radiocarbon dating of humic horizons. Conversely, identification of artifacts found in buried soils has helped to bracket their ages. Paleosols that are relicts are chiefly members of a Red-Yellow group, many of which seem to be Udults. The soils apparently began forming in warmer past periods but still persist on the land surface. Such soils are strongly acid and very low in plant nutrients, with low productivity when used for forestry or farming. Moreover, such soils are readily subject to erosion because of their landscape positions and poor plant cover.

0595

**Kato, Y.**
A dark montmorillonitic, vertisol-like soil from Japan. Kuala Lumpur, Malaysia; Malaysian Society of Soil Science. Faculty of Agriculture, Shizuoka University, Shizuoka City, Japan.

English. p. 11. 1977.

Abstracts of Papers. CLAMATROPS. Conference on Classification and Management of Tropical Soils, Kuala Lumpur, Malaysia, August 1977. A dark montmorillonitic soil on Miocene mudstone occurs at the foot of hilly land at Yui, Shizuoka Prefecture. The soil horizon sequence is A/Ag/Cg; soil texture is heavy clay; mottlings are common below a depth of 40 cm; development of cracks causes coarse blocky structure in the lower horizons. Chemical features noted are slightly acidic reaction, high value of CEC, high degree of cationic saturation and predominance of exchangeable calcium. Many of the values examined suggest the soil has affinities with grumusols, reguro or vertisols (vertic variants), except for a slight acidity and weaker development of cracks. The soil could be identified as an acidic and aqueous type of grumusol, humaquoll intergrading to peliudert, vertic humic gleysol

or pelosol. Because it occurs outside the general distribution area of vertisols or thereabouts, favorable conditions for the development of this vertisol-like soil must have prevailed. It is also inferred that the soil inherited abundant montmorillonite from the parent mudstone. At a lower part of the hill slope, in wet seasons, seepage water has maintained the clay under an expanding state, inhibiting inner drainage and leaching of bases; it has also ensured a sufficient supply of bases to the solum.

0596

**Katre, R K; Russell, M B**
Note on evapotranspiration by profile-depletion in deep Vertisol. Indian J Agric Sci.

Nov 1974 (pub. Dec 1976). Vol.44 (11): 781-782.

0597

**Kaufman, C. M.; Pritchett, W. L.; Choate, R. E.**
Growth of slash pine (Pinus elliottii Engelm. var. Elliottii) on drained flatwoods. Bulletin, Agricultural Experiment Stations, University of Florida. School of Forest Resources and Conservation, University of Florida, Gainesville, USA.

Vol. No.792. English. p. 30pp. 1977.

Tree survival averaged 77% after 5 years, and neither drainage nor bedding had significant effects on survival of improved or unimproved stock during that period. Fertilization with N and P significantly increased tree heights under all drainage conditions. Fertilized trees, with an average height of 3.87 m after five years, were 0.66 m, or 20%, taller than those not fertilized. There were no significant interactions in tree height growth between drainage or bedding and fertilization treatments. General drainage to a depth exceeding about 0.5 m serves no useful purpose and when combined with bedding can lead to excessive drying of the soil. Bedding appears to provide adequate surface drainage and removal of excess water from the root zone. Bedding also concentrates organic matter and increases the release of nutrients in the area of greatest root development, resulting in productive pine sites.

0598

**Kelley, G. E.; Edwards, W. M.; Harrold, L. L.; McGuinness, J. L.**
Soils of the North Appalachian experimental watershed. Miscellaneous Publication, United States Department of Agriculture. Soil Conservation Service, United States Department of Agriculture, Columbus, Ohio, USA.

Vol. No.1296. English. p. 145pp. 1975.

Physical, chemical, morphological and engineering properties are described for the nine soil series which occur on the watershed. The soils are classified as typic dystrochrepts, dystric fluventic eutrochrepts, typic fragiudalfs, aquultic hapludalfs, aquic hapludalfs, aeric fluvaquents and typic hapludults. A large number of representative profiles are described. Land capability is also described.

0599

**Keilogg, C.E.**
Why a new system of classification?. Soil Science.

Vol. 96, No. 1. p. 1-5. 1963.

0600

**Keng, J. C. W.; Uehara, G.**
Chemistry, mineralogy, and taxonomy of oxisols and ultisols. Proceedings, Soil and Crop Science Society of Florida.

Vol. 33. English. p. 119-126. 1974.

The physico-chemical properties of ultisols and oxisols are discussed and it is stressed that the colloids present in these soils are mainly of the constant surface potential type.

0601

**Keng, J.C.W.**
Fertilizer management with drip irrigation in an oxisol. Agronomy journal.

v. 71 (6). English. p. 971-980.- ill. Nov/Dec 1979.

Madison, Wis., -American Society of Agronomy.

0602

**Kesseba, A; Pitblado, J R; Uriyo, A P**
Trends of soil classification in Tanzania. I. The experimental use of the 7th approximation. J Soil Sci.

June 1972. Vol.23 (2): 235-247. Ref.

0603

**Kha, N.; Paquet, H.**
Mechanisms of the evolution and redistribution of clay minerals in pelosols. Bulletin, Sciences Geologiques.

Vol. 28 1. French. p. 15-28. 1975.

Pelosols (developed under a temperate climate) are characterized by a high percentage of clay and are often compared with vertisols. In pelosols, the swelling clay minerals are inherited from parent rock and are maintained almost unweathered. In vertisols, however, the typical clay mineral is montmorillonite, completely formed from the hydrolysis products of parent rock and stable inside the whole profile. At the most, it can be said that pelosols and vertisols are two groups of soils ensuring the stability of swelling clay minerals.

0604

**Khalid, R. A.; Silva, J. A.; Fox, R. L.**
Residual effects of calcium silicate in tropical soils: I. Fate of applied silicon during five years cropping. Soil Science Society of America Journal. Dep. of Agronomy and Soil Sci., Univ. of Hawaii, Honolulu, 96822, USA (J.A.S.).

Vol. 42 1. English. p. 89-94. 1978.

A field experiment was conducted at the Kauai Branch Station to study the long-term effects of calcium silicate applied to a Gibbsihumox soil. The fate of applied Si was determined during 5 years of cropping at one P level (280 kg/ha) and three pH levels (5.5, 6 and 6.5). Plant uptake by sugarcane plant and ratoon crops, corn, and seven harvests of kikuyugrass (Pennisetum clandestinum) accounted for 12 to 21% of the applied Si. Repeated extraction of profile samples taken at the end of 5 years with 0.1N acetic acid adjusted to pH 3.5 and containing 50 ppm P recovered 14 to 28% of the applied Si. There was no evidence that applied Si moved below the 30-cm soil depth. This indicated that 57 to 72% of the applied Si remained in the soil in some fixed form not readily displaced by phosphate solution. Water-soluble Si and plant uptake of Si decreased, while phosphate-extractable Si increased, as pH increased.

0605

**Khalid, R. A.; Silva, J. A.**
Soil plant relationships in oxisols. Kuala Lumpur, Malaysia; Malaysian Society of Soil Science. Center for Wetland Resources, Louisiana State University, 70803, USA.

English. p. 31. 1977.

Abstracts of Papers. CLAMATROPS. Conference on Classification and Management of Tropical Soils, Kuala Lumpur, Malaysia, August 1977. A 33 factorial field experiment was conducted on gibbsihumox soil to study the long-term effects of $CaSiO_3$ application adjusted to various P and pH levels. Response to the applied treatments was measured in sugar-cane plants and a ratoon crop, corn, and seven consecutive harvests of kikuyugrass grown during a five years' field experiment. Whole-plant and recently developed tissue samples were collected from the seventh harvest and analyzed for total Si, P, Al, K, Ca, Mg, Mn, and Zn. Soil samples were collected from the 0- to 15-cm depth after the seventh harvest and analyzed for Si, P, Al, sorbed P and pH. Multiple regression techniques were used to study the relationships between kikuyugrass yield in the seventh harvest and 40 variables that included initially applied treatment and soil and plant variables. Regression analyses indicate that initially applied Si, P, and pH treatments explained 62% of the yield variations in kikuyugrass. Soil factors that were most important for crop production included sorbed P, and $BaCl_2$-extractable Al. Plant nutrients which appeared to have a direct influence on yield were P, Mg, and K, Mn, Al, Zn and Ca.

0606

**Khalid, R. A.; Silva, J. A.**
Residual effects of calcium silicate in tropical soils: II. Biological extraction of residual soil silicon. Soil Science Society of America Journal. Dep. of Agronomy and Soil Sci., Univ. of Hawaii, Honolulu, 96822, USA (J.A.S.).

Vol. 42 1. English. p. 94-97. 1978.

A modified Neubauer seedling method utilizing rice as a test plant was employed to study the bioavailability of residual Si in a Hawaiian Gibbsihumox soil. Adsorbed soil Si was also removed with 0.1N acetic acid adjusted to pH 3.5 and containing 50 ppm P (phosphate solution). The results show that more Si was extracted by plant and ratoon crops of rice combined than by phosphate solution. Rice seedlings extracted proportionately more native Si than did phosphate solution, which resulted in comparable amounts of applied Si being recovered by the two methods, i.e., 8 to 30% for rice and 11 to 23% for phosphate extraction. The results of this study show that 55 to 72% of Si applied 5 years ago as calcium silicate was still adsorbed by or precipitated in the soil in a form that these techniques could not measure.

0607

**Khalifa, E.M.**
Study of clay skins in a Cecil (Typic Hapludult)soil. I. Composition and genesis. Soil Science Society of America, Proceedings.

Vol. 32, No. 6. p. 857-861. 1968.

0608

**Khan, A. A.; Zende, G. K.**
The site for Zn-P interactions in plants. Plant and Soil. Dep. of Agric. Chem. and Soil Sci., Mahatma Phule Agric. Univ., Rahuri, Maharashtra, India.

Vol. 46 1. English. p. 259-262. 1977.

In pot trials maize cv. Ganga Safed-2 and wheat cv. Safed Lerma were grown for 60 days on either a vertisol or ultisol treated with 0-20 ppm Zn and 0, 0.5 or 1 P-fixation capacity. Analysis of Zn and P contents of leaves, stems and roots showed that the negative correlation between Zn and P increased from roots to leaves and it was suggested that reciprocal inactivation of Zn and P occurs in the root and that translocation of these nutrients to upper plant parts is inhibited. Mobility ratios of Zn and P are presented for each soil treatment.

0609

**Khan, P. H.; Sing, T. A.; Sachan, R. S.**
Interrelationships among some soil test procedures, inorganic soil phosphorus fractions and rice growth in submerged soils. FAO, International Rice Commission Newsletter. Govind Ballabh Pant University of Agriculture & Technology, Pantnagar (Nainital), U.P., India.

Vol. 24 1. English. p. 40-52. 1975.

Studies were conducted with five mollisols to determine the interrelationships between Olsen's, Bray No.1, Bray No.2, and Morgan's inorganic P extracted by a fractionation scheme with citrate-dithionate-bicarbonate (CDB) proposed by Williams, et al. (1971), and rice growth. Changes in the available phosphorus after 60 days of submergence in relation to the inorganic phosphorus and rice growth and available phosphorus were also studied. 0.1 N NaOH extractable phosphorus was significantly correlated with Olsen's P, Bray's No.1 and Morgan's P, but non-significantly with Bray No.2 P. The CDB extractable phosphorus fraction was correlated well with all the soil test methods. The alkali extractable phosphorus fraction was the major contributor to the available phosphorus extracted by Olsen's, Bray No.1 and Morgan's extractants. Olsen's P was significantly correlated with straw and grain yield. Bray No.1 P was significantly correlated with straw yield, but not with grain yield; on submergence it was significantly correlated with both straw and grain yield. Phosphorus uptake by straw and grain showed a significant correlation with Olsen's P, Bray's No.1 and Morgan's P. CDB extractable phosphorus showed a significant correlation with straw yield and P uptake by straw.

0610

**Khanna, S.S.**
Physico-chemical characteristics of Hissar soils and their classification based on the 7th approximation. Punjab Univerisity, Journal of Research.

Vol. 5. English. p. 158-165. 1968.

0611

**Kharkar, P. T.; Deshmukh, V. A.**
Effect of moisture conditions on the availability of potassium and its uptake by the local and improved varieties of cotton and jowar. Bulletin. Indian Society of Soil Science. Punjabrao Krishi Vidyapeeth, Akola, Maharashtra, India.

Vol. No.10. English. p. 213-218. 1976.

Availability of potassium in black soil of Akola increased with the increase in soil moisture. Uptake of potassium and yield of cotton and jowar increased with decrease in the soil moisture up to a certain level beyond which they decreased. Improved varieties of cotton as compared with the local ones gave lower yields under all the moisture conditions but the reverse was the trend for jowar.

0612

**Khasawneh, F. E.; Hashimoto, I.; Sample, E. C.**
Reactions of ammonium ortho- and polyphosphate fertilizers in soil: II. Hydrolysis and reactions with soil. Soil Science Society of America Journal. Soils and Fertilizer Res. Branch, National Fertilizer Development Cent., TVA, Muscle Shoals, Alabama 35660, USA.

Vol. 43 1. English. p. 52-58. 1979.

Reactions of P from triammonium pyrophosphate (TPP), ammonium polyphosphate (APP), and diammonium phosphate (DAP) were investigated in replicated columns of Hartsells fsl soil (a Typic Hapludult) incubated for 1, 2 or 4 weeks at 25 deg C at a moisture content of 19%. The diffusive movement of P was accompanied by two major reactions: (i) hydrolysis of pyro- and polyphosphates to the orthophosphate form; and (ii) precipitation reaction of all phosphatic anions with soil. Hydrolysis of the water-soluble fraction of the condensed forms of P was rapid, with a half life that ranged from 9 to 16 days. Hydrolysis of the water-insoluble fractions was severely retarded by their insolubility and could not be measured in 4 weeks. Because the rate of hydrolysis was faster than that of diffusion, mobility of the pyro- and polyphosphates occurred largely in the orthophosphate form and accounted for the similarity of P movement among the three sources. The precipitation reactions of pyro- and polyphosphate were virtually complete in the 1st week, were irreversible and localized within well-defined zones, and accounted for nearly one-fourth of the added P. Precipitation of orthophosphates increased considerably with time and higher concentrations of water-soluble orthophosphate, and decreased by pyro- and polyphosphate competing for the same precipitating agents. Furthermore, orthophosphate precipitation was dispersed rather than localized and showed signs of reversibility. The total water-insoluble fractions after 4 weeks accounted for 58, 63, and 45% of added P from TPP, APP, and DAP, respectively.

0613

**Khengre, S. T.; Savant, N. K.**
Distribution pattern of inorganic nitrogen following annydrous ammonia injection into a Vertisol. Soil Science Society of America Journal. Dep. of Agric. Chemistry, Mahatma Phule Krisni Vidyapeeth, Rahuri, M.S., India.

Vol. 41 6. English. p. 1139-1141. 1977.

Distribution patterns of inorganic forms of N and diffusion coefficients of NH4+ were studied after injection of 800 mg of annydrous NH3-N per dish, each dish containing 1 kg of soil (Vertisol) maintained at 1/3-bar moisture percentage and incubated for 120 days. Bell-shaped distribution patterns of NH4+ and undissociated NH3(aq) were observed. Diffusion coefficients of NH4+ decreased with incubation time. During a 15-day incubation period, diffusion coefficients of NH4+ increased with increase in moisture content up to 36%, but decreased with further increase in moisture content. A temporary accumulation of NO2- was noticed up to 30 days at the periphery, but eventually NO2- was observed near the injection point through 90 days. Production of NO3- was first observed at the periphery followed by distribution throughout the retention zone.

0614

**Khubenov, G.**
The nature of mixed-layer minerals in smonitzas. Pochvoznanie i Agrokhimiya. Institut po Pochvoznanie "N. Pushkarov", Sofia, Bulgaria.

Vol. 8 1. Bu. p. 31-36. 1973.

addition to montmorillonite, hydromicas and kaolinite, mixed-layer minerals with an irregular alteration of layers occur in the clay fraction. The mixed-layer structure is formed by a combination of layers of the hyyromica type and swelling chlorite. The former amounts to 70-75% and the latter to 25-30%. It is suggested that clay mineral formation followed the pattern: hydromicas 'right arrow' hydromicas-chlorite 'right arrow' hydromicas-swelling chlorite 'right arrow' swelling chlorite 'right arrow' montmorillonite.

0615

**Kimpe, C. R. de; Martel, Y. A.**
Effects of vegetation on the distribution of carbon, iron, and aluminum in the B horizons of Northern Appalachian Spodosols. Soil Science Society of America Journal. Canada Agriculture, Ste-Foy, Quebec.

Vol. 40 1. English. p. 77-80. 1976.

The distribution of C, Al, and Fe was studied in the B horizons of Spodosols developed under coniferous and deciduous trees in Quebec and Maine. Vegetation affected the content of these elements mainly in the upper parts of the illuvial horizon. Differences were also observed in the fulvic acids which among organic fractions contributed the most to the formation of organometallic complexes. This may influence the classification of Northern Appalachian Spodosols.

0616

**Kimpe, C. R. de; Tabi, M.; Zizka, J.**
Influence of basic material on soil genesis in the Thetford-Black Lake area, Province of Quebec. Canadian Journal of Soil Science. Research Station, Agriculture Canada, Ste. Foy, Quebec.

Vol. 53 1. English. p. 27-35. 1973.

One profile derived from serpentine rock and three from till were sampled near the contact between the acidic and ultramafic deposits. Glacial activity and the input of dust from asbestos mining operations have slowed down the evolution of podzolic soils. The base saturation level in the B horizons reached 100% and pH values were high. The profile derived from serpentine rock and one from the till were classified as cryochrepts and the other two till soils as cryorthods.

0617

**King, L. D.; Morris, H. D.**
Land disposal of liquid sewage sludge: IV. Effects of soil phosphorus, potassium, calcium, magnesium, and sodium. Journal of Environmental Quality. Agronomy Department, University of Georgia Agricultural Experiment Station, Athens, Ga. 30601, USA.

Vol. 2 3. English. p. 411-414. 1973.

a two-year period, a total of 6.93, 13.75, 20.0 and 40.0 cm of liquid sewage sludge (6.2% solids) was applied to coastal bermudagrass on sandy clay loam (typic hapludult). The area was sod-seeded to rye (Secale cereale) during the winter. A chemical fertilizer treatment supplied a total of 722-177-366 kg/ha of N-P-K to the bermudagrass and rye during the experimental period. Sludge applications resulted in increased Na but decreased the dilute acid-extractable K, Ca, and Mg and had no effect on P. Chemical fertilizer increased P, decreased K, and did not affect Ca and Mg. Results indicate that additions of dolomitic limestone and supplemental K fertilizing would be required for sustained productivity of soils receiving sewage sludge.

0618

**King, R. H.; Brewster, G. R.**
Characteristics and genesis of some subalpine podzols (spodosols), Banff National Park, Alberta. Artic & Alpine Research.

Vol. 8 1. English. p. 91-104. 1976.

Two well-drained pedons within the subalpine ecotone at Bow Pass, Banff National Park, have been markedly influenced in their development by the chemical and physical composition of the parent materials. Of particular importance has been the presence of a surficial aeolian deposit containing significant amounts of volcanic ash of unknown origin. The pedogenic degradation of the ash component under strongly acidic conditions results in the formation of Ae horizons with a characteristic clay mineral suite dominated by montmorillonite, and podzolic B horizons containing high concentrations of amorphous iron and aluminum oxides. Some of these extractable Fe and Al oxides have been produced as a result of intensive weathering in situ rather than as a result of podzolization sensu stricto. An underlying calcareous till tends to restrict soil profile development; the sola of the Podzols are shallow and largely confined to the surficial aeolian deposit.

0619

**Kinjo, T; Pratt, P F; Page, A L**
Nitrate adsorption. III. Desorption movement and distribution in Andepts. Soils. Soil Sci Soc Amer Proc.

Sept/Oct 1971. Vol.35 (5): 728-732. Ref.

0620

**Kirby, R. M.; Matthews, E. D.**
Soil survey of Anne Arundel County, Maryland. Washington, D.C., USA: US Department of Agriculture.

English. p. 127 pp. 1973.

Thirty-three series (ultisols, entisols and inceptisols) are described and mapped on a scale of 1:20 000. Land use and management of the soils are recorded. Parent materials include sedimentary deposits of clay, sand, greensand, silt, marl and diatomaceous earth.

0621

**Kirschner, F.; McCarter, P.**
Soil survey of Elkhart County, Indiana. Washington, D.C., USA: US Department of Agriculture.

English. p. 96pp. 1974.

Thirty-six series (mainly alfisols, mollisols, histosols and entisols) are described and mapped at a scale of 1:20 000. Land use and management are recorded. Parent materials include glacial till and outwash, alluvium, aeolian sand and organic material.

0622

**Knibbe, W. G. J.; Thomas, G. W.**
Potassium-calcium exchange coefficients in clay fractions of some vertisols. Soil Science Society of America Proceedings. Texas A & M University, College Station, USA.

Vol. 36 4. English. p. 568-572. 1972.

From X-ray diffraction data and total K analyses of 4 vertisols, it was concluded that the highly montmorillonitic clay fractions were interstratified with mica. The Gapon coefficients (KG) of the soil clay fractions at high K saturation were 4 to 5 times higher than for bentonite and increased sharply with K saturation. Differences in affinity for K at low K saturation were related to mica content. Three sites were identified for K adsorption: edge interlayer sites of mica, wedge shaped sites forming between mica-montmorillonite layers, and planar sites on montmorillonite. Chemical analysis of the fine clay fraction of two vertisols indicated that the high charge density originated mainly in the octahedral layer.

0623

**Knibbe, Willem Gerard Johan; 1935**
Potassium-calcium equilibria in clay fractions of some vertisols. College Station.

1968. Vol.108 1. illus.

Thesis - Texas A&M University. Authorized facsimile by University Microfilms, Ann Arbor, 1970. Bibliography: leaves 91-97.

0624

**Knox, , E.G.**
Soil individuals and soil classification. Soil Science Society of America, Proceedings.

Vol. 29, No. 1. p. 78-84. 1965.

0625

**Knox, E G**
Criterios para diferenciacion de familias de suelos; sistema taxonomico americano (7a aproximacion); Criteria for differentiation of soil families; American taxonomic system (7th approximation). Monogr Inst Geogr "Agustin Codazzi" Dir Agrol.

Spanish. 1974. Vol.10 (8), 20 p.

0626

**Koinov, V.**
FAO 1:1,000,000 scale map of Europe (Bulgaria's soils in relation to the FAO classification). Pochvoznanie i Agrokhimiya. N. Poushkarov Institute of Soil Science, Sofia, Bulgaria.

Vol. 12 2. Bulgarian. p. 3-13. 1977.

The Bulgarian system accepted for the soil map of Europe, and begun in 1965, includes 23 main soil units. The main divisions represented in Bulgaria are: Fluvisols (alluvial-meadow), Gleysols (meadow-boggy), Regosols (eroded), Lithosols (undeveloped), Rendzinas (rendzinas), Rankers (shallow soils on silicate rocks), Vertisols (heavy clayey), Solonchaks (solonchaks), Solonetzes (solonetzes), Chernozems (chernozems), Phaeozems (low humus-containing chernozems), Cambisols (brown forest soils), Luvisols (grey and cinnamonic forest soils), Planosols (pseudopodzolic soils), Acrisols (zheltozems) and Histosols (peaty soils). A table showing the correlations between soil units in the FAO system and corresponding soil units in the Bulgarian system is given.

0627

**Kolling, J.; Stammel, J. G.; Kornelius, E.**
Effect of lime and phosphorus fertilizers on dry matter production in tropical legumes and on soil composition. 'dagger' . Agron. Sulriograndese. Campinas, Brazil; Brazilian Society of Soil Science.

Vol. 12-7. Portuguese. p. 254-260. 1976.

Annals of the Fifteenth Brazilian Congress of Soil Science. In a greenhouse experiment with an ultisol of pH 5.3 and containing 2.0 ppm P (North Carolina method), liming at 1.1 to 4.4 t/ha calcium and magnesium carbonate, and P at 180 and 360 kg/ha P2O5 increased yields of Macroptilium atropurpureum and Desmodium intortum, optimum pH for each crop being 5.5 and 5.9 respectively. Liming markedly decreased soil Al and Mn contents.

0628

**Kopas, F. A.**
Soil survey of Fayette County, Pennsylvania. Washington, D.C., USA; US Department of Agriculture.

English. p. 108pp. 1973.

Thirty-two series (alfisols, ultisols and inceptisols) are described and mapped on a scale of 1:20 000. Land use and management are given. Parent materials include sandstone, siltstone, shale and limestone.

0629

**Kornblium, E A; Liubimova, I N; Ivanov, A M**
The role of density and hardness changes in the formation of compact Chernozems (Vertisols) in the Kuban'. Pochvovedenie.

Russian. Jan 1977. Vol.1: 14-30. Ref. Eng. sum.

0630

**Kounetsron, D.; Robert, M.; Berrier, J.**
Smectite formation in vertisols. Comptes Rendus Hebdomadaires des Seances de l'Academie des Sciences, D. Ecole Normale Superieure, Atakpame Togo, B.P.no.1515, Lome, Togo.

Vol. 284 9. French. p. 733-736. 1977.

Smectite formation in Togo vertisols developed on biotite gneiss or amphibolites gives rise to aluminous beidellites. Scanning electron microscopy has demonstrated that these smectites can form from both mica and plagioclase, and the end products have similar properties and morphology. This indicates the overriding influence of the conditions of formation.

0631

**Kovar, J. A.; Dideriksen, R. I.; Fisher, C. S.**
Soil Survey of Crawford County, Iowa. Washington, D.C., USA; US Department of Agriculture.

English. p. 61 pp. 1973.

Seventeen series (mollisols, alfisols and entisols) are described and mapped at a scale of 1:15 840, and engineering and land-use interpretations are given. Parent materials include loess, glacial till, alluvium and aeolian sand.

0632

**Kowalik, P.; Loveday, J.; McIntyre, D. S.; Watson, C. L.**
Deep percolation during prolonged ponding of a swelling soil, and the effect of gypsum treatment. Agricultural Water Management. CSIRO Div. of Soils, Canberra, ACT, Australia (J.L.).

Vol. 2 2. English. p. 131-147. 1979.

A sodic clay soil (a Vertisol) was instrumented from a 5 m deep pit to avoid the problems of preferential cracking around surface installations. Infiltration rates and changes in water content and vertical swelling at a number of depths in the soil profile were measured during prolonged ponding (139 and 160 days on separate plots). Essentially no deep percolation in one plot contrasted with a substantial amount (6.6 mm/day) in the second, gypsum-treated plot, with resultant changes in

ground-water level. A method of calculating deep percolation is presented which takes into account the effects of swelling.

0633

**Krantz, B. A.; Kampen, J.; Russell, M. B.**
Soil management differences of Alfisols and Vertisols in the semiarid tropics. ASA American Society of Agronomy Special Publication. International Crops Res. Inst. for the Semi-Arid Tropics, Hyderabad, Andhra Pradesh, India.

Vol. No.34. English. p. 77-95. 1978.

Alfisols and Vertisols have distinctly different profile characteristics due mainly to the type and amount of clay. The water-holding capacities in the root zones of Alfisols and deep Vertisols in the Hyderabad area range from 50 to 100 mm and from 200 to 300 mm, respectively. In spite of their lower saturated hydraulic conductivity, deep Vertisols, due to surface cracks, have a higher initial intake rate and less runoff in the early rainy season storms than Alfisols. The greater early season runoff in the Alfisols provides opportunity for water collection. The requirement for supplemental irrigation during breaks in the monsoon is frequent on Alfisols and rare on deep Vertisols; crops on both soils benefit from supplemental water in the dry season. By timely tillage of deep Vertisols during the dry season, dry planting of sorghum, pigeonpeas and maize just before monsoon rains has been successful in 5 years of research at ICRISAT. Dry planting on Alfisols is hazardous. Based on 70 years of rainfall data at Hyderabad the median length of growing season on the Alfisols and Vertisols was calculated to be 17 and 26 weeks, respectively. Under the traditional system of farming of deep Vertisols (fallow during the rainy season), 3/4 or more of the rain is lost by evaporation, runoff and drainage. With the development of improved management systems and proper selection of crops, it is possible in most years to crop most deep Vertisols during both seasons. On Alfisols, intercropping and/or the availability of supplemental water facilitates growing two crops on at least part of the land. Land preparation and tillage can be done with bullock-drawn implements. The watershed-based farming system using a graded 150-cm bed and furrow system at 0.4-0.6% slopes with grassed waterways and small tanks shows potential for reduced soil erosion, effective rainfall use, improved surface drainage, supplemental irrigation, reduced risk, and greatly increased crop yields.

0634

**Krishnamoorthy, P.; Rajan, S. V. G.**
Genesis and classification of associated red and black soils under Rajolibunda Diversion Irrigation Scheme (Andhra Pradesh). Journal of the Indian Society of Soil Science. Indian Agric. Res. Inst., New Delhi.

Vol. 25 3. English. p. 239-246. 1977.

A black soil and a red soil developed in close proximity under similar climatic conditions are described and particle size distribution and chemical and physico-chemical properties are presented. The geology of the area is mainly a granitic-gneissic complex. The differences between the soils are attributed to minor differences in parent material mineralogy and topography.

0635

**Krustanov, S.; Kabakchiev, I.**
Humus in smolnitza-chernozems of Bulgaria. Transactions, 10th International Congress of Soil Science, II. Institut Pochvovedeniya Im. N. Pushkarova, Bulgaria.

Russian. p. 118-128. 1974.

Data for five soils developed over reworked deposits of various geological age indicated that parent material had little effect on humus composition. It is concluded that smolnitza humus is of the humate type.

0636

**Krustanov, S.; Kabakchiev, I.**
The effect of parent material on organic matter composition in mechanical fractions of smolnitzas. Pochvoznanie i Agrokhimiya. Institut po Pochvoznanie i Agrokimiya "N. Pushkarov", Sofia, Bulgaria.

Vol. 9 6. Bulgarian. p. 3-12. 1974.

Five smolnitza profiles, developed over redeposited weathering products from andesite, granite and limestone rocks were studied. The effect of the parent rock on humus composition is insignificant. The humus is of a humate type which contributes to the strong black coloration of smolnitzas. Organic matter in the acid extract consists of acid-soluble organic compounds, absorbed by the clay minerals. The presence of humus in the coarser fraction was due to its presence in Fe-Mn concretions.

0637

**Kulkarni, B. K.; Savant, N. K.**
Effect of soil compaction on root-cation exchange capacity of crop plants. Plant and Soil. Dep. of Agric. Chem. and Soil Sci., Mahatma Phule Agric. Univ., Rahuri 413 722, Maharashtra, India.

Vol. 48 2. English. p. 269-278. 1977.

A pot trial, a field experiment and a laboratory tube-study using clay loam vertisol (0-20 cm) were conducted to study the effect of soil compaction on root CEC of maize, sunflower, safflower, chickpea, pigeon pea, cowpea, soyabean and lentil. Over a bulk

density range studied (1.10-1.85 g/cm3), soil compaction increased root CEC on a unit wt. basis as well as on a unit surface area basis, probabl, due to increase in percentage of the N content of the roots and carboxyl groups on roots of the plants

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**Lafleur, K S**
Reaction of a Georgeville soil with Orange II and Meth,lene Blue Ultisols. Soil Sci.

June 1971 Vol 3 (6) 360-364

Bibliograph, p. 363-364.

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**LaFleur, K. S.**
Some surface properties of selected south Carolina ultisols. Soil Science Clemson Universit,, South Carolina, USA.

Vol 115 4 English p 288-293. 1973

These soils can be characterized by adsorption experiments using diverse molecules and ions as sorbates. Heating the soils produced artifacts which, considered with their unheated counterparts, gave supplementary soil differentiation. The characterization method offers clues to soil mineralog,, ranks amphoteric balance, and suggests practical technological strateg,

0640

**Lakkad, L.V**
Note on response of pearlmillet 'HB 3' to soil moisture regimes, nitrogen and phosphorus in the summer season. Gujarat Agricultural University, research journal.Gujarat Agricultural University.

v. 4 (1) English. p. 51-52.- ill. July 1978.

Ahmedabad, -The University,

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**Lakshminarayanan, S.**
Response of phosphorus in legume-cereal cropping sequence in a Mollisol. Journal of nuclear agriculture and biology.

v. 8 (1). English. p. 16-18.- ill. Mar 1979.

New Delhi, -Shri G. R. Sethi.

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**Lal, P.; Reddy, G. G.; Modi, M S.**
Accumulation and redistribution pattern of dry matter and N in triticale and wheat varieties under water stress condition. Agronomy Journal. Dep of Agron., G.B Pant Univ of Agric. and Tech., Pantnagar 263 145, U.P., India.

Vol 70 4 English. p 623-626 1978.

A field experiment conducted in 1973-4 on silt loam soil (Typic Hapludoll) at Pantnagar, India, included 5 cv each of triticale (Bronco 90, Armadillo PM 112, Armadillo PM 113, Armadillo PM 114 and Armadillo PPV 13) and wheat (C 306, K 65, K 68, Kalyansona and Sonalika). Plant samples were collected from a 0.125-m2 area for DM and N content studies in culm, lower leaf, flag leaf, chaff and grain at successive stages. The loss of DM from different plant parts was assumed to be translocated to the grains. Both triticale and wheat cv. differed greatly in their capacity to accumulate and redistribute DM and N. Triticale cv. Bronco 90 and Armadillo PM 112 and wheat cv. C 306 and K 65 accumulated greater amounts of DM and N than the other cv. DM losses, presumably because of translocation to the grain, varied from 12.9% (Armadillo PM 113) to 36.9% (Armadillo PM 112) in triticale, and from 19.2% (C 306) to 31.6% (K 68) in wheat. In translocation of N to grain, Bronco 90 (58.4%) and Kalyansona (61%) were the most efficient cv of triticale and wheat, resp. Armadillo PM 112 and C 306, the top yielding cv. in respect of grain, removed the largest quantities of N (75.7 and 59.3 kg N/ha). Triticale cv. generally removed larger amounts of N than wheat.

0643

**Lal, R**
Soil erosion on alfisols in western Nigeria. I. Effects of slope, crop rotation and residue management. Geoderma.

Dec 1976. Vol.16 (5): 363-375. Ref.

0644

**Lal, R**
Soil erosion on alfisols in western Nigeria. II. Effects of mulch rates. Geoderma.

Dec 1976. Vol.16 (5): 377-387. Ref.

0645

**Lal, R**
Soil erosion on alfisols in western Nigeria. III. Effects of rainfall characteristics. Geoderma.

Dec 1976. Vol.16 (5): 389-401. Ref.

0646

**Lal, R**
Soil erosion on alfisols in western Nigeria. IV. Nutrient element losses in runoff and eroded sediments. Geoderma.

Dec 1976. Vol.16 (5) 403-417. Ref

0647

**Lal, R**
Soil erosion on alfisols in western Nigeria. V. The changes in physical properties and the response of crops. Geoderma

Dec 1976. Vol 16 (5) 419-431. Ref

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**Lal, R; Wilson, G F, Okigbo, B N**
No-till farming after various grasses and leguminous cover crops in tropical Alfisol. I. Crop performance. Field Crops Res.

Feb. 1978. Vol 1 (1) 71-84. Ref

0649

**Lal, R.; Greenland, D. J.**
Effect of soil conditioners and initial water potential of a Vertisol on infiltration and heat of wetting. Chichester, UK, John Wiley & Sons. International Inst. of Tropical Agric., PMB 5320, Ibadan, Nigeria

English. p. 191-198. 1978

Modification of Soil Structure (Emerson, W.W., Bond, R.D., Dexter, A.R. - editors). The effects of soil conditioning treatments, Penetrant 400 (polyoxyethylene mixed alcohols) and bituminous emulsions, and initial soil water potential on infiltration into vertical columns of aggregates from a vertisol have been studied. Both treated and untreated aggregates were oven-dried and kept over silica gel (O.D.), or air-dried, or dried at a relative humidity of 98%. Some untreated aggregates were also dried over P2O5. Infiltration into the soil was increased by Penetrant and bitumen, independent of the initial potential of the soil. The infiltration rate into the P2O5 dry soil was much less than that into the untreated O.D. soil. The increase in height of the soil surface was also measured. Swelling was large and similar for all O.D. samples. For samples equilibrated at 98% r.h., both treatments reduced the swelling compared with the untreated soil. Increases in the temperature of the aggregates as the wetting front passed down the column were in the order untreated < bitumen < Penetrant. For O.D. aggregates, the rises were about 20 deg C whereas for aggregates equilibrated at 98% r.h. they were < 0.2 deg C.

0650

**Lal, R.**
Changes in properties of an Alfisol produced by various crop covers. Soil science.

v. 127 (6). English. p. 377-382.- ill. June 1979.

Baltimore

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**Lal, R.**
Influence of six years of no-tillage and conventional plowing on fertilizer response of maize (Zea mays L.) on an Alfisol in the Tropics (in southwestern Nigeria). Soil Science Society of America journalSoil Science Society of America.

v. 43 (2). English. p. 399-403.- ill. Mar/Apr 1979.

Madison, Wis.

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**Lal, R.**
Clearing a tropical forest. I. Effects on (Alfisol) soil and microclimate (in southern Nigeria). Field crops research.

v. 2 (2). English. p. 91-107.- ill. Oct 1979.

Amsterdam, ~Elsevier Scientific Pub. Co.

0653

**Lambert, E N; Seaforth, C E; Ahmad, N**
The occurrence of 2-methoxy-1,4-naphthoquinone in Caribbean Vertisols. Soil Sci Soc Amer Proc.

May/June 1971. Vol.35 (3): 463-464 Ref.

0654

**Lane, H. C.; Bright, W. E.; Tyer, M. C.; Smith, W. I.**
Soil Survey of Pontotoc County, Mississippi. washington, D.C., USA; US Department of Agriculture.

English. p. 72pp. 1973.

Thirty-one series (alfisols, entisols, ultisols and inceptisols) are described and mapped at a scale of 1:20 000. Parent materials are sands, clays and shales partly overlain by loess.

0655

**Langohr, R.; Scoppa, C. O.; Wambeke, A. Van**
The use of a comparative particle size distribution index for the numerical classification of soil parent materials: application to Mollisols of the Argentinian pampa. Geoderma. University of Ghent, Belgium.

Vol. 15 4. English. p. 305-312. 1976.

A method to estimate the magnitude of discontinuities or similarities in parent materials having equivalent mineralogical composition is proposed. It is based on a particle size distribution index which compares for two samples the weight percentages of all fractions taken between selected size limits. The indexes form a matrix and are used to construct a dendrogram which illustrates the clustering into groups. The calculations are carried out by computer using a Fortran programme. The technique was applied to a set of Mollisols samples in the humic undulating pampa in Argentina and good agreement with field observations was obtained.

0656

**Lanyon, L. E.; Naghshineh-Pour, B.; McLean, E. O.**
Effects of pH level on yields and composition of pearl millet and alfalfa in soils with differing degrees of weathering. Soil Science Society of America Journal. College of Agriculture, Jundi Shapur University, Ahwaz, Iran.

Vol. 41 2. English. p. 389-394. 1977.

In a pot experiment in which millet and lucerne were grown sequentially on the soil from the top horizons of eight soils (Mollisols, an Alfisol, Ultisols and Oxisols) weathered to widely differing degrees, the response of the two crops to the application of Ca(OH)2 was different and varied with the degree of weathering of the soil.

0657

**Lanyon, L.E.**
Dissolution of selected rocks and minerals in a dilute salt solution as influenced by temperature regime (Soil development/aspect relationships). Soil Science Society of America journalSoil Science Society of America.

v. 43 (1). English. p. 192-195.- ill. Jan/Feb 1979.

Madison, Wis.

0658

**Larson, E.J.**
New soil classification: What will it mean to the soil survey user when the revised system goes into effect?. Soil Conservation.

Vol. 20, No. 5. p. 99-102 1964.

0659

**Latham, M.**
The soils of a massif of ultrabasic rocks, Le Boulinda, on the west coast of New Caledonia. Part 1. The distribution of the soils in the massif. Humiferous soils. Cahiers ORSTOM. Pedologie. Centre ORSTOM de Noumea, BP A5 Noumea-Cedex, New Caledonia.

Vol. 13 1. French. p. 27-40. 1975.

The massif consists of a mass of peridotites above a layer of serpentinites. Humiferous soils or rankers with mor occur above 1200 m. These humus accumulations may be very thick, are very acid, and appear to cause a redistribution of Fe in the subjacent mineral horizon. The facies of the ferric ferrallitic soils occurring between 1200 m and 650-250 m is greatly affected by the geomorphological history of the massif. Soils in which there has been a recombination of Si, Fe and Mg occur between 650-250 m and 10 m. The eutrophic brown soils on the eroded slopes give way to the vertisols of the ancient alluvial plain, where there are also patches of magnesic brown soils on ancient glooertite crusts.

0660

**Lathwell, D. J.; Dubey, H. D.; Fox, R. H.**
Nitrogen-supplying power of some tropical soils of Puerto Rico and methods for its evaluation. Agronomy Journal. Cornell University, Ithaca, New York, USA.

Vol. 64 6. English. p. 763-766. 1972.

Four chemical extraction methods (1.0 N KCl, 1.0 K2SO4, 0.01 M CaCl2 + K2SO4, 0.5 N Na4P2O7 + 0.5 N K2SO4) and an aerobic incubation procedure were used to obtain an index of N availability in ten representative oxisols and ultisols of Puerto Rico. N produced during incubation was highly correlated with N released to four consucutive crops in the greenhouse. N extracted by all the chemical methods, particularly N extracted by 0.01 M CaCl2 + K2SO4 solution, was highly correlated with N uptake by plants. Results showed that substantial quantities of N can be removed from these soils upon cropping, and that chemical extraction as well as incubation procedures provide a reliable means for evaluating their N-supplying power.

0661

**Latterell, J. J.; Dowdy, R. H.; Ham, G. E.**
Sludge-borne metal uptake by soybeans as a function of soil cation exchange capacity. Communications in Soil Science and Plant Analysis. Soil Science Department, University of Minesota, St.Paul, MN 55108, USA.

Vol. 7 5. English. p. 465-476. 1976.

Trace metal uptake into soybean shoots as a function of cation exchange capacity (CEC) was studied. A Typic Hapludoll soil having a CEC adjusted to between 18.5 to 5.2 meq/100 g by dilution with sand and a pH of 6.6 was used in a growth chamber experiment. For a given sludge application rate (23.2 or 46.7 mt/ha) sludge-borne Cd, Zn, Cu, Cr, and Pb uptake remained constant as the soil CEC increased. The Cd uptake reached a maximum as the sludge application rate of 23.3 mt/ha. Zn and Ni uptake increased and Cu, Cr, and Pb uptake remained constant as application rate increased. At all sludge application rates dry matter yields did not vary widely as the soil CEC increased.

0662

**Lavado, R.S.**
Some causes of variability in the salt content of a pampas Salonthid soil and its effect on the sample. Turrialba

v. 28 (4). Spanish. p. 315-323. ill. Oct/Dec 1978.

San Jose, Costa Rica, Instituto Interamericano de Ciencias Agricolas.

0663

**Laverdiere, M R; Weaver, R M; D'Avignon, A**
Characteristics of the mineral constituents of some albic and spodic horizons as related to their charge properties. Can J Soil Sci.

Aug 1977. Vol 57 (3): 349-359. Ref.

0664

**Laverdiere, M. R.; Weaver, R. M.**
Charge characteristics of spodic horizons. Soil Science Society of America Journal. Cornell University, Ithaca, NY 14853, USA

Vol. 41 3. English. p. 505-510. 1977.

Investigations on the charge properties of six Spodosol Bir horizons showed that the horizons react electrochemically as constant potential systems, with the sign and magnitude of the net surface charge being dependent upon the pH and electrolyte concentration of the ambient solution. Evidence was found for the presence of some clay minerals with a permanent net negative charge.

0665

**Lavkulich, L M; Rowles, C A**
Effect of different land use practices on a British Columbia spodosol. Soil Sci.

May 1971 Vol.111 (5): 323-329.

Bibliography: p. 328-329.

0666

**Leahy, A.; The Canadian system of soil classification and the seventh approximation.**
Soil Science Society of America, Proceedings.

Vol. 27, No. 2. p. 224-225. 1963.

0667

**Leal, J R; Velloso, A C X**
Dessorcao do fosfato adsorvido em latossolos sob vegetacao de cerrado. I. Reversibilidade da isoterma de adsorcao em relacao a concentracao de fosfato; Desorption of phosphate in oxisols covered by humid brush land cerrado. I. The reversibility of the adsorption isotherm with respect to phosphate concentration. Pesqui Agropecu Bras, Ser Agron.

Portuguese. 1972. Vol.7: 193-197. Ref. Eng. sum.

0668

**Leamy, M L**
Elephants and Oxisols. Soil surveys. N Z Soil News.

June 1971. Vol.19 (3): 83-84.

0669

**Leamy, M.L.**
Conversations in taxonomy. 1. Mollic epipedon. epipedon. New Zealand Soil News.

Vol. 26 No. 1. p. 48-51 1978.

Reprinted in Soil Survey Horizons, vol.19, No.2, p.11-13, 1978.

0670

**Leamy, M.L.**
Conversations in taxonomy. 2. Anthropic, umbric, and plaggen epipedons. New Zealand Soil News.

Vol. 26, No. 3. p. 63-64. 1978.

Reprinted in Soil Survey Horizons, Vol.19, No.3, p 7-9, 1978

0671

**Leamy, M.L.**
Conversations in taxonomy. 3. The argillic horizon. New Zealand Soil News.

Vol. 26, No. 6. p. 195-197. 1978.

Reprinted in Soil Survey Horizons, Vol.20 , No. 1, p 6-9, 1979.

0672

**Leamy, M.L.**
Conversations in taxonomy. 4. Agric, natric, and sombric horizons. New Zealand Soil News.

Vol. 27, No. 1. p. 28-29. 1979.

Reprinted in Soil Survey Horizons, Vol.20, No.2, p 7-8, 1979.

0673

**Leamy, M.L.**
Conversations in taxonomy. 5. Spodic and cambic horizons. New Zealand Soil News.

Vol. 27, No. 2. p. 43-47. 1979.

Reprinted in Soil Survey Horizons, Vol. 20, No.4,p 16-20, 1979.

0674

**Leamy, M.L.**
Oxisols of the South Pacific. Second International Soil Classification Workshop, Proceedings.

Vol. 1. p. 155-200. 1979.

Soil Survey Division, Land Development Department, Thailand.

0675

**Leao, A. C.; Silva, L. F. da**
Detailed soil survey of the Gregorio Bondar Experimental Station. Boletim Tecnico, CEPLAC, Centro de Pesquisas do Cacau, Itabuna, Bahia, Brazil.

Vol. No.40. Portuguese. p. 24pp. 1976.

An area of 710 ha was surveyed. Climatic, geological and topographical data are presented, and 5 profiles are described representing oxisols, histosols and spodosols. The agricultural potential of the soils is briefly discussed.

0676

**Lee, C. R.; MacDonald, M. L.**
Influence of soil amendments on potato growth, mineral nutrition, and tuber yield and quality on very strongly acid soils. Soil Science Society of America Journal. Agriculture Canada, Research Station Fredericton, New Brunswick, Canada.

Vol. 41 3. English. p. 573-577. 1977.

Soil amendments designed to modify the fertility of very strongly acid Ultisols were evaluated with potatoes in greenhouse soil cultures. Dolomite, superphosphate, magnesium sulphate, and cow manure were found to improve the growth and tuber yield. Potassium bicarbonate or Fe chelate did not improve potato production on a very strongly acid Ultisol.

0677

**Lee, G B; Manoch, B**
Macromorphology and micromorphology of a Wisconsin saprist Histosols. SSSA Spec Publ (Soil Sci Soc Am).

1974. Vol.6: 47-62. Ref.

0678

**Lee, G.B.**
Macromorphology and micromorphology of a Wisconsin saprist. Histosols, their characteristics, classification, and use.

No. 6. p. 47-61. 1974.

Soil Science Society of America, Special Publication.

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**Leighty, R G; Buol, S W**
Histosols--areas predominated by organic soils. South Coop Ser. EXP STN.

Mississippi, Agricultural Experiment Station Arkansas, Agricultural Experiment Station Louisiana, Agricultural Experiment Station U.S., Soil Conservation Service. 1973. Vol.174. 92-94.

0680

**Lemos, R. C. de**
Soils derived from basic igneous rocks in Southern Brazil. Agron. Sulriograndese. Campinas, Brazil; Brazilian Society of Soil Science. Universidad Federal de Santa Maria, Brazil.

Vol. 12 - 2. Portuguese. p. 351-358. 1976.

Annals of the Fifteenth Brazilian Congress of Soil Science. These soils cover an area of 350 000 km2 and include mollisols, vertisols, oxisols, ultisols, and inceptisols. Their formation is discussed in relation to their mineral and clay mineral content.

0681

**Leon S, L A; Pratt, P F**
Efectos agronomicos de la retencion y lixiviacion de nitratos en dos Andepts de Colombia; Agronomic effects of nitrate retention and leaching in two Andepts of Colombia. Soils. Turrialba.

Spanish. Oct/Dec 1974. Vol.24 (4): 408-413. Eng. sum.

0682

**Leon, L.**
Residues, degradation and behavior of (the herbicide) ametrine in a vertisol from Guanacaste, Costa Rica. Turrialba.

v. 28 (1). Spanish. p. 3-7.- ill. Jan/Mar 1978.

San Jose, Costa Rica, -Instituto Interamericano de Ciencias Agricolas.

0683

**Lepsch, I. F.; Buol, S. W.; Daniels, R. B.**
Soil-landscape relationships in the Occidental Plateau of Sao Paulo State, Brazil: II. Soil morphology, genesis and classification. Soil Science Society of America Journal. North Carolina Agricultural Experiment Station, Raleigh, NC 27607, USA.

Vol. 41 1. English. p. 109-115. 1977.

Nine profiles were characterized following detailed geomorphic and soil mapping of a 70 km2 area. Oxisols were present on sandy surficial deposits on stable geomorphic surfaces and Ultisols and Alfisols on the adjacent erosional surfaces. Mollisols were formed on erosional surfaces in calcareous sandstone containing attapulgite and smectite. Oxic horizons were apparently transformed to argillic horizons when exposed on younger erosional surfaces.

0684

**Lepsch, I. F.; Buol, S. W.**
Investigations in an Oxisol-Ultisol toposequence in S.Paulo State, Brazil. Soil Science Society of America Proceedings. North Carolina Agriculture Experiment Station, Raleigh, N.C., USA.

Vol. 38 3. English. p. 491-496. 1974.

Oxisols were found on the upper and Ultisols on the lower part of the toposequence as the oxic horizon was submerged by an argillic horizon. The Ultisols decreased in gibbsite and chlorite/vermiculite intergradient mineral content, had a lower ratio of fine to coarse clay, but increased in illuviated clay content and bulk density.

0685

**Lepsch, I. F.; Valadares, J. M. A. S.**
Detailed survey of soils of the Pindorama Agricultural Experimental Station, Sao Paulo. Bragantia. Instituto Agronomico, Sao Paulo, Brazil.

Vol. 35 1. Portuguese. p. 13-40. 1976.

The soils are classified as Tropudalf, Tropudult, and Paleudult. Tropudalfs are predominant and cover 56.8% of the area (532.8 ha). Representative profiles are described and a soil map at the scale of 1/10000 is included.

0686

**LeRoux, J**
Quantitative clay mineralogical analysis of natal oxisols. Soil Sci.

Feb 1973. Vol.115 (2): 137-144. Ref.

0687

**Lewis, D. T.**
Subgroup designation of three Udolls in southeastern Nebraska. Soil Science Society of America Journal. Univ. of Nebraska, Lincoln.

Vol. 41 5. English. p. 940-945. 1977.

Three soil series that are presently within the Aquic Argiudolls have properties that suggest that a different suborder designation might more accurately represent them. Cla, content, COLE, cracking, and potential linear extensibility, indicate that they might be better placed within a Vertic or Ustertic subgroup.

0688

**Liao, C F H; Bartholmew, W V**
Nitrate absorption and transport by corn plants in soil system under different moisture regimes. In Proceedings of the International Seminar on Soil Environment and Fertility Management in Intensive Agriculture.

1971. Vol.p. 625-633. Ref

0689

**Lima, V C; Dematte, J L I; Moniz, A C**
Mineralogia da argila do Rubrozem (Palenumult), bacia de Curitiba, Parana. Mineralogical aspects of Rubrozem soils (a Palenumult) from Curitiba, Parana State Brazil. Rev Bras Cienc Solo.

Portuguese. Ma./Dec 1977. Vol 1 (2/3). 81-85. Ma. Ref. Eng. sum

0690

**Linder, H; Kleu, B; Schultz, D; Frielinghaus, M**
Uber die Wirkung der Tieflockerung und Tiefdungung auf einer Fahlerde (Palevo-Dernovopodsolist, P., arenic Glossoboralf) auf sas Bodengefuge, die Durchwurzelung des Bodens und den Ertrag; The effect of deep loosening and deep introduction of fertilizers on the structure of sod-podzolic soil (arenic Glossoboralf), root penetration and crop yield. Trans Int Congr Soil Sci.

German. 1974. Vol.10th (v. 1). 281-287. Eng. sum.

0691

**Link, E. G.**
Soil survey of Fond du Lac County, Wisconsin. Washington, D.C., USA; US Department of Agriculture

English. p. 115pp. 1973.

Fifty-one series (mainl, alfisols, mollisols and histosols) are described and mapped on a scale of 1 15 840. Land use and management are recorded. Parent material is mainly glacial till, with a few organic, alluvial and lacustrine deposits.

0692

**Lo, R. Y.**
Relation of geological and geomorphological factors to forest soils in Kiangsu. Acta Pedologica Sinica. Nanking Technical Institute of Forest Products, China.

Vol. 15 1. Chinese. p. 23-31. 1978

Some great soil groups such as fossil red earth (paleudult), cla,pan soil (planosol), skeletal soil (lithosol), dark basic soil (related to andosol), rendzina and vadose soil were tentatively classified in accordance with structural features of rocks, geomorphological types, properties of rocks and the Quarternary deposits. The slopes are not merely weathered layers under the influence of recent climatic conditions or simply deposited strata, but are complexes affected by the paleoclimate of the Quarternary period. Geomorphologically a typical soil profile at the lower slope or foot of a mountain or hill may represent the main soil group of this area. However, it may not be the typical soil of the recent bioclimatic zone. For example, the typical soil profile at the foot of Niusou hill near Nanking is not a yellow brown earth as previously stated, but a buried fossil red earth. The effect of structural features of rocks, geomorphological types and hydrogeological conditions on soil properties and tree growth is described.

0693

**Lobato, E.; Goedert, W. J.**
Increasing the productivity of Brazilian Cerrado soils. Tokyo, Japan; Society of the Science of Soil and Manure. Centro de Pesquisa Agropecuaria dos Cerrados, Brasilia, Brazil.

English. p. 462-471. 1977.

Proceedings, International Seminar on Soil Environment and Fertility Management in Intensive Agriculture (SEFMIA), Japan 1977. About two million square km of central Brazil are covered by Cerrado (savannah) vegetation, which is associated with low natural soil fertility, due to high acidity and nutrient deficiencies, mainly of phosphorus. During 4-year experiments on dark red latosol (Haplustox), liming in the first year (to

neutralize exchangeable aluminium) and broadcasting phosphate (200 kg P205/ha in the first year plus annual row maintenance applications) both gave satisfactory results. A deep incorporation of lime, and possibly of phosphate, induced better root development, which significantly increased the production, probably due to crop resistance to the normal dry spells occurring during the rain, season.

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**Lobova, E.V.**
A short review of the main systems of soil classification in the European countries and U.S.A. Soviet Soil Science.

No. 2. English. p. 111-120. 1965.

Translated from the Russian. Pochvovedeniya, No.2, p. 1-11, 1965.

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**Loganathan, P.; Swindale, L.D.**
The properties and genesis of four middle altitude dystrandept volcanic ash soils from Mauna Kea, Hawaii. Pacific Sci.

Apr. 1969. Vol. 23(2). 161-171. map.

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0696

**Loganathan, S.; Krishnamoorthy, K. K.**
Studies on the morphological, physical and chemical properties in certain black, red, alluvial and laterite soil profiles of Tamil Nadu. Mysore Journal of Agricultural Sciences. Department of Soil Science, Tamil Nadu Agricultural University, Coimbatore, India.

Vol. 10. 4. English. p. 584-598. 1976.

0697

**Lopes, A. S.; Cox, F. R.**
A survey of the fertility status of surface soils under "Cerrado" vegetation in Brazil. Soil Science Society of America Journal. North Carolina Agric. Exp. Sta., Raleigh, USA.

Vol. 41. 4. English. p. 742-747. 1977.

518 topsoil samples were collected from central Brazil. These soils have extremely low levels of extractable Ca, Mg, P, and Zn. The effective cation exchange capacity, derived mainly from organic matter which is usually between 1.5 and 3.0%, is also low due to very acid conditions. These conditions are expressed by a low soil pH and a high degree of Al saturation. The majority of these soils are Oxisols; there is a broad range in their texture.

0698

**Lopez, M.A.L.; Escolar, R.P.A.**
Mathematical approach to evaluating the influence of various factors on the stability of aggregates in vertisols. P.R. Univ. J. Agr.

Jan. 1969. Vol.53 (1): 57-60.

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**Lorio, P.L. Jr.**
Ground-water levels and soil characteristics in a forested Typic Glossaqualf. USDA For. Serv. Res. Note SO. U.S. South. For. Exp. Stn. USDA.

U.S., Southern Forest Experiment Station. 1977. Vol.225. 5 p. Map.

0700

**Lotse, E.**
The new American system for soil classification. Grundforbattring.

Vol. 17. Swedish. p. 247-265. 1964.

0701

**Lotse, E.G.; Datta, N.P.; Tomar, K.P.; Motsara, M.R.**
Mineralogical composition of some red and black soils of India. Proceedings of the Indian National Science Academy, B. Nuclear Research Laboratory, Indian Agricultural Research Institute, New Delhi-110012.

Vol. 40. 2. English. p. 216-226. 1974.

The Red Soils were formed from granites and gneisses under conditions of good drainage. The Black Soils were formed from micaceous schists, gneisses, and basalts under conditions of poor drainage. Kaolinite was found to be the predominant clay mineral in the Red Soils, illite, quartz, felspar, and in a few cases montmorillonite, vermiculite, and chlorite also being present in small amounts. The silt and clay fractions of the Black Soils were montmorillonitic in character. Small amounts of kaolinite, illite, chlorite, quartz, and felspar were also present. The concentration of montmorillonite was higher in the medium and fine and the coarse clay fractions than in the silt fraction. It was suggested that the Red Soils have developed in material eroded from an Old Laterite layer covering southern India during the two latest epochs of the Tertiary period.

0702

**Lu, J. G.**
Effect of cultivation on the physical properties of a red soil (oxisol). Acta Pedologica Sinica. Zhejiang Agricultural College, China

Vol. 16 1. Chinese p. 63-69. 1979.

The soil (situated on rolling land in Jukian County, western Zhejiang Province), when cultivated, usually develops a friable surface layer which reduces evaporation, improves soil moisture conditions, and provides a higher soil temperature during winter. Micro-aggregates, of 0.05-0.01 mm diameter increased in the surface soil as cultivation proceeded, but these aggregates become dispersed under flooded conditions. The physical conditions of paddy soils could be improved by manure application.

0703

**Lucas, L N; Blue, W G**
Effects of lime and phosphorus on selected alluvial entisols from eastern Costa Rica. II. Forage plant responses.Digitaria decumbens. Trop Agr (St Augustine)

Jan 1972 Vol.50 (1) 63-74. Ref.

0704

**Lucas, L N; Blue, W G**
Effects of lime and phosphorus on selected alluvial entisols from eastern Costa Rica. I Phosphorus retention and soil phosphorus fractions. Trop Agr (St Augustine).

Oct 1972 Vol.49 (4) 287-295. Ref.

0705

**Lueth, R. A.**
Soil survey of Hennepin County, Minnesota. Washington, D.C., USA; US Department of Agriculture.

English. p. 159pp. 1974.

Forty-six series (mainly mollisols, alfisols and histosols) are described and mapped on a scale of 1 15 840. Land use and management are described. Parent materials include glacial till, glaciolacustrine deposits, glacial outwash and recent alluvium.

0706

**Lufficgo, M; Garcia Rodriguez, A; Gallardo, J F**
Contribucion al estudio de los suelos histicos y gleis de lavertiente norte de la Sierra de Gredos; Study of Histosol and Gleisol soils of the northern slope of the Sierra de Gredos. Anu Cent Edafol Biol Apl Inst Orientac Asist Tec Oeste.

Spanish. 1977. Vol.7 155-177. Ref. Eng sum.

0707

**Lugo-Lopez, M A; Badillo-Feliciano, J; Calduch, L**
Performance of oilseed sunflower cultivars in an Oxisol in northwestern Puerto Rico. J Agric Univ P R. EXP STN

Puerto Rico, Agricultural Experiment Station Puerto Rico, University. Apr 1977. Vol.61 (2): 200-203.

0708

**Lugo-Lopez, M A; Badillo-Feliciano, J; Calduch, L**
Response of native white beans, Phaseolus vulgaris, to various N nitrogen levels in an Oxisol Kidney beans. J Agric Univ P R. EXP STN.

Puerto Rico, Agricultural Experiment Station Puerto Rico, University. Oct 1977. Vol.61 (4): 438-442. Ref.

0709

**Lugo-Lopez, M A; Rivera, L H**
Taxonomic classification of the soils of Puerto Rico. 1975. Bull P R Agric Exp Stn. EXP STN.

Puerto Rico, Agricultural Experiment Station. June 1976. Vol.245, 32 p.

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**Lugo-Lopez, M.A.**
Updated taxonomic classification of the soils of Puerto Rico. 1977. Bulletin.Puerto Rico. -Agricultural Experiment Station.

Dec 1977. (258). English. 19 p. Dec 1977.

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0714

**Lulli, L.**
Primary considerations of the relationships between the climate and soils of Mount Amiata. Annali dell' Istituto Sperimentale per lo Studio e la Difesa del Suolo Firenze.

Vol. 1. Italian. p. 239-255. 1971.

this volcanic mountain, the distribution of soil types on western and eastern slopes was altitudinal. An Andic Psammentic Haplumbrept, an Andic Dystric Eutrochrept and a Typic Haplorthod are described.

0715

**Lutrick, M.C.**
A fritted material as a source of micronutrients on two paleudults (Troup and Red Bay), corn, sorghum, soybeans, peanuts). Proceedings Soil and Crop Science Society of Florida.

v. 38. English. p. 97-101. - ill. 1979.

n.p., -the Society.

0716

**Luzio L., W.; Monis M., M.**
Vertisols of the central zone of Chile. Turrialba.

Vol. 25 3. Spanish. p. 271-282. 1975.

Physical, physico-chemical, mineralogical, morphological and micromorphological characteristics of the clay soils from the Central Zone of Chile are presented.

0717

**Lynn, W.C.**
Field laboratory tests for characterization of histosols. Histosols, their characteristics, classification, and use.

No. 6. p. 11-20. 1974.

Soil Science Society of America, Special Publication.

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**Lynn, W.C.**
Soil taxonomy: a case for limnaquents and limnists. International Congress of Soil Science, Transactions, 11th.

Vol. 1. p. 29-30. 1978.

(Abstract only).

0719

**Magar, S.S.**
Dynamics of bulk density during drying in black cotton soil (Vertisols). Journal of Maharashtra agricultural universities.

v. 4 (1). English. p. 18-22.- ill. Jan 1979.

Pune, -B. P. Patil.

0720

**Mahjoory, R.H.**
Relationship of the new soil classification system to the mineral soils in Ingraham County, Michigan. Soil Science.

Vol. 20, No. 4. p. 295-300. 1975.

0721

**Mahler, R. L.; Bezdicek, D. F.; Witters, R. E.**
Influence of slope position on nitrogen fixation and yield of dry peas. Agronomy Journal. College of Agricultural Research Center, Washington State University, Pullman, USA.

Vol. 71 2. English. p. 348-351. 1979.

The objectives of this study were to determine the influence of soil slope on yield and N2 fixation by dry peas (Pisum sativum L.) in the field and to determine the effectiveness of isolates of Rhizobium leguminosarum taken from various slopes on N2 fixation by peas in the greenhouse. From N2(C2H2)-fixation rates conducted weekly in three positions of a Palouse catena; bottomland (Xeric Argialbolls), south slope (Ultic Argixerolls), and ridgetop (Pachic Haploxerolls), total seasonal N2(C2H2) fixed was estimated at 60, 22, and 17 kg/ha of N, respectively. For peas growing on the bottomland, south slope and ridgetop, plant N uptake was 210, 99, and 75 kg/ha of N, respectively. Pea seed yields of 2,106, and 480 kg/ha on the bottomland and ridgetop, respectively, were related to the amount of water depleted in the soil profile of 21.6 and 8.9 cm, respectively. Higher yield and greater N2 fixation by peas growing on the bottom slope were apparently related to greater root penetration and removal of water. Greater plant N and dry matter were obtained in the greenhouse when peas were inoculated with isolates from the north slope when compared with isolates from other slopes. No differences were noted in pea growth and N2 fixation between isolates from the bottomland, south slope and ridgetop, which suggested that differences in N2 fixation and yield observed in the field were not related to efficiency of the microsymbiont.

0719

**Mahnke, C. F.; Hammond, C. L.; Brown, L. E.**
Soil Survey of Howard County, Nebraska. Washington, D.C., USA: US Department of Agriculture.

English. p. 89 pp. 1974.

Thirty-one series (mainly mollisols and entisols) are described and mapped at a scale of 1:20 000. Parent materials include loess, aeolian sand and alluvium.

0720

**Mainasheva, G M; Chizhikova, N P; Nikolaeva, S A**
Changes in argillic material in Chernozems planted to rice. Mosc Univ Soil Sci Bull.

1974. Vol.29 (5/6) 19-23. Ref.

Translated from Moscow. Universitet. Vestnik. Seriia 6, Biologiia, Pochvovedenie 29 (6) 74-80. (442.9 M854).

0721

**Majka, J. T.; Lavy, T. L.**
Adsorption, mobility, and degradation of cyanazine and diuron in soils. Weed Science. University of Nebraska, Lincoln, NB 68583, USA.

Vol. 25 5. English. p. 401-406. 1977

In the field, surface applied cyanazine and diuron did not move below 5 cm in a Monona silty clay loam (Typic Hapludoll) which received 20 cm of water over a 54-day period. In hand-packed soil columns in the laboratory, surface-applied diuron and cyanazine penetrated to depths of 10 and 20 cm respectively when leached over a comparable period and with amounts of water similar to those used in the field. Soil thin layer chromatography and adsorption isotherm studies showed that diuron was adsorbed more strongly than was cyanazine. In general, both compounds were degraded more rapidly at the higher temperatures when incubated at 5, 20, 35, and 50 C over a 20-week period. Degradation was slowest at 5 C in a Valentine loamy fine sand (Typic Ustipsamment). Diuron appeared to break down most readily at 35 C. Cyanazine wss usually decomposed by the 10th week at 5 C and the 5th week at higher temperatures.

0722

**Makin, J; Schilstra, J; Theisen, A A**
The nature and genesis of certain aridisols in Kenya. J Soil Sci.

Mar 1969. Vol.20(1):111-125.

0723

**Makin, J.**
The nature and genesis of certain aridisols in Kenya. Journal of Soil Science.

Vol. 20, No. 1. p. 111-11525. 1969.

0724

**Malavolta, E.; Dantas, J. P.; Morias, R. S.; Nogueira, F. D.**
Calcium problems in Latin America. Communications in Soil Science and Plant Analysis. E.S.A. "Luiz de Queiroz", U.S.P., Piracicaba, S.P., Brazil.

Vol. 10 1/2. English. p. 29-40. 1979.

A general description of soil characteristics of Latin America is given with emphasis on the oxisols of the subtropical and tropical regions, the relationships among pH and degree of Al and Ca saturation are presented; special mention is made of the cerrado soils of Brazil. Ca requirements of main crops are tabulated. A review is made of known cases of Ca deficiency under field or greenhouse conditions with an attempt to differentiate between Ca responses and other effects of liming and/or fertilization on observed crop responses. Losses by leaching, erosion, and crop removal of Ca are estimated; a rough balance sheet of inputs and outputs is presented. Trends in fertilizer use and technology in Latin America are discussed with regard to the Ca economy of the region; the role of liming is assessed.

0725

**Maldonado P, F**
La adaptacion al castellano de los nombres usados en la 7a. Aproximacion; Spanish adaptation of names used in the 7th Approximation. Soil classification. Inst Interamer Cienc Agr Publ Misc.

Spanish. June 1971. Vol.78: 30-43.

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**Malewar, G U**
Placement of black soil of Marathwada in the comprehensive system of soil classification. J Maharashtra Agric Univ.

Dec 1976. Vol.1 (addit. no.): 195-199.

0727

**Mali, C V; Varade, S B; Badhe, N N**
Evaluation of different chemical methods for determining plant available molybdenum in vertisols of Maharashtra Uptake by wheat. J Maharashtra Agric Univ.

May 1977. Vol.2 (2): 103-106.

0728

**Malquori, A.**
Soil mineral colloids: research in Italy. Agrochimica. Istituto di Chimica Agraria e Forestale dell'Univ. di Firenze, Italy.

Vol. 22 3/4. Italian. p. 164-178. 1978.

Information obtained during the last 25 years on the structural, chemical, electrochemical and physico-chemical properties of the clay fraction of terra rossa, vertisols, Tertiary and Quaternary clay soils, soils on ophiolites and volcanic soils is discussed. Particular points noted are the presence of allophane in volcanic soils, K and NH4 fixation, phosphatolysis reactions of clay minerals with phosphate solutions, and catalysis by Fe and Mn oxides.

0729

**Mandal, L N; Khan, S K**
Influence of moisture regimes on the transformation of recently applied phosphate in soil and its availability to rice crop. J Indian Soc Soil Sci.

Dec 1977. Vol.25 (4): 379-383.

0730

**Mandal, L N; Khan, S K**
Influence of soil moisture regimes on transformation of inorganic phosphorus in rice soils. J Indian Soc Soil Sci.

Mar 1975. Vol.23 (1): 31-37. Ref.

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**Mansell, R S; Zelazny, L W; Hammond, L C**
Nutrient distributions in a Spodosol soil during corn growth. Proc Soil Crop Sci Soc Fla.

1975. Vol.34: 24-29. Ref.

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**Maples, R; Keogh, J L**
Fertilization of cotton with potassium, magnesium, and sulfur on certain Delta soils: Alfisols formed from Mississippi River Valley alluvium. Bull Agric Exp Stn Div Agric Univ Arkansas. EXP STN.

Arkansas, Agricultural Experiment Station. Feb 1974. Vol.787, 19 p. Ref.

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**Mariano, J. A.; Valmidiano, A. T.**
The description and classification of the soils of the Philippines. Technical Bulletin, ASPAC Food and Fertilizer Technology Center. Bureau of Soils, Manila, Philippines.

Vol. No. 12. English. p. 1-28. 1973.

The soil classification adopted in the Philippines is that of the USDA. The morphology, chemical characteristics and agricultural possibilities and limitations of the soil groups occurring, which comprised tropudalfs, tropaquents, tropopsamments, eutrandepts, eutropepts, tropaquepts, tropudults, chromusterts and pellusterts, are described.

0734

**Marques, A S E M**
Formas do solo e individuos-solo. O "Pedon" e outros conceitos; Soil forms and soil individuals. "Pedon" and other concepts. Agron Mocambicana.

Portuguese. Apr/Jun 1971. Vol.5 (2): 133-146. Ref. Eng. sum.

0735

**Marques, A. Sa e Melo**
Soils of the Limpopo settlement (Mozambique), Sagres region. Agronomia Mocambicana.

Vol. 6 1. Portuguese. p. 35-72. 1972.

An area of 17 500 ha south of Sagres was surveyed. The soils have developed over non-consolidated fine and coarse Quaternary sediments and include regosols, gleysols, solonetz and vertisols. Profiles representative of 18 mapping units are described. (173(679)).

0736

**Martel, Y. A.; Paul, E. A.**
The use of radiocarbon dating of organic matter in the study of soil genesis. Soil Science Societ, of America Proceedings. Universit, of Saskatchewan, Saskatoon, Canada.

Vol. 38 3. English. p. 501-506. 1974.

Radiocarbon dating supported b, determination of C/N ratios and h,drolysis of total soil was used to investigate the properties of organic matter in a range of chernozemic soils (Borolls) from Saskatchewan. The position along the slope and the depth in the profiles of a catena affected the nature and the mean residence time of the soil organic matter. Old horizons, presumabl, covered b, mass movement of upslope soil materials, were found underneath several of toda,'s profiles. The h,drol,sis of total soil was successful in separating young and old components of the soil.

0737

**Martin Aranda, J.; Fernandez Mancilla, N.**
Effect of soil moisture regime on earliness and ,ield of irrigated cotton. An Edafol Agrobiol.

Spanish. Jan/Feb. 1969. Vol.28 (1/2). 1-13.

English summar,

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**Martin, F.**
Caracteristicas analiticas , productos de pirolisis de acidos humicos pardos , grises extraidos de un vertisol. Analytic characteristics and pyrolysis products of humic acid fractions and gray extracts from a vertisol. Agrochimica.

Spanish. Ma, Jul, 1977. Vol. 2 (3/4). 190-199. Ref. Eng. sum.

0739

**Martin, F.; Saiz-Jimenez, C.; Gonzales Vila, F. J.**
Humic matter from vertisols. II. Fulvic acids. Anales de Edafologia y Agrobiologia.

Vol. 33 5/6. English. p. 477-482. 1974.

Data on the composition, functional groups, UV and IRA spectra of four fulvic acids extracted from vertisols and purified by a modification of Forsyth's method are given.

0740

**Martin, F.; Saiz-Jimenez, C.**
A water soluble fraction of humic acids from vertisols. Zeitschrift fur Pflanzenernahrung und Bodenkunde. Centro de Edafologia y Biologia Aplicada del Cuarto, Sevilla, Spain.

Vol. 35 1. English. p. 58-67. 1973.

The differences between two fractions of humic acids extracted from the upper horizons of an Andalusian black earth and separated by gel filtration are described.

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**Martin, F.**
Pyrolysis gas chromatograph, of humic substances (of) different origin. Zeitschrift fur Pflanzenernahrung und Bodenkunde. Centro de Edafologia y Biologia Aplicada del Cuarto Sevilla, Spain.

Vol. No.4/5. English. p. 407-416. 1975.

Fulvic acids extracted b, NaOH, HCl, or Na4P2O7 + NaOH from a podzol, and humic acids extracted b, NaOH, or NaOH + Na4P2O7 from a podzol, a fersialitic soil, a vertisol and lignite were pyrolysed in a Pyroprobe 100 Solids Pyrolyser attached to a gas chromatograph. Alkanes and olefins were among the low boiling point compounds produced. Alkanes and olefins were not produced when the humic and fulvic acids were oxidized b, heating in air.

0742

**Martinez, J. F.; Robertson, W. K.; Martin, F. G.**
Soil and seed treatments with lime, molybdanum and boron for soybean (Glycine max. (L.) Merr.) production on a Florida spodosol. Proceedings, Soil and Crop Science Society of Florida. Standard Fruit Co. La Ceiba, Honduras.

Vol. 36. English. p. 59-60. 1977.

In a pot experiment pelleting soybean seed with gum arabic impregnated with Mo or B and coated with lime or rock phosphate was compared with, or combined with, applications of these materials at much higher rates to a soil of pH 4.2 and containing 108 ppm of Ca extractable by ammonium acetate. The soil was from the 0.15 cm layer of an Aeric Haplaquod (Myakka fs). A soil application of 100 ppm Ca enhanced plant growth but additional Ca, 200 and 400 ppm, did not increase growth further. Soil applications of 0.4 ppm B or 0.125 and 0.25 ppm Mo following an application of 400 ppm Ca increased plant growth but with additional B, 0.6 and 0.8 ppm, or Mo, 0.5 ppm , growth decreased. Soybean seed pelleted with gum arabic containing H3BO3 and H3MoO3 and coated with CaCO3 to provide the equivalent of 0.04 or 0.08 ppm B, 0.02 or 0.04 ppm Mo, and 25 ppm Ca on a soil basis reduced plant growth when the soil had been treated with 100 ppm Ca from Ca(OH)2.

0743

**Martini, J A; Mosquera, L**
Properties of five Tropepts in a toposequence of the humid tropics in Costa Rica. Soil Sci Soc Amer Proc.

May/June 1972. Vol.36 (3): 473-477. Ref.

0744

**Martini, J A; Palencia, J A**
Soils derived from volcanic ash in Central America. 1. Andepts. Soil Sci.

Oct 1975. Vol.120 (4): 278-287. Ref.

0745

**Martini, J. A.; Jaramillo, L. R.**
Soils derived from volcanic ash in Central America. 2. Soils more developed than andepts. Soil Science. UNDP/FAO, to IICA, Turrialba, Costa Rica

Vol. 120 5. English. p. 376-384. 1975

Twenty-three soils more developed than Andepts and derived from volcanic ash in Central America were studied. These soils had been previously classified by other authors as "Latosols". Morphological, physical, and chemical properties in these soils are more uniform than in the Andepts. This reflects the warmer climate and older age. Base saturation, extractable Al, Ca, Mg, and K differ most. P, N, OM, and C/N ratio differ less, and pH, CEC, and clay content differ least. These soils have thicker sola, redder hues, heavier textures, more clay, illuviation, stronger structure, are more plastic and sticky, and have more Mg, CEC, extractable iron, and higher (Ca + Mg)/K ratios than the Andepts. The, also have good physical properties, are moderately fertile and are suitable for cultivation. Sixteen of the 23 profiles classif. as Ultisols (mostly Humults), three as Alfisols (mostly Ugalfs), four as Inceptisols (mostly Tropepts), and none as Oxisols.

0746

**Martini, J. A.; Kochhann, R. A.; Gomes, E. P.; Langer, F.**
Response of wheat cultivars to liming in some high Al oxisols of Rio Grande do Sul, Brazil. Agronomy Journal. Passo Fundo Exp. Sta., Passo Fundo, Rio Grande do Sul, Brazil.

Vol. 69 4. English. p. 612-616. 1977.

Field experiments were conducted at 5 sites on highly acid soils of pH 4.4-5.2 with wheat cv. developed in countries with varying soil reactions. Limestone at 0 or 28 t/ha and 60 kg N + 132 kg P + 100 kg K/ha were applied. The Brazilian cv. tested at 5 locations tended not to respond to liming due to tolerance to exchangeable Al and possibly Mn. Cv. from Mexico, Argentina, Uruguay, Colombia, Equador, India, Japan, Australia and Rhodesia gave highly significant yield increases, ranging from 47 to 300%. These cv. were shown to be Al-susceptible, especially those that responded most to liming. Liming to bring soil pH to 4.8-5.7 and reduce exchangeable Al to less than or equal to 1.5 meq/100 g was a more valid means of increasing yields than was raising soil pH to neutrality. Liming to pH 5.7 or higher increased the incidence of Ophiobolus graminis and a soil-borne virus mosaic.

0747

**Martini, J. A.; Kochhann, R. A.; Siqueira, O. J.; Borkert, C. M.**
Response of soybeans to liming as related to soil acidity, aluminum and manganese toxicities, and phosphorus in some oxisols of Brazil. Soil Science Society of America Proceedings. FAO Ministry of Agriculture, Passo Fundo, R.S., Brazil.

Vol. 38 4. English. p. 616-620. 1974.

The response of soya beans to liming was highly significant. Optimum yields were obtained when liming adjusted Al to 0.1-0.5 meq/100g (1-5% Al saturation), soil pH to 5.2-5.7 and Ca+Mg to 5.7-8.5 meq/100g. Liming also increased root nodulation and reduced P fixation and Mn levels in the soil.

0748

**Martini, J. A.; Macias, M.**
A study of six "latosols" from Costa Rica to elucidate the problems of classification, productivity, and management of tropical soils. Soil Science Society of America Proceedings. Ministry of Agriculture, Passo Fundo, Brazil.

Vol. 38 4. English. p. 644-652. 1974.

Physical, chemical, and mineralogical properties show that these tropical soils are as highly weathered as their morphology indicates. These soils are predominantly Ultisols and not Oxisols as is frequently assumed; they do not fully fit Kellogg's original definition of Latosols. Although physical properties are found to be adequate, chemical properties are indicative of poor soil productivity and difficult management.

0749

**Mata, A.; Blue, W. G.**
Fertilizer nitrogen distribution in Pensacola bahiagrass sod during the first year of development on an aeric haplaquod. Proceedings, Soil and Crop Science Society of Florida. Department of Soil Science, Institute of Food and Agricultural Science, Florida University,

Gainesville, USA.

Vol. 33. English. p. 209-211. 1974.

Stolon-root mass and N uptake were found to be much less than previously reported for mature bahiagrass stolon-root systems receiving similar treatments. Approximately 40% of applied N was recovered in the top part of the plant. The stolon root system accounted for some 7% of applied N when 100 and 200 kg/ha were added, but 23% at the 300 kg/ha rate.

0750

**Mathan, K. K.; Sankaran, K.; Kanakabushani, N.; Krishnamoorthy, K. K.**
Effect of continuous rotational cropping on the organic carbon and total nitrogen content in a black soil. Journal of the Indian Society of Soil Science. Department of Soil Science and Agricultural Chemistry, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India.

Vol. 26 3. English. p. 283-285. 1978.

Continuous cropping and manuring increased the level of nitrogen and carbon in a typical black soil during a three-year period. The accumulation of organic C was highest under optimum NPK plus farmyard manure and least in the unmanured control. The same was true for total N.

0751

**Mathan, K. K.; Sankaran, K.; Kanakabushini, N.; Krishnamoorthy, K. K.**
Available nitrogen status of black soil under the influence of continuous cropping. Journal of the Indian Society of Soil Science. Department of Soil Science and Agricultural Chemistry, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India.

Vol. 26 2. English. p. 166-168. 1978.

In a ragi-cowpea-maize rotation, increasing the rate of N application in conjunction with P had substantially increased the amount of available N in the soil after two years. Adding N alone had no significant effect and is considered unnecessary where a legume is included in the rotation.

0752

**Mathur, S P; Sanderson, R B**
Relationships between copper contents, rates of soil respiration and phosphatase activities of some histosols in an area of southwestern Quebec in the summer and the fall. Can J Soil Sci.

May 1978. Vol.58 (2). 125-134. Ref.

0753

**Matthews, D.; Reynolds, E. F.; Colvin, G. P.; Weems, T. A.; Ray, C. A.; Seaholm, J. E.; Kilpatrick, W. W.**
Soil survey of Ouachita Parish, Louisiana. Washington, D.C., USA. US Department of Agriculture.

English. p. 80pp. 1974.

Twenty-four series (mainly alfisols, ultisols and inceptisols) are described and mapped at a scale of 1:20 000. Land use and management are recorded. Parent materials include marine, coastal and alluvial deposits ranging from sand to clay.

0754

**Mausel, P W**
Geographical approaches to 7th approximation subgroup analysis of selected soil interpretation maps. Ill State Acad Sci Trans.

1969. Vol.62(1):29-35.

0755

**Mazurak, A. P.; Chesnin, L.; Tiarks, A.**
Detachment of soil aggregates by simulated rainfall from heavily manured soils in eastern Nebraska. Soil Science Society of America Proceedings. Nebraska Agricultural Experiment Station, Lincoln, Nebraska, USA.

Vol. 39 4. English. p. 732-736. 1975.

The effects of annual applications of high rates of manure incorporated by disk plowing a Typic Argiudoll soil to depths of 10 cm, 20 cm, and 30 cm were studied under simulated rainfall conditions. The amount of soil material detached by simulated raindrops was related to rainfall intensities. The amount of soil particles detached by the raindrops decreased with increasing depths of disk plowing. Applications of manure increased the amount of large soil aggregates and decreased the penetrometer resistance of the soil crust formed by the raindrops.

0756

**Mazza, C. A.**
Mineralogy and probable genesis of the clay fraction in a vertisol from the province of Entre Ricos, Argentina. Revista de la Facultad de Agronomia, Argentina. Laboratoire de Physicochimie Minerals, Institut des Sciences de la terre, Universite Catholique de Louvain, Belgium.

Vol. 51 1. Spanish. p. 1-16. 1975.

Results of X-ray, DTA and IR analysis revealed the presence of a montmorillonite mineral rich

in K. Its origin and development are discussed.

0757

**Mc Kinzie, W E**
Criteria used in soil taxonomy to classify organic soils. SSSA Spec Publ (Soil Sci Soc Am)

1974 Vol.6 1-10

0758

**McDole, R.E.**
Soil temperature in selected southeastern Idaho soils. I. Evolution of sampling techniques and classification of soil. Soil Science Society of America. Proceedings.

Vol. 38 No. 3 p. 480-486. 1974.

0759

**McEwen, H. F.; Crout, J.**
Soil Survey of Wharton County, Texas. Washington, D.C., USA., US Department of Agriculture

English. p. 43 pp. 1974.

(173.764) Eighteen series (mainly entisols, mollisols and alfisols) are described and mapped at a scale of 1:20 000. Parent materials include marine sediments and alluvial deposits

0760

**McEwen, H. F.; Wheeler, F. F.; Williams, J. C.**
Soil survey of Collingsworth County, Texas Washington, D.C., USA. US Department of Agriculture

English. p. 56pp. 1973.

Twenty-one series (mollisols, entisols, alfisols and inceptisols) are described and mapped at a scale of 1:20 000. Land use and management are recorded. Parent materials include Tertiary, Permian and Quaternary deposits.

0761

**McGinnies, W. J.; Ludwig, J. R.**
Effects of natrustoll (solonetz) soil horizons and nitrogen on growth of tall wheatgrass. Agronomy Journal. USDA, Agric. Exp. Sta., Fort Collins, CO 80521, USA.

Vol. 69 3. English. p. 518-520. 1977.

In pot experiments using soil from a saltgrass (Distichlis stricta) meadow, herbage yields of tall wheatgrass plants grown from seed in soils from depths of (a) 0-13, (b) 14-40 or (c) )40 cm with 8.6, 26.4 and 174.6 meq Na/l, resp., or mixtures of those soils, were in the order (a) ) (b) ) (c), were usually higher with (a) + (b) than with (a) alone and were always reduced by admixture of (c). N added at 56-448 kg/ha increased yields progressively, with percentage increases lowest with (a) and highest with (c), but yields with (c) at the highest N rate were lower than were yields with (a) without added N. Biomass increase/kg applied N was highest at 112-224 kg N/ha.

0762

**McGinnies, W.J.**
Effects of Natrustoll soil horizons on germination, emergence, and growth of four (forage) grasses (Colorado). Agronomy JournalAmerican Society of Agronomy.

v. 70 (6). English. p. 1086-1088.- ill. Nov/Dec 1978.

Madison.

0763

**McKeague, J A; Sheldrick, B H**
Sodium hydroxide-tetraborate in comparison with sodium pyrophosphate as an extractant of "complexes" characteristic of spodic horizons Soils. Geoderma.

Oct 1977. Vol.19 (2) 97-104. Ref.

0764

**McKee, G S; Hajek, B**
Vertisols--cracking clayey soils. South Coop Ser. EXP STN.

Mississippi, Agricultural Experiment Station Arkansas, Agricultural Experiment Station Louisiana, Agricultural Experiment Station U.S., Soil Conservation Service. 1973. Vol.174: 29-32. Ref.

0765

**McKinzie, W.E.**
Criteria used in soil taxonomy to classify organic soils. Histosols, their characteristics, classification, and use.

No. 6. p. 1-10. 1974.

Soil Science Society of America, Special Publication.

0766

**McLean, E. O.; Ssali, H.**
Effects of prosphorus rate and form in combination with lime and gypsum on yields and compositions of German millet and alfalfa from highly weathered soils. Soil Science Department of Agronomy, Ohio State University, Columbus, USA

Vol. 123 3 English. p. 155-164. 1977

A study was conducted to evaluate effects of P rate and degree of acidulation of rock phosphate in combination with liming and gypsum additions on German millet (Setaria italica, 'German') and alfalfa (Medicago sativa). The stud, was conducted in a growth chamber on two Oxisols from Uganda and one oxidic Ultisol from Tennessee. Millet yields increased significantly when P was applied at all pH levels on all soils. On the relatively more weathered Kabanyolo and Alcoa (Tennessee) soils, yields with the higher rate (P2) of triple superphosphate (TSP) were higher than those with the lower rate (P1) of TSP or with partially acidulated rock phosphate (PARP) at the P2 rate. On relatively less weathered Serere soil, yields of millet with TSP were higher than those with PARP. For all soils, millet yields decreased with increasing pH. Alfalfa yields were increased by P on Serere and Alcoa soils but form and rate of P did not affect yields. In contrast, alfalfa yields were depressed by P on Kabanyolo soil which had rela. vely high levels of Al-P and native available P. Alfalfa yields markedl, increased with initial increase in pH and generally continued to increase at high Ca and pH levels. Plant analysis and visual symptoms suggested that manganese was depressing alfalfa growth at low pH.

0767

**McNutt, R. B.**
Soil Survey of Chilton County, Alabama. Washington, D.C., USA, US Department of Agriculture

English. p. 82 pp. 1972.

Thirty-two series (mainly udults) are described and mapped at a scale of 1:20 000, and land use and engineering interpretations are given. Parent materials include schists, gneiss, slate and marine deposits of sand, silt and clay.

0768

**Meeker, R. L.; Brug, W. H.; Matanzo, F.; Googins, R. L.; Schafer, G. M.**
Soil survey of Fayette County, Ohio. Washington, D.C., USA; US Department of Agriculture.

English. p. 82 pp. 1973.

Thirty-one series (mainly mollisols and alfisols) are described and mapped on a scale of 1:15 840. Land use and engineering data are given. Parent materials include glacial drift, limestone and clay shale bedrock, and loess.

0769

**Mehlich, A; Bowling, S S**
Advances in soil test methods for copper by atomic absorption spectrophotometry Histosols. Commun Soil Sci Plant Anal.

1979. Vol.6 (2). 113-128. Ref.

0770

**Mehlich, A.**
Influence of fluoride, sulfate and acidity on extractable phosphorus, calcium, magnesium and potassium. Communications in Soil Science and Plant Analysis. Agronomic Division, North Carolina Department of Agriculture, Raleigh, North Carolina 27611, USA.

Vol. 9 6. English. p. 455-476. 1978.

In Ultisols where Fe-P was predominant, extractable P increased with increasing concentrations of NH4F and increased further in the presence of sulfate, while in one Ultisol and one Terric Medisaprist where Al-P was predominant, extractable P increased with increasing concentrations of NH4F but with no further increases due to sulfate. Where Ca-P was predominant (Alfisol, Inceptisol, Mollisols, Typic Medisaprist) extractable P increased greatly with increasing concentrations of acid, whereas NH4F had either little influence or decreased extractable P above 0.01N NH4F, particularly above 0.05N HCl. Extractable Ca, Mg and K increased with increasing concentrations of acid, while NH4F had little influence on extractable K, decreased Mg slightly and greatly reduced extractible Ca due to precipitation as CaF2. The effect of soil test extractants on the dissolution of P and Ca from commercial Ca phosphates and phosphate rock was discussed.

0771

**Mehrotra, O N; Garg, R C; Prasad, M**
Effect of different soil moisture regimes on growth, yield and quality of tobacco. Indian J Agron.

June 1970. Vol.15 (2): 148-149.

0772

**Mehuys, G. R.; Kimpe, C. R. De**
Saturated hydraulic conductivity in pedogenetic characterization of podzols with fragipans in Quebec. Geoderma. Research Station, Agriculture Canada, Sante-Foy, Quebec, Canada.

Vol. 15 5. English. p. 371-380. 1976.

Saturated hydraulic conductivity (K) values were measured in the laboratory on two podzolic soils (Spodosols) with fragipans developed from till deposits in the Appalachian and Laurentian Highlands. The main difference between these tills lies in their contrasting textures. Due to the presence of coarse fragments and to a brittle and compact horizon, usual methods of measuring K in the field could not be used. Instead, blocks of soil were carved out and encased in paraffin. The technique insures minimum disturbance of the samples and accommodates variations in sample size due to stones. Sainte-Agathe sandy loam (sandy, mixed, frigid Fragiorthod) had higher K values than Arago loam (fine-loamy, mixed, frigid Fragiorthod) throughout the profile. In both soils, K decreased with depth largely as a result of an increase in bulk density. At any given bulk density, however, K was always lower in Arago than in Sainte-Agathe soil. This was attributed to illuviation and reorganization of particles within pores and partings. In the Arago profile, rearrangement of clay-size particles created an important vesicular porosity, thus closing off a portion of the pore volume to water transmission. In the Sainte-Agathe profile, material ranging from fine silt to clay was deposited selectively according to size class. Accessibility of the pore volume to percolating water was thus maintained. A second eluvial horizon Aex (A'2x) is present in the Arago, but not in the Sainte-Agathe soil, just above the fragipan, probably as a result of the very abrupt increase in bulk density from the podzolic B horizon to the fragipan. Water accumulating at the top of the fragipan seeps laterally, enhancing the eluviated character of the Aex horizon. Hydraulic conductivity was higher in this horizon than in over- and underlying horizons, although bulk density was greater.

0773

**Meints, V. W.; Peterson, G. A.**
Further evidence for the inability of the Kjeldahl total nitrogen method to fully measure indigenous fixed ammonium nitrogen in subsoils. Soil Science Society of America Proceedings. Nebraska University, Lincoln, USA.

Vol. 36 3. English. p. 434-436. 1972.

Kjeldahl total N values for samples from all depths of 3 typic argiustolls were determined by $H_2SO_4$ digestion for 5h with a $K_2SO_4$ + $CuSO_4$ + Se catalyst or for 2.5h with a $K_2SO_4$ + $CuSO_4$ + pumice catalyst or by $H_2SO_4$ digestion for 1h after pretreatment with a HF + HCl + $H_2SO_4$ mixture for 16h. N values after the HF-acid pretreatment were higher than for the other 2 methods. The differences were greater for subsoils than for topsoils and were attributed to only a partial inclusion of fixed $NH_4$-N by the first 2 methods.

0774

**Meints, V. W.; Peterson, G. A.**
The influence of cultivation on the distribution of nitrogen in soils of the Ustoll suborder. Soil Science. Montana State University, Bozeman, Montana, USA.

Vol. 124 6. English. p. 334-342. 1977.

Four pairs of matched virgin and cultivated Ustoll profiles were analyzed for organic C, total N, nonhydrolyzable N, hydrolyzable $NH_4^+$-N, hexosamine N, and alpha amino acid N to determine the distribution of these fractions throughout the profile and the changes that occur in the distribution upon cultivation. The data demonstrated that the effects of cultivation on soil N and C contents can be detected to depths of more than 120 cm in soils of the Ustoll suborder. Losses of organic C and total N upon cultivation were greatest in the surface and decreased with increasing soil depth. An increase in organic C and total N occurred in the deepest portions of three of the four cultivated soils, compared to the virgin counterparts. The concentrations of the four organic N fractions also decreased with depth. The proportion of hexosamine N and amino acid N remained constant with depth, and the proportion of nonhydrolyzable N decreased with depth. Cultivation decreased the concentrations of all four N fractions. It also decreased the proportions of total N that were nonhydrolyzable N and amino acid N, but it increased the proportion of hydrolyzable $NH_4^+$-N.

0775

**Melo, A. A. D. da; Silva, L. F. da**
Soils of the coastal strip Itacare-Camamu, Bahia, Brazil. Boletim Tecnico, CEPLAC. CEPEC-CEPLAC, Itabuna, Bahia, Brazil.

Vol. No. 14. Portuguese. p. 27 pp. 1971.

The geology, climate, vegetation and soils of the area are described. The soils include: oxisols (red-yellow latosols of low and medium Fe content); ultisols (red-yellow podzolic soils); alfisols (low-humic gley soils); spodosols (podzols); and entisols (sandy alluvial soils). Their agricultural potential is briefly discussed.

0776

**Melo, W. J.; Suzuki, J.**
Effect of drying and storage on the content of exchangeable ammonium and nitrate nitrogen in soil samples. Agronomica Cientifica. UNESP, 14870 Jaboticabal, Sao Paulo, Brazil.

Vol. 4 2. Portuguese. p. 124-131. 1976.

Air drying increased ammonium nitrogen and decreased nitrate nitrogen in samples of the two soils tested. Storage of moist samples at room temperature or in a refrigerator for 21 days had no significant effects on the ammonium nitrogen content. In a typic eutrorthox, nitrate content did not change significantly when moist samples were stored in the refrigerator for 42 days or at room temperature for 84 days. In a typic haplorthox, no significant changes in the nitrate content were observed when air-dried samples were stored at -20 deg C for 21 days or at room temperature for 189 days.

0777

**Mensah-Ansah, J. A.; Adu, S. V.**
Soils of the proposed Cocoa Research Institute, Ghana Sub-Station, Afosu. Technical Report, Soil Research Institute, Ghana. Soil Research Institute, Ghana.

Vol. No. 84. English. p. 1-22. 1972.

Six soil series (mainly oxisols and gleysols) are described and mapped at a scale of 1:3125. The soil parent materials consist mainly of schists, phyllites and greywackes. The suitability of the environmental conditions and of the soil for cocoa is discussed.

0778

**Michel, P.**
The alluvial valley of Senegal (West Africa). Relationships between geomorphology, soils and agricultural suitability, and their mapping at 1/50 000. Catena. Centre de Geographie Appliquee (L.A.95 au CNRS) 43, rue Goethe, 67083 Strasbourg, Cedex, France.

Vol. 5 2. French. p. 213-225. 1978.

Pedogenesis in the valley is closely related to landform and flooding. The high sandy levees of the Post-Nouakchottian period are covered with poorly developed hydromorphic soils, the lower levees with hydromorphic pseudogley soils, and the sub-recent levees with associations of poorly developed and hydromorphic soils. Topomorphic vertisols are formed in the basin plains with clayey sediments; the lower parts are occupied by hydromorphic clay soils. The higher levees are easy to irrigate, the lower ones can be irrigated and the basin plains are suitable for rice, but sub-recent levees, with a complicated microrelief, and the lower parts of basins, which are flooded for a long time, are not irrigable.

0779

**Miedema, R.; Jongmans, A. G.; Slager, S.**
Micromorphological observations on pyrite and its oxidation products in four holocene alluvial soils in the Netherlands. Kingston, Ontario, Canada; Limestone Press. Department of Soil Science and Geology, Agricultural State University, Wageningen, Netherlands.

English. p. 772-794. 1974.

Soil Microscop. (Rutherford, G.K., Editor). Profiles of two typic sulfaquepts, one sulfic haplaquep and one typic haplaquoll, as well as the forms and distribution of pyrite are described, including framboids and angular crystals of pyrite, gypsum, jarosite, and ferrihydroxides. The genesis of the various forms is discussed in relation to chemical and microbiological reactions under varying conditions of O2, H2 and H2O.

0780

**Miedema, R.; Vuure, W. Van**
The morphological, physical and chemical properties of two mounds of Macrotermes bellicosus (Smeathman) compared with surrounding soils in Sierra Leone. Journal of Soil Science. Department of Soil Science and Geology, Agricultural University, POB 37, Wageningen, Netherlands.

Vol. 28 1. English. p. 112-124. 1977.

The mounds are situated in the Makeni Area, Northern Province, Sierra Leone. Seventy five percent of this area consists of clayey upland soils that belong to the Makeni series (Typic Paleudult), which contain about 80 per cent of gravel-sized hardened plintnite glaebules. The upland is dissected by numerous streams along which gravel-free fine-loamy terrace soils occur that belong to the Masuba series ('Plinthic' Udoxic Dystropept) occupying about 15 per cent of the area. Mound I is a young inhabited mound on a Masuba soil, whilst mound II is an old abandoned mound on a Makeni soil. A trench was dug from the centre of the mounds into the surrounding soils. Profiles were described and samples were analyzed for organic carbon, CEC, exchangeable Ca, Mg, K, Na, and pH, and for particle size analysis with 5 sand fractions. The material used to build the mounds is derived from the subsoil (between 30 and 100 cm depth). Termite channels extended laterally for at least 10 m for mound I, but could not be traced so clearly for mound II. Mound I and the nest of mound II contain a higher percentage of particles less than 250 mu m than the surrounding subsoil. Material over 2 mm is not carried by termites. Both mounds show a higher base saturation and higher values of exchangeable Ca, Mg and K, compared to the surrounding subsoil. Increased CEC and pH are noted in mound I and the nest part of mound II, the latter also showing increased values of exchangeable Na. Organic carbon values are equal to those of the surrounding subsoil. Accumulation of mineral elements from organic matter collected as food, including small

contributions from the fungus combs and termite bodies, is primarily responsible for the observed differences. In view of the water analyses no contribution is expected from the fluctuating groundwater table.

0781

**Milfred, C.J.**
Sampling for petrographic modal analysis of an argillic horizon. Soil Science Society of America, Proceedings.

Vol. 31, No. 2, p. 244-247, 1967.

0782

**Miller, F.P.; Holowaychuk, N; Wilding, L.P.**
Canfield silt loam, a Fragiudalf. I. Macromorphological, physical, and chemical properties. Soil Sci. Soc. Amer. Proc.

Mar-Apr. 1971. Vol. 35 (2). 319-324. map. Ref.

0783

**Miller, F.P.; Wilding, L.P.; Holowaychuk, N.**
Canfield silt loam, a Fragiudalf. II. Micromorphology, physical, and chemical properties. Soil Sci. Soc. Amer. Proc.

Mar-Apr. 1971. Vol.35 (2). 324-331. Ref.

0784

**Miller, F.P.**
Physical, chemical, and mineralogical properties related to the micromorphology of the Canfield silt loam - a Fragiudalf. Dissertation Abstracts.

Vol. 26, No. 11, p. 6273, 1966.

Abstract only.

0785

**Mirchev, S.**
Iron and manganese compounds in chernozem and forest soils. Pochvoznanie i Agrokhimi,a. N. Pushkarov Institute of Soil Science, Sofia, Bulgaria.

Vol. 12 6. Bulgarian. p. 23-33. 1977.

The surface horizons of chernozems, grey forest soils, smonitzas and cinnamonic forest soils contained 2.00-6.11 per cent Fe and 0.070-0.190 per cent Mn. In the surface horizon of forest soils and in the C horizons of periodically waterlogged soils the Mn:Fe ratio was ) 50 per cent higher than in the rest of the profile. This indicates a greater mobility and reprecipation of manganese in comparison with iron. In the weathering and soil-formation processes iron is included in the formation of oxides, hydroxides, and also secondary silicates, but it is not included in the formation of carbonates. Manganese however forms 28-89 per cent of the oxides and hydroxides and a detectable part of the carbonates. The humic acids of the A horizons contained 0.141-1.456 per cent of Fe (0.02-0.42 per cent of the total iron) and 0.029-0.100 per cent of Mn (0.06-1.11 per cent of the total manganese). In addition to its relationship to soil acidity, the amount of water-soluble plus exchangeable manganese is also related to the amount and activity of the manganese oxides and hydroxides, the status of the organic matter, the mechanical composition of the soils, etc. In certain acid soils, rich in manganese oxides and hydroxides it attains 110-350 ppm and probably suppresses the growth of certain plants.

0786

**Misra, C.; Mishra, B. K.**
Miscible displacement of nitrate and chloride under field conditions. Soil Science Society of America Journal. Orissa University of Agriculture & Technology, Bhubaneswar, India.

Vol. 41 3. English. p. 496-499. 1977.

The aim of the experiment was to develop the capability for predicting the reduction loss of NO3-N during the leaching of nitrate fertilizers. A 2 cm pulse of Ca(NO3)2 solution containing 304 ppm NO3-N was displaced through an Oxisol field profile saturated with water to a depth of 55 cm. On the plowing day an identical pulse of NH4Cl solution containing 795 ppm Cl was leached through the same plot. Breakthrough curves of NO3-N and Cl stemming from the miscible displacement of Ca(NO3)2 and NH4Cl indicate that the first-order reduction rate constant of NO3-N is 0.1 hour-1 at an average soil temperature of 34 deg C. Under these conditions, the recovery of added NO3-N in the leachate was 70%, whereas that of Cl was 100% approximately when the two pulses moved past the 55 cm soil depth. The model was reasonably successful in predicting the transport of ions undergoing microbial transformation in a natural soil. A more appropriate treatment however would be to consider ion movement in stagnant and mobile phases in the soil pores.

0787

**Mitchell, C.W.**
Soil classification with particular reference to the seventh approximation. J. Soil Sci.

Dec 1973. Vol.24 (4): 411-420. Ref.

0788

**Mitsuchi, M.**
Soils with tiger stripes on Toban Terrace. Pedologist

Vol. 16 1. Japanese. p. 40-48. 1972.

In structure, texture, clay minerals, pH and chemical composition with depth are presented graphically and in tables. The soil is classified as an Aquic Paleudult.

0789

**Mitsuchi, M.**
Characteristics and genesis of nodules and concretions occurring in soils of the R Chinit area, Kompong Thom Province, Cambodia. Soil Science and Plant Nutrition. National Institute of Agricultural Sciences, Tokyo, Japan

Vol. 22 4. English. p. 409-421. 1976

Investigations of gleysols, ferralsols and vertisols indicated that nodules have developed through impregnation of the soil matrix with iron and/or manganese oxides, while concretions have formed through periodical precipitation of iron oxide around ferruginous or manganiferous nuclei to the exclusion of surrounding soil materials. Alternation of wet and dry seasons is believed to play an important part in the localization of iron and manganese into mottles and their subsequent hardening. The proportion of anhydrous iron oxides (hematite, maghemite) to hydrated iron oxide (goethite) appears to be closely related to the degree of desiccation of soils in dry seasons. Decomposition of kaolinite in the nodules and concretions was suggested by their lower kaolinite, and higher amorphous silica and alumina contents as compared to the surrounding soils. Mechanisms involved in the genesis of each of the types are further discussed.

0790

**Moberg, J. P.**
Some soil fertility problems in the West Lake Region of Tanzania, including the effects of different forms of cultivation on the fertility of some ferralsols. East African Agricultural and Forestry Journal. The Royal Veterinary and Agricultural University, Copenhagen, Denmark.

Vol. 38 1. English. p. 35-46. 1972.

Fertility was low in the ferralsols, vertisols and arenosols of the West Lake Region, N, P and Zn commonly being in short supply. Ca, Mg and K were also rapidly reduced to low levels under land use involving shifting cultivation and/or grazing. The gleysols were well supplied with nutrients but their productivity was limited by the need for drainage.

0791

**Moberg, J. P.**
Some chemical and mineralogical properties of four soils of the West Lake Region of Tanzania. East African Agricultural and Forestry Journal. Veterinary and Agricultural University, Copenhagen, Denmark.

Vol. 39 1. English. p. 46-56. 1973.

Typical profiles each of ferralsol, vertisol, gleysol, and arenosol are described, and chemical and mineralogical data are presented.

0792

**Mobley, H. L.; Ringwald, W. J.**
Soil survey, of Jefferson County, Oklahoma. Washington, D.C., USA, US Department of Agriculture.

English. p. 65pp. 1973.

Twenty-six series (mainly mollisols, alfisols, entisols and inceptisols) are described and mapped at a scale of 1:20 000. Land use and management are recorded. Parent materials include Permian sandstone, shale and clay, Quaternary sand and loam, and alluvium.

0793

**Moeberg, J. P.**
An edaphological and pedological investigation of the soils in the West Lake region of Tanzania. Copenhagen, Denmark; Royal Veterinary and Agricultural University.

English. p. 156 pp. 1973.

Climate, geology and geomorphology are the main factors influencing mineralogy in these soils. Quartz is the predominant mineral in the sand and silt fractions. Some muscovite occurs in soils developed from metamorphic material, and some K feldspar where granite is the parent rock. In gleysols, montmorillonite, illite and kaolinite occur in the clay fraction, the last two decreasing and montmorillonite increasing towards the lower, broader regions of the river plains. In vertisols montmorillonite and kaolinite are the predominant clay minerals. In ferralsols, kaolinite is the predominant clay mineral and haematite, goethite and quartz are present. Ferralsols rapidly lose their fertility under incorrect management. Their fertility can be maintained without the use of chemical fertilizers, but, in this case, it is essential to keep the soil covered by crops, farmyard manure or mulches throughout the year. Depth to the parent rock or hardpan is the main factor determining good plant growth; a soil depth of 1.8-2.0 m is essential for perennial crops under rainfed conditions. Alluvial and lacustrine gleysols, if adequately drained, are among the most fertile soils in the region. In vertisols, physical factors (drainage, soil structure, consistency) may limit plant growth.

0794

**Moeberg, J. P.**
Formation, mineralogy and fertility of some tropical highland soils. Copenhagen, Denmark; Royal Veterinary and Agricultural University.

English. p. 65pp. 1974.

Geological and geomorphological factors play an important, if not predominant, role in soil development in the highland areas studied. For edaphological purposes silicate analysis in addition to routine chemical analysis can be used for determining clay mineral contents. In some acid and strongly leached soils dioctahedral vermiculite may be more stable than montmorillonite towards weathering. The iron regime of the landscape seems to be predominantly affected by redox processes, although other factors and processes may also participate. The movement of iron in a landscape may be termed a 'geopedological process' because of the magnitude of its duration. The content of chelate-extractable Zn is generally low in freely drained iron-rich soils. Chelate-extractable Cu is generally low in vertisols, but at an adequate level in ferralsols. Before the classification systems in current use in temperate regions can be applied to tropical areas, the criteria for separating soil units and orders need to be redefined. In the meantime, soil and land-use classification groupings are reasonably satisfactory for agricultural development planning.

0795

**Moffatt, H. H.**
Soil survey of Caddo County, Oklahoma. Washington, D.C., USA; US Department of Agriculture.

English. p. 70pp. 1973.

Thirty series (mainly mollisols, inceptisols and alfisols) are described and mapped at a scale of 1:20 000. Land use and management are recorded. Parent materials include sandstone, shale, limestone, gypsum and alluvium.

0796

**Moffitt, W. C.; Brasefield, J. F.; Campbell, J. F.; Moore, R. K.**
Soil Survey of Dekalb County, Tennessee. Washington, DC, USA, U.S. Department of Agriculture.

English. p. 64pp. 1972.

Twenty-seven series (mainly udults and udalfs) are described and mapped at a scale of 1:15 840; their engineering properties and their suitability for maize, oats, tobacco, lucerne, lespedeza, pasture and woodland are indicated. Parent materials include limestone, shale and alluvium. (173(768)).

0797

**Mohana Rao, E V; Venkata Rao, B V**
Further analysis of the thermophysical properties of the fine textured Mollisols. J Indian Soc Soil Sci.

Dec 1976. Vol.24 (4): 356-362.

0798

**Mohd Noordin Bin Wan Daud.**
Genesis on some shale-derived soil in Peninsular Malaysia. Kuala Lumpur, Malaysia; Malaysian Society of Soil Science, Rubber Research Institute of Malaysia, Kuala Lumpur, Malaysia.

English. p. 9. undated.

Abstracts of Papers. CLAMATROPS. Conference on Classification and Management of Tropical Soils, Kuala Lumpur, Malaysia, August 1977. Profiles developed on shales representing distinct stages of soil formation such as inceptic, argillic, oxic and lateritic stages were studied. Based on the physico-chemical characteristics, the intensity of weathering on the inceptisol, Ultisol, Haplorthox and Gibbsiorthox increases in that order. The Ultisol clay has a higher permanent charge than the Oxisol clay. The different stages are further indicated by their clay mineralogy. A young soil at the early stage of pedogenesis such as the Inceptisol is characterised by the presence of a significant amount of water dispersable clay, and an absence of gibbsite. With the progress of pedogenesis, there is a marked disappearance of water dispersable clay as seen in the Oxisols. The amount of kaolinite, gibbsite and goethite increases with thn progress of pedogenesis, and hence dominates the entire clay fraction of the soils at the later stage of pedogenesis. Point-count analysis has been employed for micromorphological study. Changes in plasma fraction characterise the above weathering stages. The sepic features are more dominant in the Inceptisols than in the Ultisols and the Oxisols.

0799

**Moinereau, J.; Robert, M.**
The formation of clays in a weathering profile on siliceous lacustrine marls rich in palygorskite. The formation of clay with flints by solution of the palygorskite. Science du Sol. Geologie et Science du Sol, ENSA, Montpellier, France.

Vol. No.4. French. p. 247-257. 1976.

The destruction of palygorskite and the transformation of an illite, by the widening of its layers, towards a vermiculite are apparent at the top of a profile of a leached fersiallitic soil (an Ultisol) that has been formed on clay with flints by the weathering of

a siliceous marl rich in palygorskite. There is no direct genetic relationship between the disappearance of palygorskite and the appearance of the micaceous clay. The latter is present as an impurity in the parent rock, together with traces of quartz and kaolinite, but is masked by the palygorskite and is only revealed by complete analysis. A volumetric balance sheet shows that, 90% of the palygorskite having disappeared, the 10% of impurities consisting essentially of illite represent the entire clay fraction in the weathering horizon. Such a weathering profile suggests that some deposits of clay with flints could be formed not only by decalcification of calcareous parent rock but primarily by the weathering of fibrous magnesium clays which occur frequently in sedimentary formations supersaturated with silica and magnesium.

0800

**Moncharoen, L.**
Low activity clay ultisols and alfisols in Thailand. Second International Soil Classification Workshop, Proceedings.

Vol. 2. p. 91-106. 1979.

Soil Survey Division, Land Develoment Department, Thailand.

0801

**Moormann, F.**
Report on the Brazil meeting of the committee on the classification of alfisols and ultisols with low activity clays. First International Soil Classification Workshop, Proceedings.

p. 45-63. 1978.

EMBRAPA-Servicio Nacional de Levantamento e Conservacao de Solos, Brazil.

0802

**Moormann, F.R.**
The soils of the lowland rainy tropical climates: their inherent limitations for food production and related climatic restraints. International Congress of Soil Science, Transactions, 11th.

Vol. 2. p. 272-291. 1978.

0803

**Moormann, F.R.**
Concepts for the classification of alfisols and ultisols with low activiity clays. Second International Soil Classification Workshop, Proceedings.

Vol. 2. p. 167-183. 1979.

Soil Survey Division, Land Development Department, Thailand.

0804

**Moormann, F.R.**
Taxonomic problems of low activity clay alfisols and ultisols. Second International Soil Classification Workshop, Proceedings.

Vol. 2. p. 13-20. 1979.

Soil Survey Division, Land Development Department, Thailand.

0805

**Morais, F. I.; Page, A. L.; Lund, L. J.**
The effect of pH, salt concentration, and nature of electrolytes on the charge characteristics of Brazilian tropical soils. Soil Science Society of America Journal. Department of Soil Science and Agricultural Engineering, University of California, Riverside, USA.

Vol. 40 4. English. p. 521-527. 1976.

Measurement of adsorption of cations and anions by Brazilian tropical soils (Ultisols, Alfisols and Oxisols) from solutions of $MgSO_4$, $K_2SO_4$, KCl and $MgCl_2$ showed that the nature and valence of the counterions influenced the magnitude of electric charges on the soil particles. Charge distribution also varied with pH and electrolyte concentration.

0806

**More, S D; Varade, S B; Bharambe, P R**
Studies on volatilization losses of ammonia from different N nitrogen- carriers in calcareous Vertisols. J Maharashtra Agric Univ.

May 1977. Vol.2 (2): 106-109. Ref.

0807

**More, S.D.**
Phosphorus fixing capacity as influenced by soil characteristics of Vertisols. JournalIndian Society of Soil Science.

v. 26 (4). English. p. 403-404.- ill. Dec 1978.

New Delhi.

0808

**Morras, H. J. M.**
Gibbsite glaebules of a soil profile from Santa Cruz island, Galapagos (Ecuador). Pedologie. Faculty of Hydrology, National University of the Littoral, Argentina.

Vol. 26 1. English. p. 91-96. 1976.

Gibbsite glaebules in a Hapludoll may be the residues of plagioclases weathered in situ, or they may have been formed by the liberation and mobilization of Al in the form of a gel and its subsequent concentration and crystallization in cavities in the soil or basalt.

0809

**Mota, F. O. B.; Lima, F. A. M.**
Erodibility of the soils of FEVC (Farende Experimental Vale do Curu). Solo. Escola Superior de Agricultura 'Luiz de Queiroz', Sao Paulo, Brazil.

Vol. 68 2. Portuguese. p. 60-62. 1976.

Erodibility data are reported for seven series (one Aridisol, four Ultisols, one Mollisol and two Entisols).

0810

**Mota, F.O.B.**
Water retention in the Alfisol soil profile of the Mossoro area, Rio Grande do Norte, Brazil. Ciencia agronomica.

v. 8 (1/2). Portuguesetuguese. p. 23-29.- ill. Dec 1978.

Fortaleza, -Centro de Ciencias Agrarias da Universidade Federal do Ceara.

0811

**Moura Filho, W; Buol, S W**
Studies of a Latosol Roxo (Eutrustox) in Brazil: clay mineralogy. Experientiae.

Apr 1972. Vol.13 (7): 218-234. Ref.

0812

**Moura Filho, Waldemar.**
Studies of a Latosol roxo (Eutrustox) in Brazil.

English. vii, 57 leaves :- ill. ;- 29 cm.

Ann Arbor, Mich. - University Microfilms - 1970.

0813

**Muir, J.W.**
The general principles of classification with reference to soils. Journal of Soil Science.

Vol. 13, No.1. p. 22-30. 1962.

0814

**Mukhtar, O. M. A.; Swoboda, A. R.; Godfrey, C. L.**
The effect of sodium and calcium chlorides on structure stability of two vertisols: Gezira clay from Sudan, Africa, and Houston Black clay from Texas, USA. Soil Science, Texas A & M University, College Station, USA.

Vol. 118 2. English. p. 109-119. 1974.

Soil samples were leached with NaCl + CaCl2 solutions (1.5, 10 and 25 meq/l and SAR 0.5, 5 and 25 for each concentration). Hydraulic conductivity of disturbed samples, flow rates through undisturbed clods and water-stable aggregates generally increased with increasing electrolyte concentration but decreased with increasing SAR. The effects were more pronounced in the Gezira soil than in the Houston Black soil. Drying after leaching increased water-stable aggregates in some samples and decreased them in others.

0815

**Mulcahy, M.J.**
Soil classification, soil surveys, and land use. Soils and Fertilizers.

Vol. 30, No. 1. p. 1-8. 1967.

0816

**Munevar, F; Wollum, A G II**
Effects of the addition of phosphorus and inorganic nitrogen on carbon and nitrogen mineralization in Andepts from Colombia. J Soil Sci Soc Am. OTHER US.

May/June 1977. Vol.41 (3): 540-545. Ref.

0817

**Munn, L. C.; Nielsen, G. A.; Mueggler, W. F.**
Relationships of soils to mountain and foothill range habitat types and production in western Montana. Soil Science Society of America Journal. Dep. of Plant & Soil Science, Montana State Univ., Bozeman, 59715, USA.

Vol. 42 1. English. p. 135-139. 1978.

Soils at 23 sites representing eight habitat

types ranged from Borollic Calciorthids at the dry end of a moisture and soil development gradient to Pachic Cryoborolls on the moist end. Corresponding vegetation was a Stipa comata-Bouteloua gracilis community at the dry end and a Festuca idahoensis-Agropyron caninum community at the moist end. Soil taxonomic units and vegetation habitat types were ordered along the moisture gradient. Multiple linear regression analysis was used to model above-ground productivity. Eighteen significant variables were identified including thickness of the mollic epipedon, soil organic matter, total N, elevation, depth to free carbonates, annual precipitation, aspect, solum thickness, summer soil temperature, percent coarse fragments in the A horizon, and extractable K. The thickness of the mollic epipedon was the variable most highly correlated with productivity and the best regression model accounted for 90% of the variability in productivity.

0818

**Munns, D. N.; Fox, R. L.**
The slow reaction which continues after phosphate adsorption: kinetics and equilibrium in some tropical soils. Soil Science Society of America Journal, University of California, Davis, USA.

Vol. 40 1. English. p. 46-51. 1976.

In Hawaiian soils at 0.1 bar moisture the solubility of added phosphate declined to equilibrium at 100-200 days, 30-50% remaining in labile sorbed form. The decline accelerated on suspending and shaking the soil and approached first-order kinetics with respect to solution phosphate concentration. Rate constants were similar in three Oxisols, higher in an Andept, and little affected by lime. Desorption hysteresis diminished with time of reaction.

0819

**Munns, D. N.; Fox, R. L**
Comparative lime requirements of tropical and temperate legumes. Plant and Soil. Dep. of Soils and Pl. Nutrition, California Univ., Davis, California, USA.

Vol. 46 3. English. p. 533-548. 1977.

In field trials, CaCO3 was applied to a N-deficient Hawaiian oxisol at rates which increased along the plant row from 0 to 22 t/ha, producing a gradient in soil pH from 4.7 to 7.1. 18 species of inoculated legumes were grown. Lime response curves showed no distinct general difference between tropical and temperate legumes. Within each group, individual species varied. The species ranked as follows according to the amount of lime needed for 90% of the maximum attained yield: Coronilla varia (16 t/ha) ) Leucaena leucocephala (11) ) Phaseolus vulgaris, lucerne (9-10) ) soyabean cv. Kanrich (7) ) Glycine wightii cv. Cooper, Lotus corniculatus (6) ) Glycine wightii var. Tinaroo, white clover, subterranean clover (5) ) Desmodium canum, Dolichos axillaris, soyabean cv. Kahala (4) ) groundnut, Desmodium intortum, cowpea (1-2) ) Stylosanthes fruiticosa, Stylosanthes guyanensis (0.1.). The species ranked as follows according to the magnitude of yield increase due to lime: C. varia (20-fold increase) ) white clover (9-fold) ) L. leucocephala, D. axillaris, lucerne (6-fold) ) G. wightii var. Tinaroo (5-fold) ) P. vulgaris (4-fold) ) G. wightii var. Cooper, L. corniculatus (3-fold) ) D. canum, D. intortum, subterranean clover (2-fold) ) groundnut, soyabean, S. fruiticosa, S. guyanesis, cowpea (30-50%). Improved Ca availability could account for plant responses to lime rates over 3-4 t/ha. Only 4 t CaCO3 sufficed to raise soil pH to 6 and depress solution Al and Mn to low concentrations, but 6 t were needed to raise soluble Ca to 1 meq/l and 20 t to raise it to 3 meq/l. Additions of 4 t CaCO3/ha raised soil pH to 6 and reduced the concentration of Al and Mn in soil solution. Growth responses at pH )6 were probably due to increased availability of Ca but 6 t CaCO3 raised soluble Ca to 1 meq/l and 20 tons and raised soluble Ca to 3 meq/l. The possibilities of selecting legume species with lower lime requirements is considered.

0820

**Munns, D. N.; Fox, R. L.**
Stabilization of calcium by surface charge variation in an Oxisol. Soil Science Society of America Journal. Dep. of Soils and Plant Nutrition, Univ. of California, Davis, 95616, USA.

Vol. 41 4. English. p. 682-685. 1977.

Buffering of solution-phase Ca concentration against effects of dilution and addition of lime could be explained by variation in surface charges with pH and ionic strength. The buffering explains why liming can be inefficient in raising Ca availability, and saturation-extract Ca can approximate to soil-solution Ca adequately for diagnostic purposes.

0821

**Munns, D. N.**
Heterovalent cation exchange equilibria in soils with variable and heterogeneous charge. Soil Science Society of America Journal. Department of Soils and Plant Nutrition, University of California, Davis, USA.

Vol. 40 6. English. p. 841-845. 1976.

Exchangeable Ca and K can be differentiated into loosely and tightly adsorbed fractions by analysis of desorption data. Mass action coefficients for Ca/K exchange on loosely adsorbing sites remained constant despite large variation in pH-dependent charge and Ca/K ratio in three soils. The loosely adsorbed Ca may

control Ca-availability. The variable charge mobilized by liming differed from the fixed charge in having a slightly higher proportion of sites with high divalent affinity in the Oxisol and a much lower proportion in the Vertisol and Mollisol.

0822

**Murali, V; Sarma, V A K; Krushna Murti, G S R**
Mineralogy of two red soil (Alfisol) profiles of Mysore State, India. Geoderma.

Mar 1974. Vol.11 (2): 147-155. Ref.

0823

**Murphree, L. C.; Huddleston, J. S.; Nichols, L. H.**
Soil survey of Chickasaw County, Mississippi. Washington, D.C., USA; US Department of Agriculture.

English. p. 68pp. 1974.

Twenty-eight series (mainly ultisols, inceptisols, alfisols and entisols) are described and mapped at a scale of 1:20 000. Land use and management are recorded. Parent materials include cretaceous and Palaeocene silt, sand, and acid and calcareous clay sediments, and alluvium.

0824

**Murty, G. N.; Rahiman, M. A.; Narasimham, R. L.**
Some aspects of potassium availability in red and black soils. Bulletin, Indian Society of Soil Science. Department of Soil Science, Agricultural College, Bapatla, Andhra Pradesh, India.

Vol., No.10. English. p. 46-51. 1976.

Red soils from the Guntur district of Andhra Pradesh contained more water soluble K but less exchangeable K than black soils. The addition of K increased exchangeable K contents, particularly in the red soils. The contribution of fertilizer K to K uptake was greater in Phaseolus mungo than in Eleusine coracana, especially in the red soils.

0825

**Mutscher, H.**
The potassium regime of typical soils of northern Algeria. Part 2. A comparative study of different genetic soil groups. Beitrage zur Tropischen Landwirtschaft und Veterinarmedizin. Institut fur tropische Landwirtschaft der Karl-Marx-Universitat, DDR703 Leipzig, German Democratic Republic.

Vol. No.1. German. p. 43-58. 1978.

The maximum, minimum and average values of 9 characteristics describing the K regime of 39-87 profiles of 6 genetic soil groups were determined. The K regime tended to vary with soil group. These variations were strongly associated with the nature of the parent rock, but were also related to soil formation processes. The average K-supplying power of the soil decreased in the order chestnut soils ) red and brown Mediterranean soils ) brown carbonate soils, rendzinas, and poorly developed soils ) Vertisols and Vertisolic soils ) brown and rust-red carbonate-free forest soils. Exchangeable K was related only slightly to K-supplying power.

0826

**Mwandemere, H. R.; Robertson, W. K.**
Selected mineralogical and chemical properties of ten soils of Malawi. Proceedings, Soil and Crop Science Society of Florida. Soil Science Department, University of Florida, Gainesville, FL 32611, USA.

Vol. 35. English. p. 155-160. 1976.

Mineralogical and chemical properties were determined on the Ap horizon of 10 soils of Malawi, of which eight were Ultisols, one an Entisol, and one an Inceptisol. The purpose was to assess their fertility status for growing peanuts. Kaolinite was dominant in the clay fraction of eight soils, ranging from 46 to 80% with highest values in the Ultisols. Mica occurred in all but two soils and ranged from 6 to 33%. Montmorillonite was present only in the Inceptisol (42%). Non-crystalline material averaged 10%. The Fe-oxide contents were low in all soils, with values between 0.3 and 0.7%. In all cases the pH measured in N KCl was lower than that measured in water. Aluminium ions were the main source of exchangeable acidity and ranged from 0.10 to 0.30 meq/100g. Values for BaCl2-TEA acidity, CEC, exchangeable Ca, and the sum of the exchangeable bases varied from 2.41 to 12.10, 2.60 to 21.18, 0.95 to 11.78, and 1.63 to 17.71 meq/100 g, respectively; and organic matter contents ranged from 0.53 and 5.31%. Mn, Cu, Fe, and Zn extracted by double acid ranged from 46 to 125, 0.3 to 1.5, 4 to 22, and 6 to 19 ppm, respectively. Although the majority of the soils are finer in texture than those planted to peanuts in Florida and are low in exchangeable bases, they have potential value for good crop production.

0827

**Myhre, D. L.; Sanford, J. O.**
Soil surface roughness and straw mulch for maximum beneficial use of rainfall by corn on blackland soil. Soil Science. Mississippi State University, State College, USA.

Vol. 114 5. English. p. 373-379. 1972.

In a 3-year field trial on a vertic haplaquoll using maize as test crop the effects of 4484

kg/ha of straw mulch and three soil-surface conditions (smooth, rough at emergence, rough at 50-cm plant height) were evaluated. Mulch and early surface roughness increased soil moisture content and mulching increased grain yields. Late surface roughness significantly depressed grain yields.

0828

**Namdeo, K. N.; Dube, J. N.**
Nitrogen transformations in a tropical virgin grassland oxisol. Journal of the Indian Society of Soil Science. Department of Soil Science and Agricultural Chemistry, J.N. Krishi Vishwa Vidyalaya, Jabalpur, India.

Vol. 21 3. English. p. 245-249. 1973.

Urea applied at 0, 100 and 200 kg/ha increased total- and mineral N content of the soil. The mineralizable-N index was increased by 0.5 to 1.3% only in the soil that received the highest rate or urea. Availability index of N was almost doubled in urea-treated soil throughout the cropped and uncropped stages. Urea increased the non-hydrolysable-N fractions of the soil, and urea and paraquat increased the hexosamine and unidentified-N fractions of the hydrolyzable-N.

0829

**Namdeo, K. N.; Dube, J. N.**
Proteinase enzyme as influenced by urea and herbicides applied to grassland oxisol. Indian Journal of Experimental Biology. Jawaharlal Nehru Agricultural University, Jabalpur, India.

Vol. 11 2. English. p. 117-119. 1973.

Urea, dalapon and paraquat each increased urease activity and decreased proteinase activity. The combination of urea plus paraquat increased proteinase and decreased numbers of ureolytic actinomycetes.

0830

**Namdeo, K. N.**
Persistence of dalapon in grassland soil. Plant and Soil. Jawaharlal Nehru Agricultural University, Rewa, Madhya Pradesh, India.

Vol. 37 2. English. p. 445-448. 1972.

The persistence of 2,2-dichloropropionic acid in a grassland oxisol was studied under incubation and soil perfusion techniques using antibiotics. The herbicide was degraded in about 10 weeks in non sterile incubated soils. When the soil was perfused decomposition occurred within a week.

0831

**Narang, R S; Dastane, N G**
Water use by Allium cepa L. (bulb onions) grown under different soil moisture regimes. Indian J Hort.

July/Dec 1969. Vol.26 (3/4): 176-180.

0832

**Nelson, R. E.; Nettleton, W. D.**
Some properties of smectite and mica in clays of soils in dry regions. Geoderma. Soil Survey Investigations Units, W.T.S.C., S.C.S., Riverside, California, USA.

Vol. 14 3. English. p. 247-253. 1975.

Clay ((2 mu ) from argillic horizons of sixteen Argids, Xerolls, and Ustalfs having either smectite or mica, or both, was analyzed for CEC, total K, X-ray diffraction peaks, and free swelling. The maximum and minimum limits of CEC and K for the smectite and clay mica were determined from the linear relationships of each of the four variables to the ratio of CEC or K to total charge (CEC + K). The theoretical maximum limits are 100 mequiv. of CEC/100 g for smectite and 5.1% K for clay mica. When the 14 A peak of smectite is first lost from the suite of the two minerals, the CEC of clay mica is 40 mequiv./100 g and its K content is 3.4%. When the 10 A peak of clay mica is first lost, the CEC of smectite is 70 mequiv./100 g and its K content is 1.3%. The limits that were set by X-ray peaks can be used for estimating the amounts of clay mica and smectite in soils of dry regions.

0833

**Nemeth, J. C.; Davey, C. B.**
Site factors and the net primary productivity of young loblolly pine and slash pine plantations. Soil Science Society of America Proceedings. Coastal Zone Resources Corporation, Wilmington, North Carolina, USA.

Vol. 38 6. English. p. 968-970. 1974.

The relationship between site factors and net primary productivity of young plantations of loblolly pine (Pinus taeda) and slash pine (Pinus elliottii) were investigated. Exchange acidity, cation exchange capacity, pH, Mg, and K of these Ultisol and Alfisol soils of the fine-loamy, mixed, thermic family were correlated (P = 0.05) with the net primary productivity of loblolly pine. Net primary productivity of slash pine was correlated with cation exchange capacity (P = 0.05).

0834

**Nettleton, W D; McMcracken, R J**
Organic compounds in soil water of some ultisols of the Atlantic Coastal Plain. J Environ Qual.

Oct/Dec 1972. Vol.1 (4): 387-394. Ref.

0835

**Nettleton, W D; Witty, J E; Nelson, R E; Hawley, J W**
Genesis of argillic horizons in soils of desert areas of the southwestern United States. Proc Soil Sci Soc Am.

Sept/Oct 1975. Vol.39 (5): 919-926. Map. Ref.

0836

**Nettleton, W.D.**
Pedogenesis of certain aquultic and aquic normudultic soils of the North Carolina coastal plain. Dissertation Abstracts.

Vol. 27, No. 6. p. 1674B. 1966.

Abstract only.

0837

**Nettleton, W.D.**
Argillic horizons without clay skins. Soil Science Society of America, Proceedings.

Vol. 33, No. 1. p. 121-125. 1969.

0838

**Newhall, F**
The Soil Survey Moisture Regime Model (SSMR) and some comparisons with HL-70. In Proceedings of the National Soil Survey Conference. USDA.

U.S., Soil Conservation Service. 1975. Vol.p. 224-239.

0839

**Newland, C. T.**
Soil survey of Craig County, Oklahoma. Washington, D.C., USA: US Department of Agriculture.

English. p. 65pp. 1973.

Twenty-eight series (mainly mollisols, alfisols and ultisols) are described and mapped at a scale of 1:20 000. Land use and management are recorded. Parent materials include sandstone, limestone and shale of the Pennsylvanian period, and alluvium.

0840

**Newton, J. H.; McDonald, H. P.; Preston, D. G.; Richardson, A. J.; Sims, R. P.**
Soil survey of Madison County, Kentucky. Washington, D.C., USA: US Department of Agriculture.

English. p. 103pp. 1973.

Forty-two series (mainly alfisols, ultisols, inceptisols and mollisols) are described and mapped on a scale of 1:20 000; use and management of the soils are given. Parent materials include limestone, calcareous shales, acid shales and siltstone.

0841

**Nguyen Kha; Rouiller, J.; Souchier, B.**
Preliminary results of an experimental study of impoverishment in pelosols. Science du Sol. Centre de Pedologie biologique du C.N.R.S., B.P.5, 545000 Vandoeuvre, France.

Vol. No.4. French. p. 259-267. 1976.

In a two-year experiment in the Vosges, runoff and subsurface drainage from a pelosol on a Keuper marl were 7% and 11% respectively of the average annual rainfall of 800 mm, but were negligible from a loamy brown soil on mottled sandstone. In the pelosol, the rainfall that induced runoff and subsurface drainage was generally equal to or greater than 10 mm/day. Such rainfall occurred mainly in autumn and winter and was responsible for 75% of the total runoff and subsurface drainage in the experimental period. However, this threshold rainfall intensity varied seasonally with soil moisture content. Total soil losses showed that the removal of fine clay from the upper horizons was effected mainly by the mechanical transfer of clayey suspensions by runoff and subsurface drainage. Subsurface drainage predominated over runoff in spring and summer, but in autumn and winter at least 30% of the precipitation was lost as runoff. The average annual loss of soil from the top 20 cm averaged 400 kg/ha, and the soil profiles may be 3 700 years old.

0842

**Nicholaides, J J III; Fiskell, J G A**
Phosphate potential and P retention components in a Paleudult soil. Proc Soil Crop Sci Soc Fla.

1975. Vol.34: 38-43. Ref.

0843

**Nicholaides, J. J., III; Fiskell, J. G. A.**
Effect of pelletized phosphates in limiting phosphate sorption in a Paleudult. Proceedings, Soil and Crop Science Society of Florida. Department of Soil Science, University of Florida, Gainesville, Florida 32611, USA.

Vol. 36. English. p. 65-68. 1977.

Hydrolysis of monocalcium phosphate (MCP) to dicalcium phosphate (DCP) was followed during 26 weeks of leaching of pelleted concentrated superphosphate (CSP) uncoated, or coated with sulfur (SCSP), ordinary superphosphate (OSP) and acidulated rock phosphate (ARP) in the laboratory. Water-soluble P was more rapidly removed from CSP, OSP, and ARP than from SCSP, and release from the latter with increasing time persisted at a higher level than it did from the other sources. Correspondingly, pH remained lowest for the SCSP after the first few leachings. Dicalcium phosphate was the main residual compound in all but the ARP source and appreciable water-soluble P continued to be released after 20 weeks. In a field study with corn (Zea mays L.) on a previously uncultivated Rhodic Paleudult, yield response to residual P was similar in the second and third year to that in the first year. Pellets taken from the soil after 6 months contained about 50% of the applied P. Most of this was in the DCP form. Pelleted P minimized soil contact and provided lasting P availability.

0844

**Niederbudde, E. A.**
Differences in the properties of clays in claystone of the Frankonian Lias- and Dogger landscapes and of the clays in their soils. Zeitschrift fur Pflanzenernahrung und Bodenkunde. Lehrstuhl fur Bodenkunde der Technischen Universitat Munchen, 8050 Freising-Weihenstephan, German Federal Republic.

Vol. 142 3. German. p. 137-153. 1979.

The pelosols and pseudogleys formed from Amaltheen clay (lias delta ) and Posidonian shale (lias epsilon ) and Opalinus clay (Dogger alpha ) in the foothills of the Frankonian Alps were separated into groups according to 16 properties (7 classes of particle size and 9 chemical properties) specific for clay minerals. Discrimination analysis relating to 8 properties was used to separate the sediments from each other, and the solum from the sediments. The properties important for this separation were the effective buffering capacity for K (BCKe, meq K/100 g of soil and 100 g of clay/M1/2), K fixation (mg K/100 g of soil and 100 g/clay), and the content of labile K (meqK/100 g of soil). The available K (ARo in M1/2) was significant for separating solum from sediment, solum from solum, and sediment from sediment. The pseudogleys differed the most from the sediments of the Amaltheen and Opalinus clay, but the pelosols were also easily distinguishable from these sediments, and also from the Posidonian shale. The statistical increase in BCKe and decrease in ARo on passing from sediment to soil, and X-ray data suggest that expandable 2:1 minerals are present in the pseudogleys formed from the sediments and in the pelosols from the shale.

0845

**Nikodijevic, V.; Antonovic, G.**
Steppification in smonitza in the Soko Banja ravine. Archiv za Poljoprivredne Nauke. Institut za Proucavanje Zemljista, Beograd, Topcider, Yugoslavia.

Vol. 27 100. Greek. p. 35-46. 1974.

Steppification in smonitza occurs on light Tertiary deposits rich in CaCO3 in an arid climate favouring the upward movement of water rich in Ca(HCO3)2, and produces a soil similar to chernozem.

0846

**Northcote, K.H.**
Some thought concerning agronomy and soil classification. Australian Institute of Agricultural Sciences, Journal.

Vol. 30, No. 4. p. 241-246. 1964.

0847

**Novoa, F. V.; Nunez, R. E.**
The behaviour of five phosphorus fertilizers on three soils of Mexico with different phosphorus fixation capacities. Agrociencia. Rama de Suelos, Colegio de Postgraduados, Chapingo, Mexico.

Vol. No.19. Spanish. p. 69-82. 1975.

Ammonium-urea orthophosphate (UAO), ammonium polyphosphate (AP), urea rock phosphate (URP), magnesium potassium phosphate (MAP) and triple superphosphate (TSP) were applied to a Mollisol(A), Andosol(B) and Vertisol(C) (fixing capacities of 10, 90 and 92% respectively) in order to assess their effect on dry matter yield and P absorption by Italian ryegrass. The residual effect of the fertilizers was also tested. In (A) yield increases were similar with all the fertilizers tested. In (B) and (C) after the second cutting the highest cumulative yield was obtained with MAP. In (A) P removal by plants, throughout the five cuttings, was highest with UAO, TSP and AP. In (B), at the end of the experiment, the amounts of P removed by plants were similar for all the P sources tested, except for the URP treatments, which caused least removal of P. In (C), after the first cutting, the highest amount removed was with MAP. In all soils the amount of residual available P after the fifth cutting was highest with MAP and lowest with URP.

0848

**Nyandat, N. N.**
Gypsum as improver of the permeability of grumusol (typic pellustert) in the Kano Plains of Kenya. East African Agricultural and Forestry Journal. National Agricultural Laboratories. P.O. Box 30028, Nairobi, Kenya.

Vol. 38 1. English. p. 1-7. 1972.

Improvements in soil permeability due to treatment with gypsum were most marked during infiltration at an initial soil moisture tension of about 1 atm, and when the soil was slowly wetted. The beneficial effect of gypsum seemed to depend on maintaining the soil electrolyte concentration at a level greater than 11.52 me gypsum/l. The effect was not lasting and continual reapplication was considered necessary. (132.3.222 12.145

0849

**Ochtman, L. H. J.; Debele, B.**
Detailed soil survey and irrigability land classification of Gode Agricultural Research Station. I.A.R. Soil Survey and Land Evaluation Report, Ethiopia.

Vol. No.1. English. p. 109 pp. 1975.

The soils of Gode Station are situated on the Wabi Shebelle alluvial plain. They are mainly deep or moderately deep Chromic Vertisols over a loamy to sandy substratum. Intersecting the plain are silted-up meanders and channels in which the soils are Calcaric Fluvisols. Land classification according to suitability for irrigation, quality of the Wabi Shebelle water and some proposed land improvement measures are reported.

0850

**Ochtman, L. H. J.; Debele, B.**
Reddish brown soils of Holetta region, Ethiopian Highlands. World Soil Resources Reports, FAO. Inst. of Agric. Res., Addis Ababa, Ethiopia.

Vol. No. 47. English. p. 48-62. 1977.

Following a brief description of climate, geology and physiography, and land use suitability, the morphology, texture, structure, moisture relations, consistence and workability, pH and cation exchange, nutrient status, mineralogy, micromorphology and classification of Luvic Phaeozems (Udic Paleustolls) in the Holetta region are described.

0851

**Oliveira, J B de**
Latossolos da quadricula de Campinas, SP. II. Caracteristicas fisicas e mineralogicas; correlacao com as classifacacoes americana, francesa e FAO; Latosols (Oxisols) from the Campinas region, Sao Paulo, Brazil. II. Physical and mineralogical characteristics; correlation with American, French and FAO. Classifications. Rev Bras Cienc Solo.

Portuguese. May/Dec 1977. Vol.1 (2/3): 114-121. Ref. Eng. sum.

0852

**Oliveira, J B de; Menk, J R F**
Latossolos da quadricula de Campinas, SP. I. Caracteristicas morfologicas e quimicas; Latosols (oxisols) from the Campinas region, Sao Paulo, Brazil. I. Morphological and chemical characteristics. Rev Bras Cienc Solo.

Portuguese. May/Dec 1977. Vol.1 (2/3): 108-114. Ref. Eng. sum.

0853

**Oliveira, J. B. de; Moniz, A. C.**
Detailed soil survey of the Ribeirao Preto Experimental Station, Sao Paulo. Bragantia. Instituto Agronomico, 13100 Campinas, Sao Paulo, Brazil.

Vol. 34. Portuguese. p. 59-113. 1975.

The geology, topography, climate and vegetation of the area (594 ha) are described. The soils, on basaltic parent material, are classified as oxisols, inceptisols and alfisols. Representative profiles are described, and a soil map is included.

0854

**Oliveira, J. B. de; Valadares, J. M. A. S.; Rotta, C. L.**
Detailed survey of soils of the Itarare Experimental Station, Sao Paulo. Bragantia. Instituto Agronomico, Sao Paulo, Brazil.

Vol. 35 2. Portuguese. p. 295-333. 1976.

The survey covers 495 ha. Seven mapping units were recognized and ten representative profiles are described. The soils are mainly Inceptisols and Oxisols. A soil map at the scale of 1/10 000 is included.

0855

**Oliveira, J. B. de**
Soil distribution and differentiation into various categories in two apparently homogeneous oxisol areas. Bragantia. Instituto Agronomico, 13100 Campinas, Sao Paulo, Brazil.

Vol. 34. Portuguese. p. 309-348. 1975.

Topsoil and subsoil samples were collected on a 50 m grid pattern from the two areas and their morphological, chemical, physical and mineralogical properties were studied for classification purposes. The morphological characteristics were very similar, could not be related to the chemical properties, and were found unsuitable for differentiating the soils into classes. It was concluded that classification at the family level for one area and at the subgroup level for the other area would be adequate for a semi-detailed soil survey and a soil map at the scale of 1:50000.

0856

**Olmedo Pujol, J. de; Perez, J. M.**
Micromorphological study of a vertisol catena in Seville Province. Anales de Edafologia y Agrobiologia. Centro de Edafologia y Biologia Aplicada del Cuarto, Sevilla, Spain.

Vol. 34 9/10. Spanish. p. 745-763. 1975.

Three profiles developed on Oligocene calcareous, fossiliferous marl were studied. The influence of biological activity was pronounced. Structure, plasmic fabric, glaebules, aeolian contamination, etc. are discussed.

0857

**Olson, O. E.; Cary, E. E.; Allaway, W. H.**
Fixation and volatilization by soils of selenium from trimethylselenonium. Agronomy Journal. Chemistry Department, South Dakota Agricultural Experiment Station, Brookings, SD57006, USA.

Vol. 68 6. English. p. 839-843. 1976.

Volatilization and fixation of Se from trimethylselenonium (TMSe) was studied using a Typic Quartzipsamment, an Aeric Fragiaquept, a Typic Hapludult and a Glossoboric Hapludalf. Volatilization during several weeks of incubation at room temperature occurred with all soils, but rates varied widely. Application of CaCO3 increased volatilization from the Fragiaquept, toluene treatment or autoclaving reduced volatilization from the Fragiaquept and Hapludalf almost to nil. A nitrogen atmosphere retarded volatilization in all soils except the Fragiaquept. 75Se volatilization and fixation when added as selenate, selenite or TMSe were studied. Volatilization occurred only with TMSe, and was appreciable only with the Hapludult and Hapludalf. Fixation (Se not extracted with CaCl2 or water) was greatest with the selenite. About 30 to 50% of Se added as TMSe was fixed in all soils during three weeks. These studies suggest that Se from urinary TMSe in soil would become unavailable to plants fairly rapidly.

0858

**Orvedal, A.C.**
Some geographical aspects of the seventh approximation. Soil Sci. Soc. Amer. Proc.

Vol. 27, No. 2. p. 228-231. 1963.

0859

**Orvedal, A.C.**
The 7th approximation: its application in engineering. Soil Science.

Vol. 96, No. 1. p. 62-67. 1963.

0860

**Osiname, O A; Kang, B T; Schulte, E E; Corey, R B**
Zinc response of maize (Zea mays L.) grown on sandy inceptisols in western Nigeria. Agron J.

Nov/Dec 1973. Vol.65 (6): 875-877. Ref.

0861

**Osman, A.; Eswaran, H.**
Clay translocation and vertic properties of some red Mediterranean soils. Kingston, Ontario, Canada; Limestone Press. Soil Research Institute, Tel Amara, Lebanon.

English. p. 846-857. 1974.

Soil Microscopy (Rutherford, G.K., Editor). Micromorphological features of a Typic and a Vertic Rhodoxeralf and a Typic Chromoxerert from Lebanon are described which, with clay dispersibility data, demonstrate that clay translocation has taken place and possibly still takes place. The incipient flocculation ratio indicated that clay in the surface horizons is dispersible and subject to translocation. Strong micro-vertic characteristics masked the direct evidence of clay translocation, by disruption of illuviation argillans.

0862

**Othman, A. B.; Eswaran, H.; Cottenie, A.**
The total and extractable contents of five trace elements of some soils of Malaysia. MARDI Research Bulletin. Malaysian Agric. Res. and Development Inst., Serdang, Selangor.

Vol. 5 1. English. p. 40-49. 1977.

Soils on basic igneous rocks from the Semporna area of Sabah and the Kuantan and Segamat series in Peninsular Malaysia were investigated. The soils were classed as Dystropepts, Tropudults and Ox sols. In the Dystropepts, extractable Zn, Mn, Cu and Fe, but not Pb, were strongly correlated with organic C. Permanent charge of the soils was used as an indicator of the degree of soil evolution; only total Zn showed a relationship with this. The decrease in extractable levels of some of the elements in the most evolved profiles is ascribed to fixation by clay minerals and sesquioxides.

0863

**Ottiz, L.B.**
Performance of peanut varieties in an Oxisol in northwestern Puerto Rico. The Journal of agriculture of the University of Puerto Rico.Puerto Rico. ~Agricultural Experiment Station.

v. 63 (4). English. p. 474-475.~ ill. Oct 1979.

Rio Piedras, ~The Station.

0864

**Ovcharova, T.; Boyanov, P.**
The pF of water in some Bulgarian soils. "P'rvi Natsionalen Kongres po Pochvoznanie", Bulgaria, 1969. Poushkarov Institute of Soil Science, Sofia, Bulgaria.

Bulgarian. p. 117-121. 1972.

Experiments with smonitza and leached cinnamonic forest soils were conducted. Moisture characteristic curves showed similar trends between horizons, but differences between horizons were less in the chernozemic smonitza than in the cinnamonic forest soils. Values of the wilting point and field capacity of the soils were mucr higher when assessed from the pF than when determined by conventional methods.

0865

**Owen, R. B., Jr.; Dimond, J. B.; Getchell, A. S.**
DDT: Persistence in northern spodosols. Journal of Environmental Quality. Department of Wild Life Resources, Maine Agricultural Experiment Station, Orono, ME 04473, USA.

Vol. 6 4. English. p. 359-360. 1977.

Soils originally tested for DDT in 1967 after use of the insecticides since 1954 for the control of spruce budworm were resampled in 1973 and 1976. Soils from areas sprayed three times at 1.12 kg/ha continued to contain up to 4.5 ppm DDT residues 12 years after application. Pesticide levels in the soils sampled in 1973 and 1976 were not significantly different from levels measured in 1967. Analyses of soil profile samples through the A and B horizons indicated that )96% of the residues were still located in the O1 and O2 horizons.

0866

**Paden, H. E.; Ragon, L. G.**
Soil survey of Webster County, Nebraska. Washington, D.C., USA; US Department of Agriculture.

English. p. 72pp. 1974.

Seventeen series (mollisols and entisols) are described and mapped at a scale of 1:20 000. Land use and management are recorded. Parent materials include alluvium, loess, gravel and residuum derived from chalky limestone, and water-deposited sand.

0867

**Pagel, H.; Huay, H. Van**
Parameters of phosphate sorption in tropical and subtropical soils and the influence of P fertilization. Archiv fur Acker- und Pflanzenbau und Bodenkunde. Institut fur Tropischen Landwirtschaft und Veterinarmedizin der Karl-Marx-Universitat, 703 Leipzig, Fichtestrasse 28, German Democratic Republic.

Vol. 20 11. German. p. 765-778. 1976.

Phosphate sorption isotherms and Q/I relationships of ferrallitic, fersiallitic, alluvial and mangrove soils and a Vertisol were recorded over an 18-month period in the laboratory. Sorption curves could be plotted from the equation Y = n root X + b where Y is P-sorption, X is concentration of equilibrium solution, and n and b are soil-specific constants. Transformation of data into straight lines allowed the estimation of X, n (which is proportional to P buffering and maximum sorption), buffering, potential P release to plants, and phosphate fertilizer requirements. Application of phosphate fertilizer led to a decline in maximum sorption, which gradually increased to its original value by 6 to 18 months after application, depending on soil and water regimes. Intensity parameters and P availability increased initially and then declined.

0868

**Pagel, H.; Kiula, G.; Huay, H. Van**
Phosphate sorption parameters and phosphate fixation in some Tanzanian soils. Beitrage zur Tropischen Landwirtschaft und Veterinarmedizin. Inst. fur trop. Landwirtschaft der Karl-Marx-Univ., 703 Leipzig, Fichtestrasse 28, German Democratic Republic

Vol. 15 2. German. p. 117-130. 1977.

Ferrallitic and fersiallitic soils, an alluvial soil and a vertisol from Tanzania were used. Compared with the Langmuir equation, a new sorption equation showed advantages in the lower range of concentrations which is more important with respect to plants. The simplified calculation of the equilibrium concentration of the soil solution, the potential and actual P desorption and a constant related to P binding intensity, sorption maximum and P buffering is demonstrated. The potential release for plant uptake and P fertilizer requirements can also be calculated. The absolute and relative values of the loosely-bound phosphate decrease with increasing pH.

0869

**Pagel, H.; Prasad, R. N.**
Comparative investigations into the content of available copper in important soils of the arid and humid tropics. Beitrage zur Tropischen Landwirtschaft und Veterinarmedizin. Institut fur Tropische Landwirtschaft und Veterinarmedizin der Karl-Marx-Universitat, DDR 703 Leipzig, Fichtestr. 28, German Democratic Republic.

Vol. No.4. English. p. 399-407. 1975.

196 samples of surface and deeper soils from Yemen, Sudan, Tanzania, Ghana, Cuba and Sri Lanka, the average content of available Cu decreased from 9 ppm in fersiallitic soils to 6.4 ppm in vertisols, to 4.8 ppm in ferrallitic soils, to 4.6 ppm in arid and sub-arid soils, and to 2.6 ppm in rendzina-type soils. The percentage of samples containing sufficient available Cu was 84% in vertisols, 70% in fersiallitic soils, 65% in arid and sub-arid soils, 47% in ferrallitic soils and 36% in rendzina-type soils; it was 71% in loams and clays, and 7% in sandy soils. The available Cu content was positively correlated with the humus, clay and silt contents of the soil.

0870

**Pagel, H.**
Comparative investigations on the carbon content and various forms of nitrogen in the main soils of the arid and humid tropics. Beitrage zur Tropischen Landwirtschaft und Veterinarmedizin. Institut fur Tropische Landwirtschaft und Veterinarmedizin, Karl-Marx Universitat, Leipzig, German Democratic Republic.

Vol. 11 2. German. p. 179-198. 1973.

(166.17 116.26 143.17). In 132 soil samples the content of C, total N, mineralizable N and NH4-N increased in the order: arid and subarid soils, vertisols, fersiallitic soils, ferrallitic soils, rendzina-type soils. The relative proportion of mineralizable N and NH4-N and the C/N ratio decreased with increasing C and total N contents.

0871

**Panabokke, C. R.**
Erosion hazard and farming systems in the humid tropics of South Asia. Chichester, UK; New York, USA; Brisbane, Australia; Toronto, Canada; John Wiley & Sons. ARI Gannoruwa Peradeniya, Sri Lanka

English. p. 213-219. 1975.

Soil Conservation and Management in the Humid Tropics (Greenland, D.J.; Lal, R., Editors). In Sri Lanka, the erosion hazard is greatest on Alfisols and is low on Oxisols and Ultisols.

0872

**Panda, D.; Mohapatra, J. S.; Misra, C.; Panda, N.**
Movement and retention of phosphate in lateritic soil cores. Journal of the Indian Society of Soil Science. Orissa Univ. of Agriculture and Technology, Bhubaneswar, India.

Vol. 26 1. English. p. 25-32. 1978.

Core samples collected from an upland Oxisol at 4-10, 19-26 and 34-41 cm depths were used to study the movement of phosphate ions under saturated conditions using a miscible displacement technique. Phosphate retention and velocity of phosphate solution flow in soil pores were inversely related. Theoretical analysis indicated that phosphate sorption in this soil did not follow first-order kinetics.

0873

**Pande, H.K; Ravindranath, E; Lahiri, S**
Soil moisture extraction by wheat crop as influenced by moisture regime and soil reaction. Indian J Agron.

Sept 1975. Vol.20 (3): 226-232. Ref.

0874

**Pannell, J. P.; Yenter, J. M.; Woodyard, S. D.; Mayhugh, R. E.**
Soil survey of Alamosa Area, Colorado. Washington, D.C., USA; US Department of Agriculture.

English. p. 122pp. 1973.

Twenty-nine series (mainly mollisols, aridisols and entisols) are described and mapped at a scale of 1:24 000; use and management of the soils are discussed. Parent materials include aeolian sand, deposits, alluvium, and Precambrian granite rocks.

0875

**Papadakis, J.**
Some considerations on soil classification: the 7th approximation. Soil Science.

Vol. 94, No. 2, p. 115-119. 1962.

0876

**Papadakis, J.**
Soil taxonomy can and should be simplified from a rigid taxonomy to a precise terminology. Publ. privately by author.

English. pp. 9. 1976.

Cordoba, Argentina (published privately by author).

0877

**Paquet, H.; Vaudour, J.**
Dark clay soils and paleosols near Madrid. Revue Geographique des Pyrenees et du Sud-Ouest.

Vol. 45, 3. French. p. 217-242. 1974.

Dark clay soils and paleosols with vertic characteristics were observed in the semiendoreic depression of Vicalvaro-Coslada, and especially on the Vindobonian formations. Leached brown fersialitic soils on arkosic sands are found on the upper parts of the slopes on the eastern border. A toposequence going from xero-rendzinas to vertisols occurs on the gypsiferous sediments of the eastern side.

0878

**Paramananthan, S.**
Reconnaisance Soil Survey of Malacca. Malayan Soil Survey Report.

Vol. No. 3/1967. English. p. 59pp. 1967.

Fifteen series (mainly oxisols and ultisols) and three miscellaneous land types are described and mapped as 19 associations at a scale of 1:126 720. Parent materials include acid igneous rocks, sedimentary and metamorphic rocks and alluvium. A soil suitability classification is presented.

0879

**Paramananthan, S.**
Oxisols of Malaysia. Second International Soil Classification Workshop, Proceedings.

Vol. 1, p. 95-111. 1979.

Soil Survey Division, Land Development Department, Thailand.

0880

**Parfitt, R. L.**
Phosphate adsorption on an Oxisol. Soil Science Society of America Journal. Agric. Dep., Univ. of Papua New Guinea, P.O.Box 4820.

Vol. 41 6. English. p. 1064-1067. 1977.

Adsorption isotherms for phosphate on an oxisol showed high affinity adsorption at low solution concentrations and a linear increase in adsorption at higher concentrations. Adsorption increased with decrease in pH. It is suggested that phosphate reacts with FeOH and Fe(OH)2+ groups on soil iron oxide surfaces and with exposed Al(OH)H2O on kaolinite edges and on hydroxy-aluminum species to form binuclear or bidentate phosphate complexes.

0881

**Parsons, R. B.; Herriman, R. C.**
Geomorphic surfaces and soil development in the upper Rogue River Valley, Oregon. Soil Science Society of America Journal. West Technical Service Center, Soil Conservation Service, US Department of Agriculture, Portland, Oregon.

Vol. 40 6. English. p. 933-938. 1976.

Haploxerolls, Argixerolls, Durochrepts, and Haploxeralfs occur on a sequence of geomorphic surfaces mapped for about 650 km2 of the upper Rogue River Valley. A radiocarbon date of 2350 years provides an age for one of the Holocene surfaces and a benchmark for soil properties such as organic matter accumulation, base distribution, and B and Bt horizon development. Two kinds of periglacial patterned ground are associated with the two late Pleistocene surfaces.

0882

**Parsons, R. B.; Moncharoan, L.; Knox, E. G.**
Geomorphic occurrence of pelloxererts, Willamette valley, Oregon. Soil Science Society of America Proceedings. Oregon State University, Corvallis 97331, USA.

Vol. 37 6. English. p. 924-927. 1973.

of the time factor in the genesis of vertisols in Western Oregon is provided by this study of Bashaw soils on four geomorphic surfaces ranging in age from Holocene to middle

Pleistocene. The soils are in a very fine, montmorillonitic, mesic family of typic pelloxererts. They have slickensides and high clay contents, but lack gilgai microrelief and tonguing between the A and C horizons. Stratification in the parent alluvium has not been obliterated by churning, suggesting that one annual cracking and closing cycle will not produce all of the morphological features commonly associated with vertisols. Pedons from surfaces only 550 years old have developed sufficiently to be classified as xererts. Morphological, chemical and physical data indicate that the pedons studied are similar enough to lie within the range of one soil series. The study shows that xererts occur on very young landscapes and that very little change occurs with increasing age.

0883

**Parsons, R. B.**
Soil-geomorphology relations in mountains of Oregon, USA. Geoderma. West Technical Service Center, Soil Conserv. Service, Portland, Oregon, USA.

Vol. 21 1. English. p. 25-39. 1978.

Soils over basalt, studied in the Coast Range, were formed in transported materials and include examples of the Alfisol, Inceptisol, Mollisol and Ultisol orders. Distribution patterns of the soils can be related to active slopes, metastable slopes, pediments, ridge tops, flood plains, and alluvial fans. Variables among the factors of soil formation are chiefly geomorphic surfaces and parent materials. Soils of a lithosequence of pyroclastics, granite and schist in the Klamath Mountains include examples of the Entisol, Inceptisol and Mollisol orders. All soils from pyroclastics have argillic horizons, those from granite lack argillic horizons, and those from schist lack argillic horizons except on relatively stable surfaces. Average thicknesses of soils over saprolite range from 76 cm over granite and schist to 150 cm over pyroclastics. Lithologic discontinuities are common in both mountain areas. Field techniques for identification, described briefly, include stone lines, irregular distribution of rock fragments with depth, thicknesses of weathering rinds on rock fragments, and the lateral extensions of soil horizons.

0884

**Parsons, R. B.**
Stratigraphy and land use of the Post-Diamond Hill Paleosol, western Oregon. Geoderma. West Technical Service Center, Soil Conservation Service, Portland, Oregon, USA.

Vol. 22 1. English. p. 67-70. 1979.

The Post-Diamond Hill Paleosol generally underlies Late Pleistocene sediments of the Willamette Formation. However, in numerous localities in the Willamette Valley, reddish gray clay paleosols either outcrop at the surface or occur within the soil profile. In these cases they are part of the modern landscape. Where the paleosols outcrop, the soils are mostly Typic Pelloxererts in the fine, montmorillonitic, mesic family. Because of the nature of the paleosols, these soils are poorly suited for nearly all intensive uses; the dominant use is hay and pasture.

0885

**Parsons, R.B.**
Pedogenic and geomorphic relationships of associated aqualfs, albolls, and xerolls in western Oregon. Soil Science Society of America, Proceedings.

Vol 32, No. 4. p. 556-563. 16968.

0886

**Patel, K. S.; Sawarkar, N. J.**
Available sulphur status of shallow and deep black soils of Madhya Pradesh. JNKVV Jawaharlal Nehru Krishi Vishwa Vidyalaya Research Journal. Department of Soil Science and Agricultural Chemistry, JNKVV, Jabalpur, India.

Vol. 7 4. English. p. 298. 1973.

Based on a critical level of 8 ppm, 24% of Betul soils, 20% of Narsingpur soils, 31.9% of Seoni soils and 43.2% of Chhindwara soils are deficient in available S.

0887

**Patwary, S.U.**
Tracer studies on the balance and chemical distribution of (soil) applied nitrogen under different moisture regimes using lysimeter. Plant and soil.

v. 52 (2). English. p. 209-217.- ill. July 1979.

The Hague, -Nijhoff.

0888

**Paulk, H. L.**
Soil survey of Montgomery, Toombs and Wheeler Counties, Georgia. Washington D.C., USA; US Department of Agriculture.

English. p. 63 pp. 1973.

Twenty-six series (mainly ultisols) are described and mapped at a scale of 1:20 000. Land use and engineering data are given. Parent materials include beds of sand, loamy material and clay, stream terraces, and flood plain material.

0889

**Pavicevic, N.; Antonovic, G.**
Erosion process in the watershed of the River Lim. Arhiv za Poljoprivredne Nauke. Institut za Proucavanje Zemljista, Beograd, Yugoslavia.

Vol. 29 105. Croat. p. 3-28. 1976.

Calcareous diluvial terraces and Neogene sediments occupy the lowest positions, Paleozoic and colluvial deposits the middle, and limestone the highest positions on the watershed. On these substrata vertisols, eutric and distric cambisols, rendzina, ranker and colluvial deposits (which are the most erosive) are formed. Overstocked and poorly protected pastures show all forms of erosion. Linear forms of erosion, gullies and ravines of all sizes and stages of development occur mainly in the oak forest (lowest forest) zone in the middle and lower part of the watershed on schist, phyllite, clays, sands, serpentine and other bases. Torrents originate from mountain pastures, when they transport a large amount of coarse material, from the oak forest from numerous gullies and ravines, and from ploughed land and degraded pastures in the forest zone when they bring mainly finer material. Landslides occur on almost all terrains. Wind erosion occurs most frequently on mountains above 1000 m altitude. Fluvial erosion is found in various places as there are few wide enlargements where the river can meander freely.

0890

**Pease, D. S.; Davis, N. M.; Ingram, P. D.; Shields, P.; Hodson, M. V.; Epple, J. C., Jr.; Totah, D. S.; Berglan, L. G.**
Soil survey of Harding County, New Mexico. Washington, D.C., USA: US Department of Agriculture.

English. p. 108pp. 1973.

Thirty-eight series (mainly mollisols, aridisols, entisols, inceptisols and alfisols) are described and mapped at a scale of 1:31 680; use and management of the soils are discussed. Parent materials include Triassic, Jurassic and Cretaceous shale and sandstone, Cretaceous limestone, Tertiary basaltic lava flows, and Tertiary and Quaternary deposits.

0891

**Pedro, G.; Chauvel, A.; Melfi, A. J.**
The constitution and genesis of the terra roxa estructurada of Brazil. Introduction to a study of ferrallitic pedogenesis. Annales Agronomiques. Station de Science du Sol, Centre national de Recherches agronomiques, INRA, 78000 Versailles, France.

Vol. 27 3. French. p. 265-294. 1976.

The relationship between Terra roxa estructurada (TRE) in relation to Terra roxa legitima (TRL) and ferrallitic soils in general is discussed for the Brazilian Terra roxa formed from the basalt sheet of Parana. The mechanical composition and micromorphology of TRE as compared with TRL and considered in relation to the external physico-chemistry of the exchange complex and to the greater or lesser activity of the complex in relation to the environment suggest that the differences between the various Terra roxa is essentially a pedoplasmic difference arising from continual deionization, this process simultaneously causing superficial adsorption of Fe on the secondary components of the clay and progressive inactivation of the clay. This hypothesis envisages a whole series of intermediate stages between a ferrallitic soil in which all the clay has a free surface and one in which the surface is entirely masked. TRE would occur when free clay predominates and TRL when masked clay predominates. In general, ferrallitic pedogenesis is considered to involve two fundamental processes, one relating to the transformation of the primary minerals and the consequent formation of secondary Al components and alumosilicates, and the other relating to pedoplasmic transformations as a result of the secondary development of hydrated Fe and of the exchange complex. A ferrallitic soil can develop different facies during the second fundamental process, the most highly evolved facies being characterized by almost complete blocking of the clay and an aliatic micronodular structure (typical oxisol).

0892

**Penkov, M**
On certain problems of soil taxonomy--the essentials of the concept to pedon and polypedon. Pochvozn Agrokhim.

Bulgarian. 1973. Vol.8 (1): 135-138.

0893

**Perez Mateos, J.; Fernandez Caldas, E.**
Primary minerals in Tenerife soils. Anales de Edafologia y Agrobiologia. Centro de Edafologia y Biologia Aplicada de Tenerife, Canary Island.

Vol. 31 11/12. Spanish. p. 851-864. 1972.

The clay minerals composition of different horizons is given for twelve soil profiles, including andosols; alfisols, vertisols and brown earths, developed over different types of volcanic rocks (basalt, trachytes, phonolytes and volcanic ash) under a range of microclimatic conditions.

0894

**Perez Rodriguez, J. L.; Weiss, A.; Lagaly, G.**
A natural clay organic complex from Andalusian black earth. Clays and Clay Minerals. Centro de Edafologia y Biologia Aplicada de Cuarto, Bellavista, Spain.

Vol. 25 3. English. p. 243-251. 1977.

Protein complexes of smectites in soils are difficult to detect if the usual smectite tests show no peculiarities. Andalusian black earths are typical examples. Investigation of the alkylammonium derivatives, however, allows detection of adhered macromolecules which might be protein-like. Investigation of artificial clay-protein complexes reveals different types of clay protein interactions. Calcium smectites adsorb proteins mainly on the external surfaces, the macromolecules being anchored in the interlayer spaces. Sodium smectites give partial crystalline products in which the silicate layers are distributed in the protein matrix. Exchange of alkylammonium ions can be used as a tool for detection of the protein. If this is adsorbed on external surfaces (calcium smectites) the increased layer separation during the cation exchange enables the macromolecules to slip between the layers, and the basal spacing of the alkalkylammonium derivatives is changed in characteristic ways. The sodium clay-protein complexes are reorganized by alkylammonium ions to regular structures. The proteins are not displaced completely from the silicate surfaces so that the basal spacing is enhanced.

0895

**Perez-Escolar, R; Lugo-Lopez, M A**
Effect of depth of lime application on yield of two corn hybrids grown on a typical Ultisol of Puerto Rico. J Agric Univ P R. EXP STN.

Puerto Rico, Agricultural Experiment Station Puerto Rico, University. July 1978. Vol.62 (3): 203-213.

0896

**Perez-Escolar, R; Scott, T W; Lugo-Lopez, M A**
Legume and nonlegume crop residues as sources of N nitrogen in Oxisols and Ultisols Soils. J Agric Univ P R. EXP STN.

Puerto Rico, Agricultural Experiment Station Puerto Rico, University. Oct 1978. Vol.62 (4): 361-366.

0897

**Perez-Escolar, R.; Lugo-Lopez, M. A.**
The effect of soil pH and related acidity factors on yield of plantains (cv Maricongo) grown on Los Guineos clay, an Ultisol. Journal of Agriculture of the University of Puerto Rico. Agric. Exp. Sta., Mayaguez Campus, Univ. of Puerto Rico, Rio Piedras, Puerto Rico.

Vol. 63 1. English. p. 22-26. 1979.

The effect of soil pH and related acidity factors on yield and foliar composition of plantains grown on Los Guineos clay, an Ultisol, has been determined in a plant crop and a first ratoon. In the former, only soil pH was significantly correlated with number of fruits per bunch, in the pH range 4.4 to 5.2. Leaf calcium content was related in a highly significant way with number of fruits per bunch. In the first ratoon, no significant correlations were measured between soil acidity indices and the yield parameters, nor between nutrients in the leaves and plantain yields. Plantain cultivar Maricongo seems to be highly tolerant of low soil pH and correspondingly high ionic aluminum.

0898

**Perez-Escolar, R.**
Effect of soil pH and related acidity factors on yields of sweet potatoes and soybeans grown on tropical soils of the humid tropics. Journal of Agriculture of the University of Puerto Rico. Agric. Exp. Sta., Puerto Rico Univ., Rio Piedras, Puerto Rico.

Vol. 61 1. English. p. 82-89. 1977.

The effects of soil pH (0-15 cm depth) and exchangeable Al and Ca + Mg contents on the yields of sweet potato cv. Miguela and soyabean cv. Jupiter was studied on oxisols and ultisols in Puerto Rico. Sweet potato tuber yields were 4.6-5.7 t/ha on the (a) oxisol (pH 4.4 to )5.3) due to low rainfall, 12.4-13.4 t/ha on (b) Los Guineos clay, an ultisol (pH 4.0 to )4.7) and 12.8-13.6 t/ha on Corozal clay, an ultisol (pH 4.6 to )5.1). Soyabean seed yields were reduced by exchangeable Al content )5.5 meq/100 g soil in (b), and exchangeable base content was directly related to soyabean yield on (a). There was a positive correlation between soyabean yield and leaf N and Ca contents on (b).

0899

**Perez, A.; Vargas, D.**
Effect of fertilizer level and planting distance on soil pH, growth, fruit size, disease incidence, yield, and profit of two papaya varieties. Journal of Agriculture of the University of Puerto Rico. Agric. Exp. Station, Mayaguez Campus, Univ. of Puerto Rico, Rio Piedras.

Vol. 61 1. English. p. 68-76. 1977.

High yielding varieties were used to compare planting distances and fertilizing practices on Coto clay, an Oxisol. Plants of varieties PR 6-65 and PR 7-65 planted at 1.8 X 1.8 m were significantly larger than those at 1.2 X 1.2 m, and this was reflected in an increase in fruit yield and net profit. PR 6-65 produced a significantly heavier crop and a higher net profit/ha than PR 7-65. PR 6-65 was significantly more susceptible to the Isabela mosaic disease and more tolerant to bunchy top than PR 7-65. Soil pH was significantly lower at the 1.2 X 1.2 m planting distance than at the 1.8 X 1.8 m, probably because more fertilizer was used in the closer planting. There were no significant differences between the mean yields of papaya plants receiving monthly applications of 0.227 and 0.454 kg per plant of a 15-15-15 fertilizer.

0900

**Perkins, H.F; Byrd, H.J; Ritchie, F.T**
Ultisols--light-colored soils of the warm temperate forest lands. South Coop Ser. EXP STN.

Mississippi, Agricultural Experiment Station Arkansas, Agricultural Experiment Station Louisiana, Agricultural Experiment Station U.S., Soil Conservation Service. 1973. Vol.174: 73-86.

0901

**Persinger, I. D.**
Soil Survey of Lake County, Indiana. Washington, DC, USA, U.S. Department of Agriculture.

English. p. 90pp. 1972.

Thirty-one series (mainly udolls, udalfs and their hydromorphic associates) are described and mapped at a scale of 1:15 840; their engineering properties and their suitability for maize, soya beans, wheat, oats, grassland and woodland are indicated. Parent materials include glacial till and outwash, aeolian sand and lacustrine deposits.

0902

**Peterson, J.B; Goodrick, F.E; Melhorn, W.N.**
Delineation of the boundaries of a buried pre-glacial valley with LANDSAT-1 data Udoll soils, remote sensing. In Proceedings of the NASA National Aeronautics & Space Adm Earth Resources Survey Symposium.

1975. Vol.1st (1-A): 97-103.

0903

**Petty, D.E.**
Spodic horizons in selected Leon and Immokalee soils. Soil Science Society of Florida, Proceedings 25th Meeting.

p. 160-172, map. 1965 (publ. 1966).

0904

**Philipson, W. R.; Drosdoff, M.**
Relationships among physical and chemical properties of representative soils of the tropics from Puerto Rico. Soil Science Society of America Proceedings. Cornell University, Ithaca, New York 14850, USA.

Vol. 36 5. English. p. 815-819. 1972.

Relationships between depth, colour, structural grade, size and shape of structural unit, consistency of moist and wet soil, pH, CEC, base saturation, clay, 15-bar moisture, extractable Fe and organic C contents of 370 horizons from 84 profiles representing vertisols, mollisols, alfisols, inceptisols, ultisols and oxisols were determined by correlation and multiple linear regression. 15-bar moisture content, CEC, organic C, extractable Fe and base saturation were the dependent variables in multiple regression equations. The results indicate that although it is possible to eliminate certain properties from tropical soil data acquisition and still adequately characterize the soil, the specific properties that can be successfully eliminated depend on the soil order.

0905

**Philipson, W. R.; Layese, M. F.; Derting, J. F.**
A regression study of percent organic carbon as a soil profile depth function. Philippine Agriculturist. Central Experiment Station, University of the Philippines.

Vol. 61 5 & 6. English. p. 206-215. 1972.

In a regression study on 45 horizons from six Ustert profiles, comparisons of best-fit equations indicated that different series within the same family of a subgroup exhibited similar patterns of organic carbon distribution. The results suggest (1) that profile distributions of organic carbon could provide an additional criterion for soil correlation, and (2) that organic carbon in series profiles could be predicted by regression equations with depth as the only independent variable.

0906

**Phillips, J. A.; Kamprath, E. J.**
Soil fertility problems associated with land forming in the Coastal Plain. Journal of Soil and Water Conservation. North Carolina State University, Raleigh, USA.

Vol. 28 2. English. p. 69-73. 1973.

Chemical properties of undisturbed soil and soil which had been covered or truncated in land forming operations and simulated land forming of sample cores were determined. The soils were a deep sandy soil, a poorly-drained fine sandy loam, a moderately well-drained alluvial soil and a catena of five sandy loam soils (paleudults, ochraquults, an umbraquult and a udifluvent). The exposed soil of cut areas was acid and low in nutrients. Root growth of maize and wheat on cut soils was limited to the depths of lime incorporation.

0907

**Phung, H T; Fiskell, J G A**
Reaction rates of reduction processes in modified Spodosol systems Soils, tillage, dolomite, organic matter. Proc Soil Crop Sci Soc Fla.

1975. Vol.34: 7-11. Ref.

0908

**Piepnr, R. D.; Dwyer, D. D.; Wile, W. W.**
Burning and fertilizing blue grama range in south-central New Mexico. Bulletin, Agricultural Experiment Station, New Mexico State University. Department of Animal, Range, and Wildlife Sciences, New Mexico State University, Las Cruces, New Mexico, USA.

Vol. No. 611. English. p. 21pp. 1973.

In a five-year experiment on rangeland consisting predominantly of Bouteloua gracilis on petrocalcic calciustolls, typic argiustolls, typic and cumulic haplustolls and lithic calciustolls, NPK fertilizing significantly increased grass yields each year, but burning had no significant effect on grass yield and slightly reduced the production of forbs (mainly Sphaeralcea coccinea, Artemisia caruthii and Varbena bipinnatifida). Burning alone, or in combination with fertilizing had little effect on soil water, below-ground biomass or soil chemical properties. Fertilizing may be profitable in areas where precipitative totals and distribution are favourable, but burning to reduce forb competition is probably unnecessary.

0909

**Pietracaprina, A.**
The lower valley of the river Coghinas. A geopedological and geomorphological study. Studi Sassaresi, III, 1974. Istituto di Mineralogia e Geologia dell' Universita di Sassari, Sardinia, Italy.

Vol. 22. Italian. p. 216-258. 1975.

Three soil types, namely regosols, cambisols and vertisols are recognized in the area.

0910

**Pietri, R; Abrams, R; Julia, F J**
Influence of fertility level on the protein content and agronomic characters of pigeonpeas in an Oxisol. P R Univ J Agr.

Oct 1971. Vol.55 (4): 474-477.

0911

**Ping, C. L.; Cheng, H. H.; McNeal, B. L.**
Variations in picloram leaching patterns for several soils. Soil Science Society of America Proceedings. Washington State University, Pullman, USA.

Vol. 39 3. English. p. 470-473. 1975.

Leaching of picloram through soils under saturated conditions produced patterns which could be related to variations in soil texture and pore uniformity for three soils from arid and semiarid regions, and to diffusion from conducting pores into adjacent micropores for an Oxisol of volcanic origin from Hawaii. Evidence supporting the presence of the postulated micropore structure in the Hawaiian soil is presented.

0912

**Plass, W.; Poetsch, T.; Tributh, H.; Zakosek, H.**
The origin of a smonica profile in Rheinhesse. Zeitschrift fur Pflanzenernahrung und Bodenkunde. Geog. Inst. der Univ. Frankfurt/Main, Senckenberganlage 36, 6000 Frankfurt/Main, German Federal Republic.

Vol. 140 3/4. German. p. 317-328. 1977.

A smonica profile covered by colluvium is described. Clay mineral analysis and extended clay fractionation have shown that the dark humus enriched horizon is the lowermost colluvial horizon. The relict horizon of the smonica is the former active layer developed during the Younger Dryas period of the Wurm ice age. The parent material is clayey marl enriched with loess and pumice tuff. The smonica can be found adjacent to as well as at great distances from the chernozems of

Rheinhesse, and is thought to have the same Holocene pedogenesis.

0913

**Pleysier, J.L.**
Ion exchange equilibria involving aluminum in a kaolinitic Ultisol (profile from southern Nigeria). Journal.Soil Science Society of America.

v. 43 (5). English. p. 875-880.- ill. Sept/Oct 1979.

Madison, Wis., -The Society.

0914

**Pons, A. L.**
Residual effect of lime and phosphorus fertilizer on lucerne (Medicago sativa L.) yield on a haplohumox soil in Rio Grande do Sul. Anuario Tecnico do Instituto de Pesquisas Zootecnicas "Francisco Osorio". Instituto de Pesquisas Zootecnicas "Francisco Osorio". Porte Alegre, Rio Grande do Sul, Brazil.

Vol. 3. Portuguese. p. 540-592. 1976.

In Sept. 1971, lucerne was sown following 2 wheat crops and the residual effects of application of 0-40 t lime/ha and 0-60 kg P205/ha to the 1st wheat crop were investigated. Lucerne was not established successfully without lime and total DM yields from 5 cuts increased from 4.45 t/ha with 10 t lime/ha to 6.28 t with 40 t lime/ha. Yields increased from 4.26 t/ha without applied P to 5.57 t with 130 kg P205/ha, 5.74 t with 450 kg/ha and 5.03 t with 600 kg/ha, but the effects were only significant for 450 and 600 kg P205/ha. Application of lime or P205 had little or no effect on plant P content but increased P uptake.

0915

**Popovat, A.; Rapaport, C.; Vasu, A.**
Soils of the Cotmeana Platform and of the adjacent terraces. Analele Institutului de Studii si Cercetari Pedologice 1971.

Vol. 39. Rumanian. p. 241-257. 1972.

Brown soils, pseudogleyed sols bruns lessives, pseudogleyed sols lessives, vertisols, reddish brown soils, alluvial soils and regosols are described and their distribution is indicated on a sketch map at a scale of 1 : 200 000. Their agricultural limitations are discussed.

0916

**Porta, J; Lopez-Acevedo, M; Roquero, C**
Morfometria y clasificacion de algunos Gypsiorthids en Espana; Morphometry and classification of some Gypsiorthids in Spain Soil classification. An Inst Nac Invest Agrar Ser Gen.

Spanish. 1977. Vol.5. 85-111. Map. Ref. Eng. sum.

0917

**Porta, J**
Mise en valeur de sols salins blancs (gypsiorthids): premiers resultats des experiences sur sols des rives de la Giguela (Ciudad Real, Espagne); Evaluation of white saline soils (Gypsiorthids): first results from experiments on the soils of the shores of Giguela (Ciudad Real, Spain). An Inst Nac Invest Agrar Ser Gen.

French. 1973. Vol.2: 171-184. Ref. Eng. sum.

0918

**Poulain, J. F.**
The improvement of the fertility of the agricultural soils of Mali. The results of experiments over nineteen years (1962-1974). Agronomie Tropicale. IRAT, Mali.

Vol. 31 No. French. p. 403-416. 1976.

In the first phase, application of N to irrigated rice and P to groundnut and cotton increased yields of these crops for a few years only. Subsequently, P and S deficiencies were found to be severe in brown soils and ferruginous soils, and K and S in hydromorphic lowland soils and vertisols. P deficiency is practically general in Mali soils. The effects of N on the yields of maize, sorghum, millet and irrigated rice, and of manure and mineral fertilizer on cotton, sorghum and groundnut in rotation are tabulated.

0919

**Prasad, N. R.; Pagel, H.**
Comparative investigations into the content of available molybdenum in important soils of the arid and humid tropics. Beitrage zur Tropischen Landwirtschaft und Veterinarmedizin. Rajendra Agricultural University, Agricultural Research Institute, Kanke Ranchi, India 834006.

Vol. 14 No. 1. English. p. 79-87. 1976.

In 196 soil samples from Yemen, Sudan, Tanzania, Ghana, Cuba and Sri Lankar, the available Mo content was maximal in arid and subarid soils of dry regions (0.216 ppm) and rendzina-type soils (0.226 ppm) and minimal in

ferrallitic soils of the humid tropics (0.045 ppm). The content of available Mo was positively correlated with the pH, percentage base saturation, cation exchange capacity, and exchangeable Ca content of the soil, and was negatively correlated with the clay content. Of all the samples of arid and subarid soils, 24% were deficient in Mo. Of all the samples of vertisols, fersiallitic soils and ferrallitic soils 40%, 64% and 89% respectively, were low in Mo and probably deficient in Mo.

0920

**Prasad, R. N.; Pagel, H.**
Comparative investigations on the content of available boron in important soils of the arid and humid tropics. Archiv fur Acker-und Pflanzenbau und Bodenkunde. Institut fur Tropische Landwirtschaft und Veterinarmedizin, Karl Marx Universitat, Leipzig, German Democratic Republic.

Vol. 17 4. German. p. 271-281. 1973.

Data for 146 soil samples from Yemen, Sudan, Tanzania, Ghana, Cuba and Sri Lanka showed that the average content of water-soluble boron decreased in the order: arid and subarid soils, vertisols, fersiallitic soils, ferrallitic soils, rendzina-like soils. In 9% of the soils of the Yemen the boron content reached almost toxic levels.

0921

**Pregitzer, K. E.**
Soil Survey of Ottawa County, Michigan. Washington, D.C., USA: US Department of Agriculture.

English. p. 139 pp. 1972.

Sixty-one series (histosols, entisols, spodosols, alfisols, mollisols and inceptisols) are described and mapped at a scale of 1:15 840, and engineering and land-use interpretations are given. Parent materials include glacial deposits, wind-deposited material, alluvium and organic deposits.

0922

**Pritchett, W. L.; Smith, W. H.**
Management of wet savanna forest soils for pine production. Bulletin, Agricultural Experiment Stations, Institute of Food and Agricultural Sciences, University of Florida. Department of Soil Science, University of Florida, Agricultural Experiment Station, Gainesville, USA.

Vol. No 762. English. p. 22pp. 1974.

These acid soils of the southeastern flatlands, coastal plain are poorly drained hydromorphic soils generally belonging to the ochraquult and umbraquult (humic gley and low humic gley). They generally support a sparse stand of slow-growing long-leaf pine (Pinus palustris) along with a cover of wiregrass (Aristida stricta). A high water table for long periods of the growing season and low native fertility explain their low productivity. Surface drains were only effective for short distances. Management practices affecting root-zone moisture and nutrient levels converted these soils to highly productive forest land. Discing was not particularly beneficial, but bedding or ridging improved tree growth during the early years of plantation development; trees in bedded plots were 50% taller than in unbedded plots. Effects of fertilizer treatment on tree height were highly significant. The greatest response was to P. N increased tree growth when applied in conjunction with P. On non-bedded plots, the application of N without P generally suppressed tree growth.

0923

**Pullan, R. A.**
The soils of the Gulumba Area, North East State, Nigeria. Soil Survey Bulletin, Samaru, Nigeria. Institute for Agricultural Research, Samaru, Zaria, Nigeria.

Vol. No. 41. English. p. 1-59. 1969.

Twenty-nine series (mainly vertisols and ferrugincus, hydromorphic, halomorphic and weakly developed soils) are described and mapped as eleven associations at a scale of 1:250 000. The parent materials consist of unconsolidated sediments of different character and ages and the soils are directly related to the geomorphological evolution of the area. Present land use is described and recommendations for possible land use are given.

0924

**Puranik, R B; Ballal, D K; Barde, N K**
Studies on nitrogen forms as affected by long-term manuring and fertilization in Vertisols. J Indian Soc Soil Sci.

June 1978. Vol.26 (2): 169-172. Ref.

0925

**Puranik, R. B.; Ballal, D. K.; Barde, N. K.**
Studies on nitrogen forms as affected by long-term manuring and fertilization in Vertisols. Journal of the Indian Society of Soil Science. College of Agriculture, Nagpur, Maharashtra, India.

Vol. 26 2. English. p. 169-172. 1978.

Under continuous use of manures and fertilizers for more than 8 years, a very small part of the total N remained in mineralised form, while organic N fractions predominated in all the

treatments. Insoluble humin-N and amino acid-N predominated among the various N fractions. Addition of FYM gave a pronounced increase in total and organic N content and green manuring yielded greater amounts of readily available nitrogen (NO3-N) than the other treatments.

0926

**Pushparajah, E.; Wahab, M. A.; Lau, C. H.**
Residual effect of applied phosphates on performance of Hevea brasiliensis and Pueraria phaseoloides. Journal of the Rubber Research Institute of Malaysia. Rubber Res.Inst. Malaysia, Kuala Lumpur, Malaysia.

Vol. 25 3. English. p. 101-108. 1977.

Inorganic P in the soils (Typic paleudults) of two field experiments receiving either double superphosphate or rock phosphate was fractionated into Al, Fe and Ca phosphate fractions. Mobility of the applied phosphate in the soil and distribution of the various soil-P fractions were significantly different when superphosphate and rock phosphate were applied. Differences in the distribution of the various forms of soil phosphate affected the growth, yield and uptake of Pueraria phaseoloides and Hevea brasiliensis. Rock phosphate had a greater residual effect than double superphosphate on both plant species.

0927

**Quantin, P.; Tejedor Salguero, M. L.; Fernandez Caldas, E.**
Climosequence in southern Tenerife Island (Canary Islands). Part 1: ecology, morphology, physico-chemical characteristics. Cahiers ORSTOM, Pedologie. ORSTOM, 70, route d'Aulnay, Bondy, France.

Vol. 15 4. French. p. 391-407. 1977.

A topo-climatic sequence of soils on volcanic rocks has been investigated. The slope includes, from top to bottom, andic brown earth, eutrophic brown earth, fersiallitic soil, vertisol, cinnamonic soil, and sodic soils with calcareous and gypseous crusts. Morphology and physical and chemical properties are discussed in terms of the genetic processes and conditions occurring during evolution of the sequence.

0928

**Queiroz Filho, S. C. de; Millar, A. A.; Boers, M.**
Infiltration characteristics of vertisols in the Sao Francisco river basin. Campinas, Brazil; Brazilian Society of Soil Science.

Portuguese. p. 63-74. 1976.

Annals of the Fifteenth Brazilian Congress of Soil Science. Of the various methods tested, the furrow-infiltrometer method was the most satisfactory for measuring infiltration in this soil. Horizontal infiltration was approximately 1.8 times vertical infiltration. Results are briefly discussed in relation to irrigation.

0929

**Racz, Z.**
A contribution to the study and the significance of the changes in the consistence and volume in heavy, vertic soils of the pilot farm Jezevo. Agronomski Glasnik. Poljoprivredni fakultet u Zagrebu, Jugoslavia.

Vol. 36 3-4. Croat. p. 105-120. 1974.

The heavy soils of the farm were found to have unfavourable mechanical properties for cultivation and the consistency of the soil made mechanical tillage very difficult. High values of the coefficient of linear extensibility and swelling caused unfavourable changes in volume, depending on the soil moisture content.

0930

**Raeside, J.D.**
(The seventh approximation). International Society of Soil Science, Bulletin.

No. 19 p. 20-21. 1961.

0931

**Rafuy, A.**
Performance of 'Kalyan Sona' wheat under different soil-moisture regimes at critical growth phases. Indian journal of agricultural sciences.

v. 48 (12). English. p. 736-741.- ill. Dec 1978.

New Delhi, -Indian Council of Agricultural Research.

0932

**Ragg, J M**
The classification of some British soils according to the comprehensive system of the United States /; J. M. Ragg and B. Clayden. -. Harpenden : Soil Survey Rothamsted Experimental Station,.

1973. Vol.227 p. : ill., maps. -.

Includes bibliographical references and index.

0933

**Raghuram, K., Singh, T. A.; Vatsa, N. K.**
Effect of phosphatic fertilizers of different water solubility on maize and residual effect on wheat in a mollisol. Pantnagar Journal of Research. G.B. Pant Univ. of Agric. and Technol., Pantnagar, U.P., India.

Vol. 2 1. English. p. 40-43. 1977.

In trials with maize, plant P contents and grain yields were not significantly affected by the application of 13.2-52.8 kg P/ha in 4 forms, but there were residual effects on wheat in the following season; grain yields were 2.29-4.05 t/ha on plots which had been given P, compared with 1.46 t on those given no P, the highest yield was on plots given 39.6 kg P/ha as diammonium phosphate.

0934

**Raghuram, K.; Singh, T. A.; Vatsa, N. K.**
Effect of phosphatic fertilizers of different water solubility on maize and residual effect on wheat in a mollisol. Pantnagar Journal of Research. Dep. of Soil Science, G.B. Pant Univ. of Agric. and Technolog., Pantnagar, U.P., India.

Vol. 2 1. English. p. 40-42. 1977.

Superphosphate, diammonium phosphate, nitric phosphate and superphosphate + rock phosphate were applied at four rates to maize growing in field plots. Percentage of P in the maize crop was not affected by sources or rates of P, nor were yields affected. The residual effects on the subsequent wheat crop showed significant differences amongst sources and rates of P. Soil P content after the wheat harvest also showed differences due to P applied to maize.

0935

**Rahi, G.S.**
Calibration and sensitivity of neutron moisture probe for histosols (Soil water measurement). Proceedings.Soil and Crop Science Society of Florida.

v. 38. English. p. 87-90 - 11. 1979.

n.p., -The Society.

0936

**Rai, M. M.; Digha, J. M.; Pal, A. R.**
Availability of copper in deep black soils of Madhya Pradesh. Journal of the Indian Society of Soil Science. Jawaharlal Nehru Krishi Vishwa Vidayalaya, Jabalpur, India.

Vol. 20 2. English. p. 135-142. 1972.

In pot experiments with ten different soils Cu was supplied to wheat as $CuSO_4$ either as a soil dressing of 5ppm Cu or as 0.1% foliar spray. The availability of Cu was influenced by the clay and organic-C contents of the soils. Amounts of chemicall, extractable Cu were not significantl, correlated with Cu uptake or plant content. There was almost no yield response to Cu application, indicating very high Cu fixation.

0937

**Raicheva, L.**
Effect of nitrogen and phosphorus fertilizers, and of bacterial inoculation, on lucerne grown on smonitza. Pochvoznanie i Agrokhimiya. N. Pushkarov Institute of Soil Science, Sofia, Bulgaria.

Vol. 11 3. Bulgarian. p. 124-129. 1976.

Application of a bacterial fertilizer (Nitragin) had no effect on lucerne. Phosphorus fertilizer at 240 kg $P_2O_5$ per ha increased yields by 65 per cent, stimulated nitrogen-fixation and increased nitrogen uptake. Nitrogen at 65 kg per hectare, with or without phosphorus, increased lucerne yields by 16 to 18 per cent.

0938

**Raij, B. Van; Camargo, O. A. de**
Nitrate elution from soil columns of three oxisols and one alfisol. Transactions, 10th International Congress of Soil Science. II. Instituto Agronomico de Campinas, Brazil.

English. p. 384-391. 1974.

Leaching of nitrate through soils was studied in columns filled with samples from the A and B horizons of three oxisols and one alfisol. The positions of $NO_3^-$ elution peaks were given in terms of the volume of pores filled with solution. The peaks were found at the following positions: 1.25; 1.75 and 2.2 respectively for the A1, B1 and B21 horizons of the Typic Acrorthos; 1.09 for the Ap and 1.11 for the B1 of the Typic Eutrorthox; 1.25 for the A1 and 1.30 for the B1 of the Psammentic Acrorthox; 1.05 for the A1 and 0.95 for the B1 horizons of the Typic Paleudalf. The positions of the peaks could be explained by the positive and negative charges of the soils.

0939

**Raij, B. van; Peech, M.**
Electrochemical properties of some oxisols and alfisols of the tropics. Soil Science Society of America Proceedings. Cornell University, Ithaca, New York, USA.

Vol. 36 4. English. p. 587-593. 1972.

The potentiometric titration curves of the Ap and B2 horizons, at different concentration strengths crossed at a common point of

intersection, the zero point of charge (ZPC). The electrochemical behaviour of these soils was thus similar to that of many metallic oxides, in which the surface potential of a reversible double layer is determined solely by the activity of potential determining H+ and OH- ions in the bulk solution. Direct determination of the adsorption of ions from NaCl, CaCl2 and MgSO4 showed that pH, electrolyte concentration and valence of the counter ion influenced the magnitude of the electrical charges on the soil particles. From the known surface areas and ZPC of these soils, the values for the net electrical charge calculated by application of the stern model of the double layer theory, were found to be in good agreement with the experimental results.

0940

**Rajagopal, C. K.; Moosa Sheriff, M.; Selvakumari, G.; Jabarani, W.**
Status of available micronutrient cations in the soils of Kerala. Agricultural Research Journal of Kerala. Tamil Nadu Agricultural University, Coimbatore, India.

Vol. 15 2. English. p. 165-171. 1977.

Data are presented on the contents of available Zn (dithizone/N NH4OAc), available Cu (N NH4OAc), available Fe and exchangeable Mn in 478 samples of Kerala soils. Correlations between available micronutrients and (a) organic carbon and (b) pH are also reported.

0941

**Rajan, S. V. G.; Murthy, R. S.; Kalbande, A. R.; Venugopal, K. R.**
Micromorphology and chemistry of carbonate concretions in black clayey soils. Indian Journal of Agricultural Sciences. All-India Soil and Land-Use Survey, Bangalore.

Vol. 42 11. English. p 1020-1023. 1972.

Concretions from eleven soil series were grouped as follows:- those rich in chlorite, felspars, calcite, with a few quartz and magnetite crystals, those rich in quartz, felspars, calcite, with a few magnetite crystals, and those rich in quartz with a few felspars, amphiboles and magnetite.

0942

**Raju, T.**
Studies on liming Oxisols cropped to coffee. II. Effect of liming to varying pH (hydrogen-ion concentration) levels on the chemical characteristics of soil. Journal of coffee research.

v. 8 (1). English. p. 20-25.- ill. Jan 1978.

Karnataka, -Central Coffee Research Institute.

0943

**Raichev, A.**
Physical-mechanical properties of leached smonitza. Poushkarov Institute of Soil Science, Sofia, Bulgaria.

Bulgarian. p. 105-110. 1972.

Pervi Natsionalen Kongres po Pochvoznanie, Bulgaria, 1969. It was concluded that values of plough draft and soil cloddiness, hardness, stickiness, plasticity, swelling and shrinkage were optimum within the soil moisture range of 23-29%. (138:132.2:145.33).

0944

**Raman, K V; Mortland, M M**
Amorphous materials in a spodosol: some mineralogical and chemical properties. Geoderma.

Sept 1969. Vol.3 (1):37-43.

0945

**Ramaswamy P. P.; Mathan, K. K.; Nair, K. S.**
Azotobacter population in red and black soils of Tamil Nadu. Mysore Journal of Agricultural Sciences. Department of Soil Science and Agricultural Chemistry, Tamil Nadu Agricultural University, Coimbatore-641 003, India.

Vol. 11 3. English. p. 364-366. 1977.

The numbers of Azotobacter were greater in black soils than in red soils. The numbers decreased with depth, especially in the case of black soils. Seasonal variations were not significant.

0946

**Ramdial, L**
The mechanism of leaching in Vertisols (cracking clays). Proc Congr Int Soc Sugar Cane Technol.

1974. Vol.15th (v. 2): 905-913.

0947

**Ramirez, C. T.; Abruna, F.; Lozano, J.; Vicente-Chandler, J.**
Effect of fertilization on yields of three varieties of rice at two locations in Puerto Rico. Journal of Agriculture of the University of Puerto Rico. Agricultural Experiment Station, Puerto Rico University, Rio Piedras, Puerto Rico.

Vol. 59 1. English. p. 1-4. 1975.

Intensively managed irrigated rice of 3 varieties on a vertisol typical of large areas in the tropics responded strongl, to the application of 200 pounds of nitrogen per acre but not to phosphorus fertilization. Bluebonnet and Chontalpa varieties responded to the application of 200 pounds of potassium per acre, the Sinaloa variety to 300 pounds. All varieties responded strongly to the application of 40 pounds per acre of a complete minor element mixture

0948

**Ranney, R.W.**
Soil forming processes in glossoboralfs of west-central Wisconsin. Dissertation Abstracts.

Vol. 28, No. 2. p. 433B. 1967.

Abstract onl,

0949

**Rao, C.N.**
Availability indices of soil nitrogen during the growth period of sugarcane in a Mollisol of northern India. Indian sugar

v. 29 (2). English. p. 89-95 - ill. May 1979.

New Delhi, -Indian Sugar Mills Association

0950

**Rao, E. V. M. M.; Rao, B. V. V.**
Further analysis of the thermophysical properties of the fine textured mollisols. Journal of the Indian Societ, of Soil Science Univ. of Agric. Sciences, Hebbal. Bangalore 560024, Karnataka, India

Vol. 24 4. English. p. 356-362. 1976

Damping depth and celerity of temperature change in a clay loam, a silt, clay loam, and a loam increased with moisture content up to 60-70% of moisture saturation. The diurnal temperature wave would therefore not penetrate below about 75 cm in these soils. The thermal property also increased with moisture indicating that surface temperature amplitude would decrease with increasing moisture.

0951

**Rao, M. S. R. M.; Seshachalam, N.**
Improvement of intake rates in problem black soils. Mysore Journal of Agricultural Sciences. Soil Conservation Research Centre, Bellary, Karnataka, India.

Vol. 10 1. English. p. 52-58. 1976.

The black soils of Bellary are characterized by low infiltration rates due to structural instability, and the presence of a montmorillonite-type clay. The pH ranges from 8.5 to 9.2 and exchangeable sodium from 9 to 20 meq/100 g. When the exchangeable sodium percentage exceeds 7 a rapid decrease in hydraulic conductivity occurs and plant growth is adversely affected. Gypsum application increases the rate of water intake into these soils considerabl,

0952

**Rao, P. S. C.; Green, R. E.; Balasubramanian, V.; Kanehiro, Y.**
Field study of solute movement in a highly aggregated oxisol with intermittent flooding: II. Picloram. Journal of Environmental Quality. Department of Agronomy and Soil Science, Hawaii University, Honolulu, USA

Vol. 3 3. English. p. 197-202. 1974.

The top 40-cm of Molokai soil retained most of the picloram applied to the surface and followed by successive irrigations with a total of 48-74 cm water. Porous ceramic cups were used for in situ sampling of the soil solution. The picloram peak moved more slowly than expected from absorption data; however, a significant fraction penetrated to 143 cm depth after a single 24-cm irrigation. This pattern was thought to be due to rapid flow through macropores combined with temporary retention in aggregate micropores.

0953

**Rao, T. S.; Bhadrapur, T. G.**
Sodium hazard of stream waters in Tungabhadra River Valley Project (left bank) area. Mysore Journal of Agricultural Sciences. College of Agriculture, Dharwar-580005, India.

Vol. 10 1. English. p. 38-43. 1976.

The exchangeable sodium percentage values in a typical surface black cotton soil after equilibration with stream waters ranged from 12.3 to 21.1. This compared favourably with predicted value using Bower and Maasland's equation (US Salinity Laboratory). All the stream waters were of doubtful quality for irrigation.

0954

**Rao, V. S.; Gangwar, M. S.; Rathore, V. S.**
Genotypic variation in distribution of total and labelled zinc and availability of zinc (A and L values) to soya beans grown in Mollisol. Journal of Agricultural Science, Cambridge. Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (Uttar Pradesh), India.

Vol. 88 2. English. p. 417-420. 1977.

Three soya-bean genotypes (Bragg, Type I and

Hark) were grown in Mollisol supplemented with 0, 2.5, 5 and 10 mg Zn/kg in pot-culture experimants. The genotypes showed significant differences in their capacity to absorb Zn. Maximum Zn accumulation was found in Bragg and minimum in Hark. The pattern of Zn distribution in plant parts was also different in the three genotypes and was differently affected by Zn application. The uptake and percentage distribution of 65Zn followed more or less the same trend as that of total Zn. The genotypes differed significantly in R (recovery), A (availability of native Zn) and L (labile soil Zn) values, indicating that these three genotypes differed in their capacity for recovering applied and native Zn. Bragg had maximum R, A and L values. The results correspond well with the reported tolerance of these genotypes to Zn deficiency (Bragg > Type I > Hark)

0955

**Rapparlie, D. F.**
Soil survey of Hancock County, Ohio. Washington, D.C., USA: US Department of Agriculture

English. p. 97pp. 1973.

Thirty-nine series (mainly alfisols, mollisols and inceptisols) are described and mapped at a scale of 1:20 000. Land use and management are recorded. Parent material is mainly glacial till

0956

**Ratter, J. A.; Askew, G. P.; Montgomery, R. F.; Gifford, D. R.**
Observations on the vegetation of northeastern Mato Grosso. 2. Forests and soils of the Rio Suia-Missu area. Proceedings of the Royal Society of London, B. Royal Botanic Garden, Edinburgh EH3 5LR, UK.

Vol. 203 1151. English. p. 191-208. 1978.

The well drained soils of the Suia-Missu forest (Serra do Roncador region of NE Mato Grosso) are uniform, deep latosols (oxisols) of dystrophic nature with pH between 4.0 and 5.0. The area lies close to the meeting place of the Amazonian forest (the hylaea) and the cerrado (savanna) formation of Central Brazil. The vegetation is Evergreen Seasonal forest, which bears little evidence of the cerrado floristic element. Most of the species appear to have a hylaean centre of distribution but extend into other vegetation types. A characteristic low forest occurs in the flood plain of the Rio Suia-Missu while Swampy Gallery forests occur on permanently waterlogged soils around the headwaters of streams.

0957

**Raychaudhuri, S.P.**
New system of classification and nomenclature of soils. Indian Society of Soil Science Journal.

Vol. 9, No.1. p. 1-8. 1961.

0958

**Reeve, N G; Sumndr, M E**
Cation exchange capacity and exchangeable aluminum in natal oxisols. Soils. Soil Sci Soc Amer Proc.

Jan/Feb 1971. Vol 35 (1): 38-42. Ref.

0959

**Reeve, N. G.; Sumner, M. E.**
Amelioration of subsoil acidity in Natal oxisols by leaching of surface applied amendments. Agrochamophysica. Agricultural Research Institute, Cedara, South Africa.

Vol. 4 1. English. p. -6. 1972.

The downward movement of lime is limited by the pH dependent CEC in these soils. There was an increase in its rate of movement after heavy fertilization with acid-forming N fertilizers, but only small amounts of Ca salts, capable of neutralizing subsoil exchangeable Al, were leached from the limed topsoil. 90% of surface applied gypsum was leached to the subsoil, and lowered the subsoil exchangeable Al more effectively than lime. Since gypsum is less effective than lime in decreasing top soil exchangeable Al, a combination of gypsum and dolomite was recommended. (115:222:145.72)of surface applied gypsum was leached to the subsoil, and lowered the subsoil exchangeable Al more effectively than lime. Since gypsum is less effective than lime in decreasing top soil exchangeable Al, a combination of gypsum and dolomite was recommended.

0960

**Reeves, H E; Griffin, R H; Stone, J F; Alexander, J P; Ott, B J**
Soil moisture regime under a buffalograss sod. Okla Agr Exp Sta Progr Rep P.

Sept 1969. Vol.620: 45-47.

0961

**Reid, I**
The influence of slope orientation upon the soil moisture regime, and its hydrogeomorphological significance. J Hydrol.

Aug 1973. Vol.19 (4) 309-321. Ref.

0962

**Reneau, R. B. Jr.**
Changes in concentrations of selected chemical pollutants in wet, tile-drained soil systems as influenced by disposal of septic tank effluents. Journal of Enviromental Quality, Department of Agronom., Virginia Polytechnic Institute, Blacksburg VA 24061, USA

Vol 8 2. English p. 189-196 1979

Changes in P, methylene blue active substances (MBAS), NH4, NO3, NO2, Cl, pH, and Eh from septic effluent disposal were monitored in shallow ground waters between septic effluent disposal fields and an agricultural tile drainage system in an area composed of Typic and Aeric Ochraquults. As effluent moved through the soil system toward the agricultural tile, P and MBAS decreased logarithmically with distance. As much as 87% of the observed variation could be attributed to distance for both P and MBAS. Phosphorus and MBAS in ground waters intercepted by the tile drainage system at two of the sites had been reduced to acceptable levels. At location 1 (Typic Ochraquult), P and MBAS moved further (12 m) than might be predicted and were present in ground waters intercepted by the agricultural tile. These concentrations of P and MBAS in waters intercepted by the tile at location 1 resulted from rapid movement of effluent by saturated flow through the larger soil pores and from an inadequate soil volume for effluent purification. The concentrations of inorganic nitrogenous components in relation to the disposal area were similar at all three locations. The NH4-N concentration was highest adjacent to the drainfield (20-30 mu g/ml) and decreased logarithmically with distance. A maximum of 83% of the observed decrease in NH4 could be attributed to distance. The NO3 concentration increased to a maximum at approximately 5 m and then decreased with increased distance. This was substantiated by the NO3/Cl ratios, which indicated that NH4 was nitrified and the NO3 produced was subsequently denitrified to a large degree. NO3 accumulation was seasonal, with the highest concentrations present during periods of rising water tables.

0963

**Reneau, R. B., Jr.; Kitchell, W. F.; Peacock, C. D., Jr.**
Effect of septic tank effluent on the base status of two tile-drained soils. Soil Science, Dep. of Agron., Virginia Polytechnic Inst. and State Univ., Blacksburg, Virginia 24061, USA.

Vol. 127 2 English. p. 117-126. 1979.

Changes in SAR, pH, and EC of shallow groundwaters as a result of disposal of septic tank effluents into wet-tile-drained soils (Typic and Aeric Ochraquults) were monitored at selected distances from the drainfield in waters intercepted by the agricultural tile, and in control wells. SAR, pH, and EC generally decreased with increasing distance from the disposal area. SAR decreased from 20-25 in samples adjacent to the drainfield to (2 in the control wells. The SAR in the drinking water supply was 40. Changes in ESP, BS, and pH in both the Typic and Aeric Ochraquults reflected changes in groundwater samples. Greater ESP, BS, and pH were observed adjacent to the disposal area in the argillic horizons than in the surface horizons, decreasing with increased sampling distance from the disposal area. In the control profile, their distribution was reversed, the surface horizon normally having greater ESP, BS, and pH than the subsurface horizons.

0964

**Reneau, R. B., Jr.**
Influence of artificial drainage on penetration of coliform bacteria from septic tank effluents into wet tile drained soils. Journal of Environmental Quality. Dep. of Agronomy, Virginia Polytechnic Inst. and State Univ., Blacksburg, 24061, USA.

Vol. 7 1. English. p. 23-30. 1978.

The penetration of total and fecal coliform bacteria from septic tank drainage fields into wet tile drained soils classified as Typic and Aeric Ochraquults was studied during 1974, 1975, and 1976. These bacteria were monitored in groundwaters at selected distances from the drainage fields in the direction of groundwater flow and were compared to coliform densities in control wells and in tile outfalls. Fecal coliform densities were approx. 105/100 ml in groundwaters adjacent to the disposal area as compared to 10-103/100 ml 152 cm from the agricultural tile and (3/100 ml in control wells. The outfall from the study area was normally (200/100 ml compared to (3/100 ml in outfall waters from a control area. Fecal coliform densities of the outfall from the study area were one-tenth of those of the receiving stream. Coliform densities in groundwaters decreased as a logarithmic function of distance. In these soils, artificial drainage systems apparently lowered the seasonal fluctuating water tables to such a degree that individual treatment systems did not fail as a result of untreated effluent coming to the surface. It is more difficult to assess the penetration of coliform organisms present in the waste waters.

0965

**Rengasamy, P.; Sarma, V. A. K.; Murthy, R. S.; Krishna Murti, G. S. R.**
Mineralogy, genesis and classification of ferruginous soils of the Eastern Mysore Plateau, India. Journal of Soil Science. Indian Agricultural Research Institute, New Delhi-110012, India.

Vol. 29 3. English. p. 431-445. 1978.

The relationship between geomorphic and climatic history and the formation of the ferruginous soils on the acidic Peninsular Gneiss of the Mysore Plateau is discussed. The profiles studied are found on two different land systems. The soils of the older, fairly smooth landscape are composed of colluvium over truncated laterite profiles, with a gravel layer and a prominent kaolin layer over the weathered rock. These soils show an accumulation of pedogenic haematite grains in the sand fraction and have considerable kaolinite and amorphous ferri-aluminosilicate minerals in their clays. The soils of the younger, rugged landscape have similar clay mineralogy, but do not have a gravel layer, or haematite grains. The influence of the coarse-grained parent rock is seen in the large amounts of quartz gravel. The absence of granulation is attributed to lack of accumulation of iron. The soils were formed in an earlier, more humid, climate than prevails today. The original laterite profiles were formed on a plane surface, and subsequent change in climate has led to change in the land forms and dissection. Truncation of the profiles was followed by deposition of red colluvium over the resistant ferruginous layer. These ancient soils do not satisfy the criteria for Oxisols in the U.S. classification, but do fit well into the French system as 'Sols Ferrallitiques', subclass 'fiablement desatures en (B)'. The soil from a low lying area and formed from colluvium under hydromorphic conditions is classified as 'Vertisols et Paravertisols'.

0966

**Reynders, J J**
A study of argillic horizons in some soils in Morocco. Geoderma.

Dec 1972. Vol.8 (4): 267-271. Ref.

0967

**Ribamar Pereira, J.**
Alternation of chemical characteristics of an oxisol under irrigation.

20 leaves :- ill.

(Petrolina) - EMBRAPA, Centro de Pesquisa Agropecu aria do Tr opico Semi- Arido - 1978.

0968

**Ricardo Guerrero, R; Hernan Burbano, O; Miguel Viveros, Z**
Efecto del encalamiento sobre la evolucion del P-organico bajo fertilization fosfatada y su relacion con la utilizacion de P por la planta en un distrandept tipico; Effect of liming on the development of organic phosphorus based on phosphate fertilization and its relation to phosphorus absorption by the plant in a typic dystrandept soil Maize. Agrochimica.

Spanish. Sept 1977. Vol.21 (5): 389-397. Ref. Eng. sum.

0969

**Richardson, J. L.; Hole, F. D.**
Influence of vegetation on water repellency in selected western Wisconsin soils. Soil Science Society of America Journal. Univ. of Wisconsin, Madison, USA (F.D.H.).

Vol. 42 3. English. p. 465-467. 1978.

Water repellency in several western Wisconsin soils was characterized by three tests: wetting angle ( theta ), wetting drop penetration-time (WDPT), and 90 deg -surface tension (ST). High OM contents in the A horizon of Mollisols and Alfisols were associated with slight repellency as measured by theta and WDPT. Frequent burning of a prairie on a Mollisol increased persistence (WDPT) and ST, as compared with soil at a nearby control site, but had no influence on theta , indicating that repellency is present at initial water contact but is unstable and disappears with prolonged water contact. Mor litter layers having observable fungal mycelia had repellent surfaces as measured by all three tests. These repellent materials were observed in Spodosols under red pine (Pinus resinosa), hemlock (Tsuga canadensis), and under a mixed hard and soft wood stand with dense ericaceous shrub understory.

0970

**Richardson, J.L.**
Mottling and iron distribution in a glossoboralf-haplaquoll hydrosequence on a glacial moraine in northwestern Wisconsin. Soil Science Society of America, Journal.

Vol. 43, No. 3. p. 552-557.

0971

**Richardson, W. E.; Girdner, C. L.**
Soil Survey of Kent County, Texas. Washington, D.C., USA; US Department of Agriculture.

English. p. 67 pp. 1973.

Twenty-seven series (mainly mollisols, alfisols, entisols and inceptisols) are described and mapped at a scale of 1:31 680. Parent materials include Triassic and Permian sandstones and shales, wind-deposited sands and alluvial deposits.

0972

**Riche, G.**
Soil formation processes in the basin of the Wabi Shebelle (Ethiopia). Cahiers ORSTOM, Pedologie.

Vol. 14 3. French. p. 227-243. 1976.

Soil formation processes are related to altitude. Allophane formation occurs where the climate is a cold temperate one. Ferrallitization and clay formation occur in a temperate climate transitional to an arid-tropical climate, with illite being formed in a Mediterranean climate. The intensity of the dissolution and secondary accumulation of calcium carbonate varies with the soil moisture regime and thus principally with climate, gypsum being formed in the semi-arid zones and saline efflorescences occurring in the most arid zones. Vertisol formation occurs in all climates (except in the cold temperate climate) where drainage is lacking.

0974

**Richlen, E. M.**
Soil survey of South Umpqua Area, Oregon. Washington, D.C., USA, US Department of Agriculture.

English. p. 60 pp. 1973.

Eighteen series (inceptisols, alfisols, mollisols and ultisols) are described and mapped on a scale of 1:31 680. Land use and engineering data are given. Parent materials are mainly volcanic rocks, including tuff, breccia, agglomerate, rhyolite, dacite and basalt.

0973

**Richlen, E. M.**
Soil survey of South Umpqua Area, Oregon. Washington, D.C., USA, US Department of Agriculture.

English. p. 60 pp. 1973.

Eighteen series (inceptisols, alfisols, mollisols and ultisols) are described and mapped on a scale of 1:31 680. Land use and engineering data are given. Parent materials are mainly volcanic rocks, including tuff, breccia, agglomerate, rhyolite, dacite and basalt.

0975

**Rickert, K. G.**
Establishment of green panic as influenced by type, amount, and placement of vegetative mulch. Australian Journal of Experimental Agriculture and Animal Husbandry. Department of Primary Industries, Brian Pastures Research Station, Gayndah, Queensland, Australia.

Vol. 13 62. English. p. 268-274. 1973.

Panicum maximum var. trichoglume cv. Petrie was sown under mulches of sawdust, native pasture hay, barley straw, Dolichos lablab stubble and sorghum stubble. The long chaffed or milled materials were applied at rates of 2500, 5000 or 10 000 kg/ha-1, and comparisons were made with a control in two experiments on a self-mulching clay. Seedling emergence was superior with all surface mulches, the optimum rate being about 5000 kg/ha-1. In a third experiment seedling emergence forty-two days after irrigation was directly related to the proportion of area covered by mulch. Seedling yield followed trends in plant density.

0976

**Rieger, S.**
Cryorthods of the Cook Inlet - Susitna Lowland, Alaska. Soil Science Society of America, Proceedings.

Vol. 29, No. 4. p. 448-453. 1965.

0977

**Rieger, S.**
Temperature regimes and classification of some well-drained alpine soils in Alaska. Soil Science Society of America, Proceedings. Soil Conservation Service, US Department of Agriculture, Palmer, Alaska.

Vol. 37 5. English. p. 806-807. 1973.

at a depth of 50 cm were taken in well-drained alpine soils (three Cryorthods and one Cryochrept) of interior and south-central Alaska over a three-year period. The soils of the interior had a pergelic temperature regime (permafrost conditions), but those of the coastal mountains did not.

0978

**Rieger, S.**
Humods in relation to volcanic ash in Southern Alaska. Soil Science Society of America Proceedings. SCS, US Department of Agriculture, Palmer, Alaska, USA.

Vol. 38 2. English. p. 347-351. 1974.

In cool, humid areas of southern Alaska, Humods may develop in ashy materials, but all

well-drained Spodosols formed in other materials are Orthods. The affinity between Humods and ashy parent material appears to result from a more ready availability of aluminum from volcanic ash than from other materials.

0979

**Righi, D; Guillet, B**
Datations par le carbone-14 naturel de la matiere organique d'horizons spodiques de podzols des Landes du Medoc (France); Natural carbon-14 dating of organic matter from spodic horizons of Podzols in the Medoc Landes (France). In Soil Organic Matter Studies; Proceedings of a Symposium.

French. 1976 (pub. 1977). Vol.2: 187-192.

0980

**Righi, D.; Coninck, F. de**
Micromorphological aspects of humods and haplaquods of the "Landes du Medoc" France. Kingston, Ontario, Canada, Limestone Press. Laboratoire de Pedologie, Faculte des Sciences, Universite de Poitiers, France.

English. p. 567-588. 1974.

Soil Microscopy (Rutherford, G.K., Editor). This study shows very clearly that the organic matter of Bh horizons of the spodosols can be present in two micromorphologically distinct forms as a result of totally different origins. Monomorphic coatings and concentrations characterize the morphologically well developed spodosols, with cemented B2h, of the less hydromorphic stations. Faecal pellets, aggregates and accumulations, all more or less transformed, are more specific for the more hydromorphic spodosols, with friable illuvial horizons. A major part of the organic matter of the Bh horizons has not migrated in dispersed form but has been either transformed in situ or translocated mechanically in a solid state by the soil fauna. This may have important consequences concerning the alteration of minerals and illuviation of alteration products.

0981

**Ritchey, K. D.; Fox, R. H.**
Limitations to productivity of some ultisol and oxisol subsoils. Journal of Agriculture of the University of Puerto Rico. Department of Soil Science, Cornell University, Ithaca, New York, USA.

Vol. 58 2. English. p. 197-210. 1974.

Greenhouse experiments with maize showed that with carefully controlled water management, liming and fertilizing (especially with P and Zn) the surface soils and subsoils tested could all be raised to an equally high level of productivity. It is assumed that, in the field, P requirements would be less than 1000 ppm P, the requirement indicated by these tests.

0982

**Robertson, W K; Lipscomb, R W; Chapman, W H**
Management of a typic Paleudult (Orangeburg) in north Florida. II. Major plant nutrient requirements for general crops. Soil Crop Sci Soc Fla Proc.

1970 (pub. 1971). Vol.30th: 185-195. Ref.

0983

**Robertson, W K; Lipscomb, R W; Martin, F G**
Management of a typic Paleudult (Orangeberg) in north Florida. 1. Rotational cropping for general crops. Soil Crop Sci Soc Fla Proc.

1970 (pub. 1971). Vol.30th: 175-185.

0984

**Robertson, W K; Lipscomb, R W**
Management of a typic Paleudult (Orangeburg) in north Florida. III. Lime requirements for general crops. Soil Crop Sci Soc Fla Proc.

1970 (pub. 1971). Vol.30th: 195-200.

0985

**Robertson, W K; Lundy, H W**
Corn yield response to fertilizers, varieties, row spacing, and plant population on an entisol. Soil Crop Sci Soc Fla Proc.

1970 (pub. 1971). Vol.30th: 20-27.

0986

**Robertson, W K; Smith, W H; Post, D M**
Effect of nitrogen and placed phosphorus and dolomitic limestone in an aeric haplaquod on slash pine Pinus elliottii growth and composition. Proc Soil Crop Sci Soc Fla.

1975. Vol.34: 58-60.

0987

**Robertson, W K; Volk, G M**
Effect of deep profile mixing and amendment additions on soil characteristics and crop production of a Spodosol. Int Soc Soil Sci Trans.

1968. Vol.9th Congr.,v.3:357-366.

Bibliography: p. 364.

0988

**Robertson, W. K.; Thompson, L. G.; Martin, F. G.**
Manganese and copper requirements for soybeans. Agronomy Journal. Department of Soil Science, University of Florida, Gainesville, USA.

Vol. 65 4. English. p. 641-644. 1973.

In field experiments soybean on a drained Aeric Haplaquod limed to pH 7.0 received four rates of Mn and four rates of Cu. The highest yields occurred when the leaves contained 72 ppm Mn and 3 ppm Cu and the seeds contained 22 ppm Mn and 9 ppm Cu. The surface soil in the high yielding plots released 12 ppm Mn and 5 ppm Cu to the double acid extraction and 2 and 1 ppm, respectively, to the N NH4OAc extraction. Leaf and seed analyses were found to be good indicators of Mn deficiency. Soil extraction by the double acid, NH4OAc and hydroquinone methods were also found to be satisfactory for finding Mn deficiency. Commercial trace element sources (fritted trace elements and Mn chelate) were assessed for yield response.

0989

**Rodriguez Hernandez, C. M.; Fernandez Caldas, E.; Fedoroff, N.; Quantin, P.**
Vertisols of the western Canary Islands. Physico-chemical, mineralogical and micromorphological study. Pedologie. Lab. de Edafologia, Fac. de Ciencas, Univ. de La Laguna, Tenerife, Canary Islands.

Vol. 29 1. French. p. 71-107. 1979.

These vertisols have formed on volcanic materials, particularly basalt and lapilli, and are typical, apart from lacking micro-gilgai. Due to erosion they are shallow and in places discontinuous. The processes of weathering, mineral transformation, colluviation, clay illuviation, and swelling and drying as they have affected profile development are discussed.

0990

**Rodriguez J, M**
Fertilizacion de una rotacion maiz-frijol en suelos rojos del departamento de Antioquia; Application of fertilizers to a maize and bean rotation in Red soils Oxisols of Antioquia Department Minerals, yields. Rev ICA (Inst Colomb Agropecu).

Spanish. Mar 1974. Vol.9 (1): 49-59. Eng. sum.

0991

**Rodriguez, S. J.; Rivera-Lopez, C.**
The performance of Pelargonium stockplants in different potting mixtures. Journal of Agriculture of the University of Puerto Rico. Plant Breeding Department, Agricultural Experimental Station, Mayaguez Campus, University of Puerto Rico, Rio Piedras, Puerto Rico.

Vol. 60 2. English. p. 224-227. 1976.

The possibility of substituting peatmoss with tobacco industry residues, wood shavings, sawdust, spent ground coffee, coffee parchment, dry coffee leaves, sugarcane bagasse, or Cano Tiburones muck in potting mixture for Pelargonium stockplants was investigated. The different materials were mixed in 1:1, 1:3, or 3:1 proportions with Catano sand or Cialitos clay (an Oxisol). Dry coffee leaves and sugarcane bagasse consistently gave as good results as peatmoss. None of the other materials tested compared favorably with peatmoss for the growth of Pelargonium stock plants.

0992

**Rogers, C. A.; Goerdel, A. R.; Gooch, H. D.**
Soil survey of Jones County, Texas. Washington, D.C., USA, US Department of Agriculture.

English. p. 51pp. 1972.

Twenty-seven series (mainly ustalfs, ustolls, usterts and ustochrepts) are described and mapped at a scale of 1:20 000; their engineering properties and their suitability for cotton, sorghum, wheat and range are indicated. Parent materials consist of red-bed shale, marl, dolomite and sandstone of Permian age and alluvium.

0993

**Rogers, J. H.**
Soil Survey of El Dorado Area, California. Washington, D.C., USA; US Department of Agriculture.

English. p. 89 pp. 1974.

Thirty three series (mainly alfisols, ultisols,

inceptisols and mollisols) are described and mapped at a scale of 1:20 000. Parent materials include acid and basic volcanics and alluvium.

0994

**Rogers, J. S.; Stewart, E. H.**
Watertable elevation-drain outflow relationships in a mixed and unmixed Spodosol. Proceedings, Soil and Crop Science Society of Florida. USDA, ARS, Gainesville, Florida, USA.

Vol. 36. English. p. 94-96. 1977.

Computer simulations of flow to drains for a Spodosol after surface tillage, or after deep tillage involving mixing of the soil indicated that flow was restricted near the drains in the mixed profile. The relationship between watertable elevation and drain outflow rate for both soil profiles was constant for 5 years. This indicated that the hydraulic characteristics of neither profile have changed significantly. Thus, the restriction to flow near the drains developed very soon after the drains were installed.

0995

**Rogers, V. A.**
Soil Survey of Lancaster County, South Carolina. Washington, D.C., USA; US Department of Agriculture.

English. p. 129 pp. 1973.

Thirty-five series (ultisols, alfisols, inceptisols and entisols) are described and mapped at a scale of 1:20 000, and engineering and land-use interpretations are given. Parent materials include acid and basic igneous rocks, metamorphic rocks, marine sediments and alluvium.

0996

**Rojanasoonthon, S.**
Oxisols of Thailand. Second Internatioanlnal Soil Classification Workshop, Proceedings.

Vol. 1. p. 113-122. 1979.

Soil Survey Division, Land Development Department, Thailand.

0997

**Ronchetti, G.**
Consideration of the new American classification of soils. Accademia Italia de Science Forestal, Annales.

Vol. 12. Italian. p. 411-450. 1963.

0998

**Rosell, R. A.; Allan, A. L.; Agullo, E.; Gelos, C.; Lazarri, M. A.**
Potentiometric study of humus. III. Comparison of the functional group composition of humic acids extracted by two procedures from a dark chestnut soil (petrocalcic paleustoll). Turrialba. Universidad Nacional del Sur, Bahia Blanca, Argentina.

Vol. 23 3. Spanish. p. 333-337. 1972.

Humic acid was extracted from the A1 horizon of a dark chestnut soil with (1) 0.5N NaOH after decalcification, and (2) with Na-Dowex A-1 chelating resin without prior decalcification. The functional group composition of the humic acids obtained by the two procedures was very similar. The absorbance ratio at 465 and 665 nm showed that the humic acid extracted by the chelating resin was more condensed or less degraded than that extracted with 0.5N NaOH.

0999

**Rostad, H P W; Smeck, N E; Wilding, L P**
Genesis of argillic horizons in soils derived from coarse-textured calcareous gravels. J Soil Sci Soc Am. OTHER US.

Sept/Oct 1976. Vol.40 (5): 739-744. Map. Ref.

1000

**Roth, W. E.**
Soil Survey of Edwards County, Kansas. Washington, D.C., USA; US Department of Agriculture.

English. p. 64 pp. 1973. hr.

Twenty-four series (mainly alfisols, mollisols and entisols) are described and mapped at a scale of 1:24 000. Parent materials include sand, loess, alluvium and outwash sediments.

1001

**Roux, J. le**
Quantitative clay mineralogical analysis of Natal Oxisols. Soil Science. University of Natal, Republic of South Africa.

Vol. 115 2. English. p. 137-144. 1973.

The A,B,C and R horizons of three soils representative of the Highlands and Midland Mistbelt areas were studied. Significant amounts of a stable pedogenic aluminous chlorite were found in all three soils. Alkali-extractable amorphous aluminosilicates (mainly gibbsite) were present in large amounts and constituted as much as a third of the total clay fraction in some subsoil horizons. Shale derived soils contained unexpectedly large amounts of mica, probably as small isolated

residual cores protected by interlayer hydroxy-aluminium polymers. Two of the soils were confirmed as Oxisols but the third was classified as an Oxic-Inceptisol.

1002

**Rozov, N.N.**
Comparison of the USSR soil classification with the new American system. Soviet Soil Science.

No. 6. English. p. 597-603. 1965.

Translated from the Russian: Pochvovedeniya, No.6. p.42-48. 1964.

1003

**Rudert, B. D.; Locascio, S. J.**
Differential mobility of nitrapyrin and ammonium in a sandy soil and its effect on nitrapyrin efficiency. Agronomy Journal. Vegetable Crops Dep., IFAS, Univ. of Florida, Gainesville, Florida 32611, USA.

Vol. 71 3. English. p. 487-489. 1979.

In greenhouse studies, nitrapyrin reduced NO3-N loss from a Kanapaha fine sand (loamy, siliceous, hyperthermic Grossarenic Paleaquult) for only the first 2 weeks of a 5-week leaching period. In segmented soil columns, nitrapyrin was placed in the soil at a depth of 13 to 15.5 cm. After the soil was leached at water rates of 0, 2.5, and 5 cm/week for 2 and 4 weeks, soil samples were incubated with NH4-N. Nitrification bioassay of soil above and below nitrapyrin placement showed that nitrapyrin movement was affected more by volatility than by water rate. Movement of NH4-N from a 13.0 to 15 cm depth was studied in soil columns that contained 20 ppm nitrapyrin in the soil. After leaching, NH4-N and NO3-N levels were determined at various soil depths. With increases in the rate of water applied and in the leaching period, higher levels of NH4-N moved to lower depths than nitrapyrin. Movement of NH4-N away from nitrapyrin may account for the reduced nitrapyrin effectiveness often observed for sandy soils.

1004

**Ruhe, R. V.**
Holocene environments and soil geomorphology in midwestern United States. Quarternary Research.

Vol. 4 4. English. p. 487-495. 1974.

The most important widespread environmental event during the Holocene about 8000 y.a. was the establishment of an effective precipitation pattern that in part defines the Prairie Peninsula. The pattern occupies a region that is dominated by dry westerly air for 6-9 mo during normal years and for 9-12 mo during drought years. Regional soil geography correlates readily with zones of precipitation effectiveness with Brunizem (Udolls) conforming to the moist, subhumid zone, Chernozem (Boralls, Udolls) relating to the dry, sub-humid zone, and Chestnut and Brown soils (Ustolls) fitting the semiarid zone. During the past few thousand years, a climatic reversal has caused encroachment of forest on prairie resulting in the formation of transitional or inter-grade soils. In local areas the Holocene is expressed on the land surface by the soil geomorphic unit which is the repetitive occurrence of a sequence of soils on the erosional surface of a hillslope and on the correlative depositional body at the foot and toe of the slope. This unit embraces time, lithology, landscape, and soils and provides a means for mapping the Holocene on the countryside.

1005

**Russell, J. S.**
Effects of land smoothing on gilgaied brigalow soils on certain soil properties and plant growth. Tropical Grasslands. Division of Tropical Agronomy, CSIRO, Cunningham Laboratory, St. Lucia, Queensland, Australia.

Vol. 7 2. English. p. 209-218. 1973.

exposed by smoothing had lower pH and N and available P contents. In pot experiments using exposed subsoil, legumes responded to P, lime and Mo. In the field oats also responded to superphosphate on exposed areas.

1006

**Russell, R. C.; Dideriksen, R. I.; Fisher, C. S.**
Soil survey of Guthrie County, Iowa. Washington, D.C., USA; US Department of Agriculture.

English. p. 117pp. 1974.

Forty-one series (mainly mollisols and alfisols) are described and mapped at a scale of 1:15 840. Land use and management are recorded. Parent materials include loess, glacial till, alluvium, aeolian sand, and Cretaceous and Pennsylvanian shale and sandstone.

1007

**Ryden, J. C.; Lund, J.; Letey, J.; Focht, D. D.**
Direct measurement of denitrification loss from soils: II. Development and application of field methods. Soil Science Society of America Journal. Dep. of Soil and Envir. Sci., Univ. of California, Riverside, California 92521, USA.

Vol. 43 1. English. p. 110-118. 1979.

A method was developed for the direct measurement of denitrification N loss from field soils. The method was based on the

observation that in the presence of acetylene (C2H2) concentrations of 0.1 to 5.0% (vol/vol) the sole product of denitrification in soils was N2O. Sustained C2H2 concentrations of approximately 0.4 to 1.6% were induced in the atmosphere of a field soil by supplying C2H2 through probes inserted into the soil to a depth of 1 m. The time required to establish these C2H2 concentrations ranged from 15 to 30 min. Essentially, no increase in 30N2 concentration was detected under closed soil covers installed at C2H2-treated field locations which had received 15N-NO3. At locations without C2H2 treatment an average 30N2 enrichment of 14.2% relative to air was observed. Production of 15N-labeled N2O and N2 at locations with and without C2H2 treatment was very similar, and essentially, 100% of the 15N evolved at C2H2-treated locations appeared as N2O. Direct measurements of N2O fluxes from an irrigated, fertilized Haploxeroll at locations with and without C2H2 treatment were made using a previously established method. Net denitrification N fluxes, measured as N2O flux from C2H2-treated locations, ranged from 0.5 to 90 g N/ha-hour. Total denitrification loss during 129 days was 51.2 kg N/ha with the total fertilizer application being 335 kg N/ha. The methodology provides a technique for direct monitoring of denitrification N loss in situ.

1008

**Saatci, F.**
Studies of the organic substance (in soil) grumusol (=vertisol) in Thracia. Ziraat Fakultesi dergisi.Ege Universitesi. -Ziraat Fakultesi.

v. 15 (2). TURKISH. p. 161-180 - ill. 1978.

Bornova. -Universitesi

1009

**Sachan, R.S.**
Note on P (phosphorus) requirement of lahi (Brassica campestris var toria Duth & Full) in mollisols of Tarai area. Pantnagar journal of research

v. 3 (1). English. p. 142-143 - ill. Jan 1978.

Pantnagar, India. -M. G. Jackson

1010

**Sadzawka R., M. A.; Bernardi R., C.; Carrasco R., M. A.; Tabilo T., G.**
Active manganese in the volcanic soils of Chile. Agrochimica. Seccion de Quimica, Depto. de Agrologia, S.A.G., Chile.

Vol. 20 1. Italian. p. 46-54. 1976.

In 42 profiles of Chilean volcanic soils, classified as Inceptisols, Spodosols, Alfisols and Ultisols, average values of available, easily-reducible and active manganese ranged from 4.4 to 7.9, 11 to 212, and 17 to 220 ppm in surface horizons and from 0.4 to 3.2, 4 to 152, and 4 to 153 ppm in clay accumulation horizons, respectively. Available manganese was negatively correlated with pH in KCl. Easily-reducible and active manganese were correlated negatively with pHH2O and positively with organic matter content in surface horizons. All forms of manganese were positively correlated with clay percentage in surface horizons.

1011

**Sahrawat, K. L.**
EDTA extractable phosphorus in soils as related to available and inorganic phosphorus forms. Communications in Soil Science and Plant Analysis. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad, India.

Vol. 8 4. English. p. 281-287. 1977.

Twenty surface soil samples, representing two major soil orders alfisols and vertisols were extracted with 0.01N Na2 EDTA solution (pH 4.8) at a soil/solution ratio of 1:25. Phosphorus in the extract was determined following ammonium molybdate-stannous chloride colorimetric method. The EDTA extractable P showed significant positive correlations with extractable P according to the Olsen, Morgan, Bray 1 and 2 and also with inorganic phosphorus fractions associated with Al, Ca and Fe.

1012

**Said, M. B.**
Ammonium fixation in the Sudan Gezira soil. Plant and Soil. Gezira Agricultural Research Station, Wad Medani, Sudan.

Vol. 38 1. English. p. 9-16. 1973.

In two soil profiles (heavy clay vertisols, with montmorillonite as the dominant clay mineral) the amount of NH4 fixed and the NH4 fixing capacity increased with depth reaching a maximum at a depth of 70 to 140cm. Fixed NH4 varied from 0.28 to 0.40 meq/100g and was 5.0-5.9% of the total NH4 fixing capacity (oven-dry basis). Current cropping and fertilizing practices had little effect on the fixed NH4 content of the soils.

1013

**Saiz-Jimenez, C; Martin, F**
Pyrolysis gas chromatography of the pigment of Eurotium echinulatum Delacr a fungus isolated from a southern Spain Vertisol. In Studies about Humus; Transaction of the International Symposium Humus et Planta.

1975. Vol.6: 11-16.

1014

**Saiz-Jimenez, C.; Martin, F.; Haider, K.; Meuzelaar, H. L. C.**
Comparison of humic and fulvic acids from different soils by pyrolysis mass spectrometry. Agrochimica. Centro de Edafologia y Biologia Aplicada del Cuarto, CSIC, Sevilla, Spain.

Vol. 22 3/4. English. p. 353-359. 1978.

Humic and fulvic acids from a brown soil, a podzol, an andosol, a red soil, a vertisol and a forest soil were subjected to Curiepoint pyrolysis and analysed with a fast-scanning, low voltage, electron-impact mass spectrometer. Series of homologous compounds derived from protein, polysaccharides, alkanes and lignin phenols were characterized for humic acids of the different soil types. Fulvic acids showed close similarities in pyrolysis products, with major peaks arising from polysaccharides; aromatics and phenols were present in only trace amounts.

1015

**Saiz-Jimenez, C.**
A strain of Eurotium echinulatum Delacr. isolated from a vertisol. Microbiologia Espanola. Instituto "Jaime Ferran" de Microbiologia, CSIC, Spain.

Vol. 29 1-4. Spanish. p. 19-31. 1976.

The morphological and physiological characteristics of a strain of E.echinulatum, isolated from a vertisol and recorded for the first time in Spain, are discussed.

1016

**Salas, L.C.**
Andalusian black earth on sediments of the Guadalquivir terraces (Soil classification and genesis). Anales de edafologia y agrobiologia.

v. 37 (5/6). Spanish. p. 461-470.- ill. May/June 1978.

Madrid, -Instituto Nacional de Edafologia y Agrobiologia.

1017

**Salem, M. Z.; Hole, F. D.**
Some chemical and physical properties of certain soils of Afghanistan. Soil Science. Kabul University, Afghanistan.

Vol. 116 3. English. p. 178-190. 1973.

physical and micromorphological data are given for eight representative pedons from agricultural areas in Afghanistan. An explanation of the genesis of discoidal features is presented. Four soils are classified as orthids, one as an argid, one as an aquoll and two as fluvents.

1018

**Sallee, K.**
Soil Survey of Lane County, Kansas. Washington, D.C., USA. US Department of Agriculture.

English. p. 62 pp. 1972.

Nineteen series (mainly ustolls and orthents) are described and mapped at a scale of 1:20 000 and engineering and land-use interpretations are presented. Parent materials include loess alluvial deposits and chalk.

1019

**Salmon, R C**
Exchange reactions of potassium and magnesium in Chisumbanje vertisols. Rhod Zambia Malawi J Agric Res.

1974. Vol.12 (1): 51-56. Ref.

1020

**Salzmann, R. A.; Harwood, J. O.**
Soil survey of Bingham Area, Idaho. Washington, D.C., USA. US Department of Agriculture.

English. p. 123pp. 1973.

Fifty-six series (mainly mollisols and aridisols) are described and mapped at a scale of 1:20 000. Land use and management are recorded. Parent materials include basalt, rhyolite, alluvium and loess.

1021

**Sample, E. C.; Khasawneh, F. E.; Hashimoto, I.**
Reaction of ammonium ortho- and polyphosphate fertilizers in soil: II. Effects of associated cations. Soil Science Society of America Journal. Soils and Fertilizer Res. Branch, National Fertilizer Development Cent., TVA, Muscle Shoals, Alabama 35660, USA.

Vol. 43 1. English. p. 58-65. 1979.

Diammonium phosphate (DAP), triammonium pyrophosphate monohydrate (TPP), and ammonium polyphosphate (APP) were surface applied on columns of Hartsells fine sandy loam, a Typic Hapludult, and their influence on movement, distribution, and precipitation of soil and fertilizer cations was investigated. Fertilizer $NH_4^+$ ions moved in association with the phosphate anions by salt diffusion, and by counter diffusion, in exchange for exchangeable soil cations, a few millimeters beyond the limits reached by phosphates. Exchangeable Ca in the first 6 mm of soil contacted by the fertilizer solution from DAP was replaced by

NH4+, and the displaced Ca2+ was precipitated in place by phosphates. Displaced Ca was transported in the fertilizer solution of TPP and APP for 6 to 8 mm before it was precipitated. The resulting drop in Ca activity created a Ca gradient and consequent movement opposite to that of the phosphates, partly in exchange for NH4+ (counter cation diffusion) and partly following hydrolysis from exchange sites. Depletion of exchangeable cations caused soil pH to drop up to 1 pH unit below the initial soil value. Differences in pH between soil in the outer zones reached by phosphates and the inner layers ranged from 1.7 to 2.7 pH units. Soil Al was influenced greatly by all three fertilizer solutions. With DAP, the reaction products reprecipitated in place, while movement of Al occurred with TPP and APP. There were well-defined zones of precipitation involving Al pyro- or polyphosphates. There was no evidence to implicate Fe in similar reactions.

1022

**Samuels, G.; Hernandez, E.**
Response of plantains to magnesium fertilizer in an ultisol. Journal of Agriculture of the University of Puerto Rico. Agronomy and Soils Department, Santiago Torres, Corozal Substation, Puerto Rico.

Vol. 59 3. English. p. 233-235. 1975.

In the humid mountain area of Puerto Rico application of 200 kg MgO/ha gave better growth and higher yields than application of 76 kg MgO/ha. Leaf Mg values of 0.35% and above, in eleven-month old plantains, were associated with high yields.

1023

**Samuels, G.; Orengo-Santiago, E.; Beale, A.**
Influence of fertilizers on the production of plantains with irrigation. Journal of Agriculture of the University of Puerto Rico. Agricultural Experiment Station, Mayaguez Campus, University of Puerto Rico, Rio Piedras, Puerto Rico.

Vol. 62 1. English. p. 1-9. 1978.

The fertilizer requirements of plantains (Musa acuminata X M.balbisiana) were determined for a San Anton sandy clay (Cumulic Haplustolls), with drip irrigation, on the southern coast of Puerto Rico. Significant responses per plant in number of fruit and weight per bunch were obtained with 168 kg N/ha. Use of the Capo fertilizer-yield equation indicated that applications of 259 and 282 kg N/ha would be required for a maximum yield of 155,988 fruit/ha weighing 45,030 kg. Levels of N in excess of 336 kg N/ha reduced production by restricting the number and weight of bunches/ha, with 673 kg N/ha having 22.8% less bunches than with optimum N fertilizer application. Leaf-N value of 3.20% at 10 mo of age was associated with response to N fertilizers and values of 3.66% with maximum production. Optimum K2O fertilization rates, required for maximum yields, were 420 and 405 kg/ha for number and weight of plantains, respectively, with 336 kg K2O giving 99% of maximum yields. Phosphorus increments up to 336 kg P2O5/ha failed to increase production plant or per hectare. The unfertilized soil contained 45 p/m P (Olsen), and leaf samples from these plots contained 0.28% P in the leaf at 10 mo. Applications of 94 kg MgO/ha were sufficient to attain 95% of maximum yield potential for number and weight of fruit per ha. Soil and leaf values (699 p/m Mg and leaf 0.48% Mg) for the no-Mg treatment exceeded published critical values for plantains. For optimum production of plantains on an irrigated San Anton sandy clay, the use of 168 kg N and 336 kg K2O/ha are suggested.

1024

**San Valentin, G. O.; Zelazny, L. W.; Robertson, W. K.**
Potassium exchange characteristics of a rhodic paleudult. Proceedings, Soil and Crop Science Society of Florida. Soil Science Department, Florida University, Gainesville, 32601, USA.

Vol. 32. English. p. 128-132. 1973.

The effects of lime and K fertilizer on the K content of a fine sandy loam before and after cropping with a maize-groundnut rotation were determined. The soil initially contained 2.87 meq/100 g total K, 0.32 meq/100 g boiling N HNO3-extractable K and 0.05 meq/100 g neutral NH4OAc-extractable K. Orthoclase was the source of soil K. The potential buffering capacity of K was increased and the Gapon selectivity coefficient was decreased by liming. The equilibrium activity ratio of K decreased with liming before cropping but after cropping it increased in limed soils. On unlimed soils the Gapon selectivity coefficient decreased with K addition but on limed soils it was increased by K addition.

1025

**Sanchez Diaz, J.**
The aridisol order on the island of Gran Canaria (Chemical, mineralogical and morphological soil properties, Canary Islands). Anales de edafologia y agrobiologia.

v. 37 (3/4). Spanish. p. 231-247.- ill., map. Mar/Apr 1978.

Madrid, -Instituto Nacional de Edafologia y Agrobiologia.

1026

**Sanchez Diaz, J.**
The order Vertisol on gran Canaria Island (Canary Islands). Anales de edafologia y agrobiologia

v. 37 (3/4). Spanish. p. 375-385.- ill.,map. Mar/Apr 1978

Madrid. -Instituto Nacional de Edafologia y Agrobiologia

1027

**Sanchez Diaz, J.**
The suborder Andept on Gran Canaria island (Canar, Islands). Anales de edafologia y agrobiologia

v. 37 (3/4). Spanish. p. 387-400.- ill. Mar/Apr 1978

Madrid. -Instituto Nacional de Edafologia y Agrobiologia

1028

**Sanchez, P A**
Advances in the management of Oxisols and Ultisols in tropical South America. In Proceedings of the International Seminar on Soil Environment and Fertility Management in Intensive Agriculture

1977. Vol.p. 539-565. Map. Ref.

1029

**Sanchez, P. A.; Buol, S. W.**
Properties of some soils of the upper Amazon basin of Peru. Soil Science Society of America Proceedings. Soil Science Department, North Carolina State University, Raleigh, USA.

Vol. 38 1. English. p. 117-121. 1974

The main well-drained soils around Yurimaguas and Iquitos are Typic Paleudults with kaolinitic mineralogy. The somewhat poorly-drained soils are Tropaquults and Tropaquepts with abundant amounts of montmorillonite in the gleyed horizons. Spodosols were found in less extensive areas with coarser parent material. This area has been incorrectly mapped as Oxisols or their taxonomic equivalents.

1030

**Sandoval, F. M.**
Deep plowing improves sodic claypan soils. North Dakota Farm Research. USDA, Northern Great Plains Res.Center, Mandan, North Dakota, USA.

Vol. 35 4. English. p. 15-18. 1978

Trials have shown that sodic claypan soils of western North Dakota (also called Natriboroll or Solonetzic) are improved by deep plowing. Plowing 24 to 30 inches deep crumbles the dense subsoil layer and brings up natural gypsum (calcium sulfate) from below the pan. Density is reduced, permeability and water holding capacity are increased, and cereal production is benefited.

1031

**Santo, L**
Placement of drip irrigation tubes in an Oxisol. Rep Hawaii Sugar Technol Annu Conf. OTHER US.

1977. Vol.25th. 199-204.

1032

**Sarigumba, T I; Pritchett, W L; Smith, W H**
Transformations of urea in a Leon fine sand soil under four soil moisture regimes. Forest soils, fertilization. Proc Soil Crop Sci Soc Fla. OTHER US.

1978. Vol.37. 146-150. Ref

1033

**Sarigumba, T. I.; Pritchett, W. L.; Smith, W. H.**
Urea and ammonium sulfate fertilization of potted slash pine under two soil moisture regimes. Soil Science Society of America Journal. University of Florida, Gainesville, USA.

Vol. 40 4. English. p. 588-593. 1976.

Growth response of slash pine seedlings growing on a Spodosol in pots was greater to urea than to ammonium sulphate. Tree growth was greater when soil matric suction limit was set at 170 cm than at 500 cm of water. Correlation coefficients were positive between growth response and nutrient uptake, but negative between growth response and nutrient leaching. Urea resulted in greater mineral uptake whereas ammonium sulphate resulted in greater leaching of nutrients.

1034

**Sarkar, A. N.; Raj, D.**
Study of the mineralogical composition of sand fractions from major groups of soils in South India and W. Bengal. Madras Agricultural Journal. Madras University, India.

Vol. 60 (9). English. p. 158-163. 1973.

An analysis of forty soil samples of black, alluvial, red and latosol groups showed that minerals of the fine sand fraction generally conformed with those of the parent rock. Quartz and Fe-bearing minerals were predominant, ilmenite, hornblende, chlorite, zircon and tourmaline occurred in moderate amounts; muscovite, pyroxene, biotite, glauconite and sphene occurred in traces. Mineralogical composition was closely similar for the same soil group under similar rock association, geological time and comparable elevation. On the basis of relative abundance of resistant minerals weathering is considered to increase in the order, black, alluvial, red and laterite soil.

1035

**Saroha, M.S.**
Effect of prevention of iron chlorosis on the quality of sugarcane grown on vertisols. Plant and Soil.

v. 52 (4). English. p. 467-473. - ill. Sept 1979.

The Hague. -Nijhoff.

1036

**Satyanarayana, T; Shivamurthy, S C; Hadimani, A S**
Influence of texture and soil moisture regimes on phosphate mobility. Mysore J. Agr. Sci.

1976. Vol. 4 (3). 247-252.

Bibliography. p. 252.

1037

**Satyanarayana, T., Hedge, B. R.; Havanagi, G. V.**
A note on the estimation of 1/3 and 15 bars moisture percentage of black soils of northern Karnataka. Annals of Arid Zone. Dryland Agriculture Project, University of Agricultural Sciences Bangalore, India.

Vol. 16 (1). English. p. 147-148. 1977.

In 72 samples of soil that were predominantly montmorillonitic, more than 75% of the samples were clay loams and less than 10% were sandy loams. The 1/3 and 15 bar moisture contents of the soils were positively correlated with the contents of clay, clay + silt, and silt in the soils, and were negatively correlated with the sand content.

1038

**Savithri, P; Krishnamoorthy, K K**
Effect of compaction and moisture regime on the migration of nitrate ion. Soils. Madras Agric J.

Aug 1975. Vol.60 (8). 894-898.

1039

**Schafer, W.M.**
Morphology of a paralithic contact in a soil over soft sandstone (in southeastern Montana). Soil Science Society of America Journal.

v. 43 (2). English. p. 383-386.- ill. Mar/Apr 1979.

Madison, Wis.

1040

**Schargel, R.**
Characteristics and formation of a chronosequence of soils developed on alluvial deposits between the Bocono and Masparro rivers in Barinas (Venezuela). Agronomia Tropical. Oficina Edafologica de Occidente, Direccion de Obras Hidraulicas, Ministerio de Obras Publicas, Venezuela.

Vol. 22 (4). Spanish. p. 345-373. 1972.

The three soils studied have developed under similar conditions of climate, vegetation, relief and parent material upon ground-surfaces of different age. The difference in age is reflected in considerable variations in the degree of soil development. The most recent soil has only a thin horizon of organic matter accumulation. The soil of intermediate age has a thick surface horizon of organic matter accumulation with the characteristics of a mollic epipedon; this overlies a cambic horizon containing Fe-Mn nodules. The oldest soil has a distinct argillic horizon and many Fe-Mn nodules. Considerable amounts of biotite were observed in the sand fraction of the two most recent soils, and vermiculite, illite and kaolinite predominated in their clay fraction. The oldest soil contained only traces of biotite in the sand fraction, with montmorillonite, illite and kaolinite as the predominant minerals in the clay fraction. Most of the kaolinite was inherited from the parent material. The soils, in increasing age order, were classified as ustifluvents, haplustolls, and haplustalfs.

1041

**Scharpenseel, H. W.; Beckmann, H.**
Heavy metals in terrestrial, hydromorphic and sub-aqueous soils from rural, urban and industrial regions. Landwirtschaftliche Forschung. Institut fur Bodenkunde der Universitat Bonn, German Federal Republic

Vol. 28 2. German p. 128-134 1975

In a large number of samples, garden soils from the centre of Bonn had a very high Pb content but only slightly increased contents of Cd, Co, Cu, Zn, Fe and Mn compared with rural soils. Terrestrial soils in the industrial Rhine-Westphalia region had Pb contents only about 50 ppm higher than those of other terrestrial soils (excluding the Bonn soils). The clay content of gley, in accumulative locations was mostly lower than that of terrestrial Vertisols but the gleys had higher contents of all the heavy metals. The heavy metal content of gyttja remote from urban industrial regions was greater than that of remote urban terrestrial soils but, except for some young sub-aqueous soils, gyttja from industrial urban areas was very rich in all the metals.

1042

**Scharpenseel, H. W.; Pietig, F**
University of Bonn natural radiocarbon measurements IV. Radiocarbon. Institut fur Bodenkunde, Universitat Bonn, German Federal Republic

Vol. 13 2. English p. 189-212 1971.

Radiocarbon dating was carried out on groundwater samples from West German, and Tunisia. Similar dating of soil samples from Hungary and Russia and samples of specific soil types (podzols, kraznozems, plaggen soils, vertisols, brown earths and buried soils) were also carried out.

1043

**Scharpenseel, H. W.; Pietig, F.**
University of Bonn radiocarbon measurements VI. Radiocarbon. Institut fur Bodenkunde, Universitat Bonn, German Federal Republik.

Vol. 15 2. English. p. 252-279. 1973.

Radiocarbon dating measurements were made on groundwater samples from West Germany. Similar dating was carried out on vertisols from Spain, Portugal and Australia and on chernozems and gyttja soils from Germany to investigate their time of formation. The ages of soil organic matter fractions and archeological samples were also investigated.

1044

**Scharpenseel, H. W.**
Natural radiocarbon measurement of soil and organic matter fractions and on soil profiles of different pedogenesis. Proceedings, 8th International Conference on Radiocarbon Dating, Wellington, New Zealand, October, 1972. Institute of Soil Science, Bonn University, German Federal Republic

English. p. 382-393. 1972.

Particle-size fractionation was considered the best soil pre-treatment for sample preparation. "Apparent mean residence time" (AMRT) versus depth relationships were tested with 543 soil samples. Spodosols and plaggepts showed erratic patterns where the organic matter was percolating and had been reworked. Significant relationships were found for Udolfs, Udolls and Vertisols, where the humic-C was mostly fixed by clay-organic interaction.

1045

**Scharpenseel, H. W.**
Natural radiocarbon measurements as a means of studying soil processes and their dynamics. Transactions, 10th International Congress of Soil Science, VI (II).

German. p. 315-330. 1974.

Data from 14C measurements show that in Spodosol and Plaggept profiles there was no correlation between age and depth due to illuviation and mixing of organic matter within the profile. In Udalf, Udoll and Vertisol profiles the age of the organic matter obviously increases with depth although in cracks this correlation is somewhat less distinct. The shape of the age depth curve can reflect the presence or absence of dynamic processes (swelling and contraction in Vertisols), or the type of moisture regime in the initial stage of soil formation.

1046

**Scheylenborgh, J. Van**
On soil genesis in temperate humid climates. V The formation of the "albic" and "spodic" horizon. Netherlands Journal of Agricultural Science.

Vol. 13, No. 3. English. p. 267-279. 1965.

1047

**Schmude, K.O.**
A mountaintop view of the new comprehensive system of classification. Soil Survey Horizons.

Vol. 9, p. 3. p. 3-6. 1968

1048

**Schoephorster, D. B.; Hinton, R. B.**
Soil Survey of Susitna Valley Area, Alaska. Washington, D.C., USA: US Department of Agriculture.

English. p. 71 pp. 1973.

(173.798) Twenty-five series (mainly spodosols, histosols, entisols and inceptisols) are described and mapped at a scale of 1:31 680, and engineering properties are tabulated. Parent materials include loess, glacial till, alluvium and organic deposits.

1049

**Schultz, L. D.; Driessen, J. L.**
Soil Survey of Lake County, South Dakota. Washington, D.C., USA: US Department of Agriculture.

English. p. 78 pp. 1973.

Thirty series (mainly mollisols) are described and mapped at a scale of 1:20 000. Parent materials include glacial deposits, stream deposits and loess.

1050

**Schuylenborg, J van; Slager, S; Jongmans, A G**
On soil genesis in temperate humid climate. VIII. The formation of a "Udalfic" Eutrochrept. Neth J Agr Sci.

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**Sehgal, J L; Sharma, H C; Dev, G**
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Soils and relief on basement and sedimentary rocks of the Harer Plateau (eastern Ethiopia). Catena. Geographisches Inst. der J.W. Goethe-Univ., Senckenberganlage 36, 6000 Frankfurt/Main, German Federal Republic.

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Medium black soils on alluvium occupy a large area in Kota district. Three regions are distinguishable on the basis of geological formations, heavy mineral assemblages and soil texture. One representative profile from each region was investigated. The soils are calcareous and range from sandy loam to clay. Development is in the early or middle stages. A discontinuity of the parent material was observed. CEC ranged from 16 to 28 me/100g. Organic carbon was low (0.5%). Montmorillonitic clay minerals predominate in two profiles; in the third profile quartz was the predominant mineral.

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Effect of compaction of black cotton soils on the uptake of N, P and K by wheat. Indian Journal of Agricultual Research. Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, India.

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Classification of some black soils of Tungabhadra catchment area in Mysore State. Indian Journal of Agricultural Research. Indian Agricultural Research Institute, New Delhi.

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Distribution of free iron and organic carbon as related to available water in some forested sandy soils. Soil Science Society of America Proceedings. Ford Forestry Centre, L' Anse, Michigan, USA.

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Study on soil profiles from black and associated soils of Madhya Pradesh. JNKVV Research Journal. Department of Soil Science and Agricultural Chemistry, J.N. Krishi Vishwa Vidyalaya, Jabalpur, India.

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Soils from four localities showed wide variation in colour, texture, structure, stickiness and plastic number. The clay content was low in brown soils and higher in black soils. Its content tended to decrease with depth in medium black soil along with a concomitant increase in sand content. The clay was unevenly distributed in the profiles of deep black soil. The brown soil was slightly acidic to neutral in reaction, while black soils were neutral to alkaline with low to medium content of organic matter and total nitrogen. The cation exchange capacity and exchangeable cations were lower in brown soils than in black ones. C.E.C. increased with depth, although clay and organic matter content decreased. Exchangeable Ca++ was found to be a dominant cation but Mg++ and K+ content were medium and low, respectively.

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The climate, topography and geology of the area are described, analytical data for 9 profiles representative of vertisols, ultisols, inceptisols and entisols are presented, and land capability is discussed.

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Effect of boron and zinc applications on yields of intensively managed plantains growing on a steep ultisol. Journal of Agriculture, University of Puerto Rico. Agricultural Experiment Station, Mayaguez Campus, University of Puerto Rico, Rio Piedras.

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On a deep red clay soil situated on a 40% slope at about 1400 ft elevation, plantains dio not respond to Zn, but applications of 1 oz/plant B (equivalent to 55 lb/acre borax) increased yields by an average of 4,140 plantains. Plantains did not respond to heavier applications of B.

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Predicting exchangeable sodium ratios in irrigated tropical vertisols. Soil Science Societ, of America Proceedings. Hawaii Agricultural Experiment Station, Honolulu.

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Isotherms expressing Na exchange with either Ca or Mg were obtained and Gapon's constants were derived to reflect differences in exchange equilibria among Hawaii's Vertisols, their horizons, the electrolyte concentration levels, and competing divalent cations. Differences among soils and among electrolyte concentration levels were found to be the most important factor causing differences in exchangeable cation ratios obtained for defined sodium adsorption ratios.

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Extractable sesquioxides in six Mediterranean soils developed on basalt and scoria. Journal of Soil Science. Dept. of Soil & Water Science, Hebrew Universit, of Jerusalem, Rehovot, Israel.

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Iron, Al, and Mn were extracted by oxalate and dithionite from two brown Mediterranean soils, two red Mediterranean soils, one vertisol and one gley soil, all derived from basalt or scoria in the sub-humid and humid Mediterranean regions of the Golan Heights. Ratios of oxalate:dithionite extracted iron (Feo:Fed) were low in all soils, indicating that the predominant form of free iron is crystalline. Feo accumulates in the argillic B horizons of the Mediterranean soils, while Fed accumulates in the surface horizons. A large part of the free iron oxide in the surface horizons of Mediterranean soils is associated with non-clay fractions. While manganese behaves in a manner somewhat similar to that of iron, no definite trends could be discerned in the vertical distribution of free aluminium. In the vertisol, Feo and Mno accumulate in the subsoil. Fed and Mnd increase slightly with soil depth. In the gley soil, amorphous iron accumulates in the surface horizon, total free iron in the bottom horizon. Both amorphous and total free Mn had been depleted from the upper horizons of the gley soil.

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Phosphorus retention in some basalt and tuff derived Mediterranean soils. Agrochimica. Dep. of Soil and Water Science, Hebrew Univ. of Jerusalem, Rehovot, Israel.

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P retention capacities of 12 neutral or mildly acid Mediterranean soils from the Golan Heights were determined from the adsorption maxima of the Langmuir isotherms. The retention capacities were lower in Vertisols than in Red and Brown Mediterranean soils. OM, pH and specific surface area were not correlated with retention capacity, but extractable Fe and Al gave good indices of P retention. Acetate-extractable Fe gave the best correlation.

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The nature of basalt weathering in Israel. Soil Science. Dep. of Soil and Water Science, Hebrew Univ. of Jerusalem, Rehovot, Israel.

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Three major weathering forms of upper Cenozoic basalts are recognized: a weathering crust, several mm thick, at the interface with the massive basalt; a weathering zone, several cm thick, associated with vesicular basalt; and thoroughly altered basalt saprolite, mostly obtained under prolonged water-saturated conditions. The clay fractions in the weathering crust and zone consist of smectite and kaolinite with halloysite, while in the saprolite, smectite is the only clay mineral formed. $SiO_2/Al_2O_3$ ratios change from 5-7 in the rock to 2-3 in the crust clay, and this decrease represents maximum desilication obtained under eastern Mediterranean conditions. With soil development, a resilication of soil clays relative to crust clay may take place in the deeper stable profiles. Soil development also involves

aeolian accumulation of quartz in the coarser size fractions, and Fe and K enrichment in the clay fraction. Grumusols (Vertisols) represent the mature, stable endproducts of basalt weathering on uneroded surfaces in semiarid and subhumid parts; in the more humid parts, Red and Brown Mediterranean soils (Xeralfs) becomu dominant.

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A study was initiated in the Washington Cascades to examine processes of soil genesis in situ through the analysis of soil solution chemistry. Parent material of the pedon studied included andesite bedrock and tephra. Suction plate lysimeters were used to continuously extract soil solution held below 0.1 atm from the O2, A2, IIB2hir, and IVB32 horizons of a forest soil. Movement of elements was in the order Si ) Al ) Fe ) Mn. The O2 and A2 were the source of the Fe, Al, and Si which entered the IIB2hir. Most of the Mn originated in the A2. Virtually all of the Fe, 48.5% of the Al, 50% of the Mn, and 15% of the Si which left the A2 remained in the IIB2hir. According to its morphology, this soil appears to be a Spodosol, and the lysimeter data indicate that podzolization is the major process of soil formation. The soil does not meet the criteria of a Spodosol in Soil Taxonomy, possibly because (i) the intensity of weathering is low, or (ii) soil taxonomy criteria for the order are not broad enough.

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Mustard on vertisols in Rajasthan. Indian Farming. Dep. of Agron., Udaipur Univ., Udaipur 313 001, Rajasthan, India.

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The kinetics of C and N mineralization in soils amended with organic materials was investigated following incubation periods of up to 30 weeks. The data indicated that the decomposition of organic matter in soil is controlled by two simultaneous first-order kinetic reactions. Mineralization potentials of the soils were derived on the premise that the rate of C or N mineralization is proportional to the amount of substrate. The estimates of C or N mineralization potential, mineralization rate constants and half-time for C or N mineralization are reported for the amended soils. The relative enrichment of conventional humus fractions after a 30 week period of incubation indicated that the soils could be ranked in the following order of humification rate: Haplustults ) Haplaquents ) Calciorthents.

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Alfisols--light-colored soils of the humid temperate areas. South Coop Ser. EXP STN.

Mississippi, Agricultural Experiment Station Arkansas, Agricultural Experiment Station Louisiana, Agricultural Experiment Station U.S., Soil Conservation Service. 1973. Vol.174: 61-72. Ref.

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Factors influencing profile development exhibited by some hydromorphic soils in Illinois. "Pseudogley and Gley" Transactions of Commissions V and VI of the International Society of Soil Science. University of Illinois, Urbana, USA.

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Relationships between soil properties, management practices, and corn yields on South Atlantic Coastal Plain soils. Agronomy Journal. North Carolina State University, USA.

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Field studies on tolerance of plant species and cultivars to acid soil conditions in Colombia. Ithaca, New York, USA; Cornell University Agricultural Experiment Station. Beef Production Program, Apartado Aereo 67-13, CIAT, Cali, Colombia.

English. p. 213-222. 19777.

Plant Adaptation to Mineral Stress in Problem Soils. Proceedings of a workshop, Beltsville, Maryland, USA; November 1976 (Wright, M.J. - editor). Screening of cultivars of corn, sorghum, rice, cowpea, peanuts, black beans and cassava for response to applications of lime in an Oxisol at Carimagna is reported. In this soil the major value of lime appears to be to reduce exchangeable Al levels. Rice cultivars showed a wide range of tolerance to soil acidity, but the early semi-dwarf varieties were generally very intolerant, indicating the need for breeding. Cassava was extremely tolerant of acid soils and the negative effect of lime appeared to be due to Zn deficiency.

1123

**Sparks, D.L.**
Soil Science Society of America, Journal.

Vol. 43, No. 4. p. 786-789. 1979.

1124

**Spratt, E. D.; Smid, A. E.**
Yield and elemental composition of flax as affected by P and micronutrients. Agronomy Journal. Res. Sta., Agric. Canada, Brandon, Manitoba, Canada R7A 5Z7.

Vol. 70 4. English. p. 633-638. 1978.

The residual P from 100, 200 and 400 kg P/ha applied in 1965 to 2 Manitoba soils (orthic haplustolls) affected the yields of oilseed flax in 1971 and 1972. In 1972 the levels of $NaHCO_3$-extractable P in the surface soil ranged from 1.5 p.p.m. where no fertilizer P was added to 46.5 p.p.m. in the surface soil where 400 kg P/ha was applied in 1965. The higher levels of P in the soil increased the P conc. in the plants, but the Zn and Cu conc. were depressed

to near critical levels in some cases. Field applications of Zn and Cu fertilizer did not increase flax seed yields. In the growth chamber, increases in the levels of NaHCO3-extractable P in the soil increased the shoot and root yields, decreased fertilizer P uptake, and decreased Zn and Cu conc. Applications of fresh fertilizer P increased yields and further increases were obtained with P-Zn-Cu combinations. Conc. of N, P and K were similar in both the roots and shoots, but conc of Fe, Zn and Cu were 25, 2 and 2 times greater, resp., in the roots than in the shoots. Mn conc. was twice as great in the shoots as in the roots. It is recommended that flax crops grown on calcareous soils in Manitoba should be monitored for Zn deficiencies when NaHCO3-extractable P in the surface soil exceeds 20 p.p.m.

1125

**Springer, M.E.**
Mineralogy of dystrochrepts in the Belgian Ardennes. Intrernational Congress of Soil Science, Transactions, 11th.

Vol. 1. p. 120-121. 1978.

(Abstract only).

1126

**Spycher, G.; Young, J. L.**
Water-dispersible soil organic-mineral particles. II. Inorganic amorphous and crystalline phases in density fractions of clay-size particles. Soil Science Society of America Journal. Oregon State University, Oregon, USA.

Vol. 43 2. English. p. 328-332. 1979.

Water-dispersible clay-organic particles from six epipedons and one Bh horizon were fractionated by density. After oxidation of organic matter in hydrogen peroxide, the amorphous particle phase was removed using a kinetic method and analyzed for Si, Al, and Fe. Light particles contained high levels of amorphous oxides and a poorly ordered phyllosilicate matrix. Heavy particles had low levels of amorphous oxides and a more crystalline matrix. A continuum in particle compositions and properties between the density extremes was observed and explained in terms of an aggregate model proposed in part I of the study. Molar silica to alumina ratios of the amorphous phase in particles ranged from 0.2 to 6.7. Low ratios (( 1) occurred in particles from an Aquod Bh horizon and were attributed to organically complexed Al. The amorphous particle phase, mineral matter dissolving at a fast rate, was allophanic (low ratio) in two Andepts, and highly siliceous in an Argic. Intermediate ratios in other soils may have resulted in part from disordered phyllosilicates.

1127

**Sqalli, A.**
Determination of isotopically exchangeable phosphorus in four Moroccan soils. Al Awamia.

Vol. No 49. French. p. 29-49. 1973.

Available P in four Moroccan soils was studied by means of E, A and L values. Based on these indexes, the soils were classified in the following decreasing order of P availability: "Dess" soils (weakly developed soils on complex alluvial material, calcimorphic in the deeper layers), brown calcareous soils, "Tirs" (topo-lithomorphic vertisols), and leached red Mediterranean soils.

1128

**Srinivasan, T R; Bali, Y P; Tamhane, R V**
Placement of black soils of India in the comprehensive soil classification system--7th approximation. Indian Soc Soil Sci J.

Sept 1969. Vol.17 (3): 323-331.

1129

**Srinivasan, T R; Kamphorst, A**
Placement of medium and deep cracking clay soils in the comprehensive system of soil classification. Indian Soc Soil Sci J.

Dec 1971. Vol.19 (4): 415-421.

1130

**Srinivasan, T. R.**
Taxonomy of saline, alkali and saline-alkali soils. Journal of the Indian Society of Soil Science. Indian Photo-interpretation Institute, Dehra Dun, Uttar Pradesh.

Vol. 24 1. English. p. 12-19. 1976.

The applicability of USDA soil taxonomy to soils in the Karnal district was considered using aerial survey data. New taxa proposed for the classification of saline-alkali soils include Episalic, Natric and Halic subgroups in the Alfisols. The delineation of Salic, Halic and Natric subgroups within Vertisols, and Vertic and Stratic subgroups in Salorthids is also considered briefly.

1131

**Stahnke, Clyde Raymond;**
The genesis of a chrono-climo-sequence of mollisols in west-central Oklahoma. Stillwater.

1968. Vol.124 1. illus.

Thesis- Oklahoma State University. Authorized facsimile by University Microfilms, Ann Arbor, 1970. Bibliography: leaves 102-105.

1132

**Staijanssens, M.; Marcoen, J. M.; Fabry, J.; Rassel, A.**
Organic matter removal by low temperature ashing prior to soil mineralogical analysis. Annales de la Societe Geologique de Belgique.

Vol. 98 2. French. p. 393-403. 1975.

A new technique of ashing organic matter at low temperature in a stream of electronically excited oxygen was studied. The results from rendzina, mull, moder, vertisol and sedimentary clay soil types were verified by X-ray diffraction, IR spectrometry, DTA and E.M. It was found that this technique is preferable to the classical hydrogen peroxide procedure.

1133

**Stanford, G.; Smith, S. J.**
Nitrogen mineralization potential of soils. Soil Science Society of America Proceedings. US Department of Agriculture, Soil and Water Conservation Research Division Soils Laboratory, Beltsville, Maryland 20705.

Vol. 36 3. English. p. 465-472. 1972.

Samples of 39 soils (entisols, alfisols, aridisols, ultisols and mollisols) were incubated at 35 deg C for 30 weeks in consecutive periods of 2, 2, 4, 4, 4, 6 and 8 weeks. Cumulative net N mineralization was linearly related to the square root of time for most of the soils. Soil pH changed very little during incubation. N mineralization potentials, mineralization rate constants and the time required for 1/2 of the potentially mineralizable N to be mineralized were determined. Mineralization rate constants did not differ significantly among most of the soils and the most reliable estimate of the rate constant was 0.054 plus or minus .009 week -1 (116.17.16.07).

1134

**Stark, N. M.; Jordan, C. F.**
Nutrient retention by the root mat of an Amazonian rain forest. Ecology. Montana Forest and Conservation Exp. Station, Univ. of Montana, Missoula, 59812, USA.

Vol. 59 3. English. p. 434-437. 1978.

Surface root mats on oxisols and spodosols near San Carlos de Rio Negro, Venezuela, were sprayed with 45Ca and 32P to simulate the addition of nutrients to the soil surface through leaching of decomposing litter, and through precipitation and throughfall. Collections from lysimeters placed below the root mat and humus layer showed that in all but one case, ( 0.1% of the radiotracers leached past the root-organic mat, and leaching stopped completely after 1 to 2 months. Through analysis of root mat samples, the radioisotopes were found to have been taken up and translocated by living roots. This is the first evidence supporting the ability of the root mat on the surface of depleted tropical soils to efficiently take up dissolved nutrients before they percolate to mineral soil.

1135

**Steele, F; Daniels, R B; Gamble, E E; Nelson, L A**
Fragipan horizons and Be masses in the middle Coastal Plain of north central North Carolina. Soil horizons, ultisols. Soil Sci Soc Amer Proc.

Sept/Oct 1969. Vol.33 (5): 752-755.

Bibliography: p. 755.

1136

**Stephens, C.G.**
The 7th approximation: its application is Australia. Soil Science.

Vol. 96, No. 1. p. 40-48. 1963.

1137

**Stephens, F R**
Source of cation exchange capacity and water retention in southeast Alaskan spodosols. Soil Sci.

Dec 1969. Vol.108 (6): 429-431.

1138

**Steur, G. G. L.; Heijink, W.**
Peaty soils in the Netherlands. Bocr en Spade. Stichting voor Bodemkartering, Wageningen, Netherlands.

Vol. No.18. Nl. p. 9-40. 1972.

Peaty soils are transitional between peat soils and mineral soils; they have an organic matter layer beginning at 40 cm or less from the soil surface and are differentiated into peaty podzol soils (histic haplaquods) and peaty earth soils (histic humaquepts).

1139

**Stevens, J. G.**
Soil survey of Berrien and Lanier Counties, Georgia. Washington, D.C., USA: US Department of Agriculture.

English. p. 66 pp. 1973.

Twenty-seven series (mainly ultisols and entisols) are described and mapped at a scale of 1:20 000. Land use and management are recorded. Parent materials are sedimentary and include loamy, sandy and clayey deposits.

1140

**Stevenson, F.J.**
Lead-organic matter interactions in a mollisol (Soil pollution). Soil biology and biochemistry.

v. 11 (5). English. p. 493-499.- ill. 1979.

Oxford, -Pergamon Press.

1141

**Stewart, E H; Calvert, D V; Rogers, J S**
Water management for citrus on Spodosols of Florida. In Contribution of Irrigation and Drainage to the World Food Supply; Proceedings of Specialty Conference.

1974 (pub. 1975). Vol.p. 181-188.

1142

**Stoops, G. J.; Zavaleta, A.**
Micromorphological evidence of barite neoformation in soils. Geoderma. Rijksuniversiteit Gent, Geologisch Instituut, B-9000 Gent, Belgium.

Vol. 20 1. English. p. 63-70. 1978.

The occurrence of authigenic, idiomorphic barite microlites in a Typic Haplustult from Bellavista, Peru is described on the basis of micromorphological and scanning electron microscope techniques. The microlites occur as clusters in the pores of the lower B and C horizons, which have slightly hydromorphic characteristics. These horizons are furthermore characterized by sepic plasmic fabrics and a strong fragmentation of most illuviation ferri-argillans, indicating conditions of repetitive swelling and shrinking. The occurrence of the microlites in voids, rather than being incorporated in the s-matrix during soil movement, suggests that they were formed after such movements and proves their authigenic character. They are presumed to be related to hydromorphic conditions and caused by saline groundwater. The microlites in the centres of the clusters are tabular and consist of the following crystallographic forms: (001) ; (011) and probably (101). The others are prismatic, consist of the same crystallographic forms, but are dominated by (011) and elongated according to (001).

1143

**Stuff, R. G.; Dale, R. F.**
A soil moisture budget model accounting for shallow water table influences. Soil Science Society of America Journal. National Aeronautics and Space Administration, Houston, Texas, USA.

Vol. 42 4. English. p. 637-643. 1978.

Since 60-70% of the cropland of Indiana was influenced by shallow water tables, it was necessary to adapt models to consider capillary rise under these conditions. Such a model, for simulating the daily moisture status and changes in the root zone of Zea mays (inputs: pan evaporation, precipitation, soil moisture characteristics, silking date, initial soil moisture) was found to closely track measurements of soil moisture and water table depths. On a tile-drained Typic Argiaquoll during three growing seasons, capillary water was found to supply an average of 27% of the evapotranspiration (ET) in periods with little or no precipitation. Computer model estimates showed capillary water to furnish about 17% of the total ET over a 100-day period from 49 days before silking to 50 days after.

1144

**Summerfield, H. B., Jr.; Bagley, D. G.**
Soil survey of Surprise Valley-Home Camp Area, California-Nevada. Washington, D.C., USA: US Department of Agriculture.

English. p. 130pp. 1974.

Sixty series (mainly mollisols, aridisols and inceptisols) are described and mapped at a scale of 1:31 680. Land use and management of the soils are recorded. Parent materials include basalt, rhyolite and andesite; weakly to strongly consolidated volcanic material; alluvium, and aeolian sand.

1145

**Supak, J. R.; Swoboda, A. R.; Dixon, J. B.**
Adsorption of aldicarb by clays and soil organo-clay complexes. Soil Science Society of America Journal. Texas Agricultural Extension Service, Lubbock, TX 99409, USA.

Vol. 42 2. English. p. 244-248. 1978.

Adsorption experiments conducted with S-methyl-14C-aldicarb resulted in what appeared to be negative adsorption (exclusion) of the toxicant on Ca- and Al-saturated montmorillonite clays. Calculated exclusion volumes indicated that aldicarb did not

penetrate the interlamellar region. Aldicarb was excluded from at least the first 16 layers of water on external surfaces of montmorillonite. Positive adsorption occurred with Ca- and Al-saturated illite and kaolinite clays. Equilibration of aldicarb solutions with one acid and two calcareous Vertisols, and with the organo-clay complexes isolated from these Vertisols, produced negative adsorption isotherms for the acid and positive adsorption isotherm for calcareous adsorbents.

1146

**Swindale, L. D.; Silva, J. A.; Beinroth, F. H.**
The Benchmark Soils Project - an innovative approach to agrotechnology transfer. Kuala Lumpur, Malaysia: Malaysian Society of Soil Science. International Crops Research Institute for the Semi-Arid Tropics, Hyderabad, India.

English. p. unpaged. undated.

Abstract of Papers. CLAMATROPS. Conference on Classification and Management of Tropical Soils. Kuala Lumpur, Malaysia, August 1977. The objectives of the projects, undertaken by the Universities of Hawaii and Puerto Rico, are to correlate food crop yields on a network of benchmark soils, to determine the transferability of agroproduction technology among tropical countries and to develop a methodology for agrotechnology transfer. Preliminary analyses indicate the hydric dystrandepts required high rates of P and little, if any lime, whether they occur in Hawaii, the Philippines or Indonesia. Tropeptic eutrustox appeared to require moderate applications of P in both Puerto Rico and Brazil.

1147

**Swindale, L.D.**
Soil classification and its relation to soil use. Miscellaneous Publication.

No. 39. p. 22-25.

Hawaii University, Cooperative Extension Service.

1148

**Sys, C.**
The soils of Central Africa in the American classification--7th approximation. Sols Afr.

Jan/Aug 1969. Vol.14 (1/2): 25-44.

Bibliography: p. 43-44.

1149

**Sys, C.**
The concept of ferrallitic and fersiallitic soils in central Africa: their classification and their correlation with the 7th approximation. Pedologie.

Vol. 17, No. 3. English. p. 284-325. 1967.

1150

**Sys, C.**
African oxisols. Second International Soil Classification Workshop, Proceeedings.

Vol. 1. p. 221-231. 1979.

Soil Survey Division, Land Development Department, Thailand.

1151

**Talleyrand, H; Lugo-Lopez, M A**
Performance of high-yielding corn hybrids Pioneer X-306 B and Funk's G-795W at high levels of fertilization in the acid and relatively infertile soils (Ultisols and Oxisols) of Puerto Rico. J Agric Univ P R.

Jan 1976. Vol.60 (1): 132-134.

1152

**Talleyrand, H; Perez-Escolar, R; Lugo-Lopez, M A; Scott, T W**
Utilization of N nitrogen from crop residues in Oxisols and Ultisols. J Agric Univ P R. EXP STN.

Puerto Rico, Agricultural Experiment Station Puerto Rico, University. Oct 1977. Vol.61 (4): 450-455.

1153

**Talleyrand, H.; Lugo-Lopez, M. A.**
Effect of five levels and three sources of N on sweetpotato yields on an Ultisol. Journal of Agriculture of the University of Puerto Rico. Agricultural Experiment Station, College of Agricultural Sciences, University of Puerto Rice, Rio Piedras, P.R.

Vol. 60 1. English. p. 9-14. 1976.

The soil was situated in the central, hilly, interior of Puerto Rico at about 450 m above mean sea level. Treatment differentials were: Broadcast, preplant applications of 0, 10, 20, 40 and 50 kg/ha of N from urea and 40 kg/ha of N from two sulfur-coated urea compounds (slow-releasing N sources) containing 39.6 and

37% N in each case. The soil had a pH of 4.7 in the top 25 cm of the profile but it apparently supplied enough Ca for a sweetpotato crop. There was no evidence of Al injury to the crop even though exchangeable Al levels were high, i.e., more than 50% of the sum of cations in the 25-50 cm layer. Maximum marketable yields were 14.6 tons/ha (130 cwt/acre), which were obtained with the application of 40 kg/ha (35.6 lb/acre) of N as ordinary urea. Evidently there was no advantage in using slow-releasing N sources. In fact, a slight yield depression was observed. The Capo fertilizer-yield equation was applied to the mean yield data obtained from the urea treatments, and a coefficient of determination of 0.99 was obtained. This equation appeared to be useful in predicting sweetpotato yields in terms of the N fertilizer applied in this experiment.

1154

**Tama, K.; El-Swaify, S. A.**
Charge, colloidal and structural stability interrelationships for oxidic soils. Chichester, UK; John Wiley & Sons.

English. p. 41-49. 1978.

Modification of Soil Structure (Emerson, W.W.; Bond, R.D.; Dexter, A.R. - editors). An Inceptisol, an Ultisol and an Oxisol from Hawaii were shown to possess zero points of charge (zpc) in KCl at pH values of approx. 7.1, 3.5 and 2.7, respectively. In the Inceptisol peptization was attained at pH values both below and above the zpc; in the other two soils it occurred only above the zpc. For all soils, colloidal stabilities were qualitatively but not quantitatively related to the magnitudes of net charge. Increasing the electrolyte concentration at a given pH outside the zpc, resulted in increased net charges but not increased peptization. In parallel with colloidal stability patterns, recovery of ( 2 mu m particles from whole, natural soils by use of vigorous shaking was most successful at pH levels of ( 5.5, ) 7.6, and ) 8.2 for the three soils, respectively. Appreciable clay was released from both the Inceptisol and Oxisol without pH adjustments. Measurements of structural parameters in the absence of vigorous shaking indicated that field structural behaviour depends not only on electrostatic forces but also on non-electrostatic bonds within soil aggregates.

1155

**Tan, K. H.; Perkins, H. F.; McCreery, R. A.**
Kaolinite-gibbsite thermodynamic relationship in ultisols. Soil Science. Department of Agronomy, University of Georgia, Athens, USA.

Vol. 116 1. English. p. 8-12. 1973.

The formation of kaolinite and gibbsite and their persistence in three soil series from Georgia was investigated by mineralogical, chemical and thermodynamic analysis. Results showed that the Hayesville soil, with high gibbsite and relatively low amounts of kaolinite, had high Al and low Si content soluble in NaOH. In Cecil soil where both gibbsite and kaolinite were well represented in the clay fraction, alkali-soluble Si and Al were present in larger amounts. In the Tifton soil where kaolinite was dominant over gibbsite, the highest Si and lowest Al soluble in NaOH were found. A stability diagram developed from three calculated chemical potentials showed six stability areas. It appeared that the formation and stability of kaolinite and gibbsite in the ultisols studied were dependent upon successively increasing/decreasing levels of H4SiO4 and upon the gibbsite potential pH-1/3pAl3+. (119.623.91.119.521 145.63).

1156

**Tan, K. H.; Perkins, H. F.; McCreery, R. A.**
Amorphous and crystalline clays in volcanic ash soils of Indonesia and Costa Rica. Soil Science. Department of Agronomy, University of Georgia, Athens, USA.

Vol. 119 6. English. p. 431-440. 1975.

Clay mineralogy of soils derived from volcanic ash under tropical conditions was studied by differential dissolution, X-ray diffraction, DTA, infrared analysis, and scanning electron microscopy. Andepts and oxisols of the mountains and lowlands of Indonesia and Costa Rica were used. The results showed the presence of substantial amounts of amorphous material mixed with crystalline clay. The amorphous fraction in andepts, with SiO2/Al2O3 ratios of 0.6, contained allophane as was indicated by scanning electron micrographs. Although the oxisols had amorphous substances with SiO2/Al2O3 ratios of 1.0, which were in the range of allophane, scanning electron microscopy showed the presence of a dispersed and fine-grained compound different from allophane. The crystalline clay in the andepts and oxisols was identified by DTA and scanning electron analysis as kaolinite. X-ray diffraction did not reveal 1:1 lattice type of clay in andepts and exhibited only very weak peaks at 7.10-7.24 A in oxisols for halloysite and kaolinite. Data indicated that in Indonesia and Costa Rica gibbsite formation was greater in mountain than in lowland soils.

1157

**Tan, K. H.; Perkins, H. F.**
The value of the U.S. soil taxonomy in classification of red tropical soils derived from volcanic ash. Kuala Lumpur, Malaysia; Malaysian Society of Soil Science. Agronomy Department, University of Georgia, Athens, GA 30602, USA.

English. p. 14. undated.

Abstracts of Papers. CLAMATROPS. Conference on Classification and Management of Tropical

Soils, Kuala Lumpur, Malaysia, August 1977. Red and reddish soils, which occur extensively in tropical regions, are considered to have great potential for increasing world food production. In Southeast Asia, and particularly in Indonesia, these soils have been classified as laterites, latosols and red yellow podzolic soils. With the introduction of the 7th Approximation, they were tentatively grouped into the oxisols order. Investigations on two red yellow podzolic soils, a reddish brown latosol and a red latosol, derived from dacitic and andesitic volcanic tuff in different regions of the Indonesian archipelago showed that the clay mineralogy, morphological, climatic, and to some extent their chemical data, met the requirements for Oxisols. However, the CEC and retention of $NH_4^+$, amounting to 1.16 me and 1.10 me respectively, per 100 g clay, in addition to the presence of considerable amounts of weatherable minerals in the sand fraction, were in disagreement with criteria for oxic horizons. The red yellow podzolic soils appear to approach the criteria of the clayey, kaolinitic, isohyperthermic family of typic tropudults. On the other hand, the data of latosols show a conformity, in part with anric humitropept or anric eutropept. The reddish brown latosol is tentatively classified as a clayey, kaolinitic, hyperthermic, anric eutropept or anric humitropept, whereas the red latosol meets the requirement of a clayey, kaolinitic, isohyperthermic, anric humitropept. Such a conclusion may seem controversial, but unless some adjustment is made in the set of criteria for oxisols, the latosols can only meet the requirements for the inceptisol order.

1158

**Tan, K. H.**
Infrared absorption similarities between hymatomelanic acid and methylated humic acid. Soil Science Society of America Proceedings. University of Georgia, Athens, USA.

Vol. 39 1. English. p. 70-73. 1975.

Infrared spectroscopy of hymatomelanic acid and methylated humic acid, extracted from Ultisols and Inceptisols, revealed close similarities in spectrograms, indicating that hymatomelanic acid was a naturally esterified fraction of the humic molecule. Carbon-14-labelled ethanol extraction of humic acid yielding hymatomelanic acid, with radioactivity counts below the control, supported the conclusion that hymatomelanic acid was not a humic fraction ethylated by ethanol employed in the extraction.

1159

**Tan, K. H.**
The catalytic decomposition of clay minerals by complex reaction with humic and fulvic acid. Soil Science, Agronomy Department, University of Georgia, Athens, Georgia, USA.

Vol. 120 3. English. p. 188-194. 1975.

Complex formation between kaolinite and the clay fractions of Ultisols and humic-fulvic acids extracted from a Paleudult was investigated by Sephadex gel filtration and infrared spectroscopy. Humic acid remaining in solution after complex formation exhibited infrared spectrograms with increased absorption in the 1050, 1400, and 1600 cm-1 regions for Si-O and carboxyl vibrations, respectively, coupled with the appearance of new peaks at 940-840 cm-1 for O-Al-OH vibrations. Gel filtration of the humic acid above resulted in the separation of HA/I (high molecular weight) with strong infrared Si-O absorption, and of HA/II (low molecular weight) with spectrograms revealing the O-Al-OH absorption. Admixture with clay particles was eliminated by Sephadex, since clay was not eluted through the column. Infrared analysis of the clay material before and after reaction with humic acid, showed spectrograms indicating the presence of possible structural changes. After reaction with humic acid, kaolinite and soil clays had spectrograms with decreased absorption for Si-O vibrations. These observations suggested the possibility of a gradual decomposition of the Si-O-Si linkages in the clay structure by acidolytic attack of humic acid. Increased amounts of Si and Al contents found in the remaining supernatant humic acid solution were supporting evidence for the release of these elements by clay.

1160

**Tan, K. H.**
Complex formation between humic acid and clays as revealed by gel filtration and infrared spectroscopy. Soil Biology and Biochemistry. Department of Agronomy, University of Georgia, Athens, GA 30602, USA.

Vol. 8 3. English. p. 235-239. 1976.

Complex formation between pure silicate clay minerals (kaolinite and bentonite) and humic acid (HA) extracted from a Eustis loamy sand (Psammentic Paleudult) was investigated by i.r. spectroscopy and Sephadex G50 and G25 gel filtration. Gel filtration of humic acid after treatment with clay resulted in the separation of normal amounts of high m.w., but reduced concentrations of low m.w. HA. This observation suggested that only the low m.w. fraction of HA was adsorbed by silicate clays. As compared to i.r. spectrograms of original HA, humic acid remaining in solution after interaction with clay exhibited i.r. curves with new bands at 940 and 840 cm-1 for O-Al-OH vibrations and increased absorption in the 1050, 1400 and 1620 cm-1 regions for Si-O and COO- stretching vibrations, respectively. The absorption band for Si-O was retained by the i.r. spectrum of the high m.w. fraction of HA, and the O-Al-OH absorption by that of low m.w. HA. The latter showed in addition the strong band for COO- stretching vibrations.

1161

Tan, K. H.
Contamination of humic acid by silica gel and sodium bicarbonate. Plant and Soil. Department of Agronomy, University of Georgia, Athens, Georgia, USA.

Vol. 44 3. English. p. 691-695. 1976.

Humic fractions were extracted with 0.1 N NaOH from a surface sample of a Davidson soil (Rhodic Paleudult, Reddish-brown Lateritic soil). After purification, the humic preparations were characterized by scanning with the Beckman IR-18A spectrophotometer using the micro KBr pellet technique. The spectra of the various humic fractions corresponded to the respective spectra reported in the literature. No indications were obtained for the presence of silica gel, sodium bicarbonate or sodium carbonate. Strong absorption at 1000 cm-1, as exhibited by non-purified humic acid, could be caused by Si-O vibrations. However, this band disappeared after washing humic acid with HCl-HF.

1162

Tan, K. H.
Infrared spectroscopy of pyrolyzates of soil humic and fulvic acids. Soil Science. Agronomy Department, University of Georgia, Athens, USA.

Vol. 122 1. English. p. 52-58. 1976.

Humic and fulvic acids extracted from two Ultisols and a tropical Andept were pyrolyzed in vacuum at 900 deg C for 10 sec. The pyrolyzates were collected either as a condensate on NaCl disks or as vapor. Both the condensate and the vapor pyrolyzate were characterized by infrared spectroscopy. The results showed that the vapor phase exhibited infrared spectrograms indicative of the presence of CO2, CO, and some COO groups. The infrared features of the condensates were more distinctive than those of nonpyrolyzed humic and fulvic acids, enabling a better characterization and identification of functional groups. Vacuum pyrolysis yielded reproducible condensates with consistent spectrum characteristics, indicating the breakdown of the humic molecule into smaller fractions without reaching total decomposition into CO2 and H2O. Although variations occurred in intensities, the spectra of the condensates of pyrolyzed humic and fulvic acids were characterized by absorption as a doublet at 3150-3050 cm-1, by absorption near the 1700 and 1600 cm-1 region and at 1400, 1200 and 1050 cm-1. These bands suggested the presence of (a) bonded OH or aromatic CH; (b) CH-CH2; (c) COOH; and (d) phenolic CH2OH, giving a composition with the general formula of C10H1203 for the smallest possible fraction of the humic molecule. Among the organic substances available conforming to the formula above, benzoic acid esters were assumed to be the most important. Mass spectrometry of the condensates and infrared analysis of o-hydroxy benzoic acid and benzoic acid gave indications supporting the presence of benzoic acid units in the humic molecule. Since both humic and fulvic acid condensates had in common the distinctive infrared bands at 1600, 1400, 1200, and 1050 cm-1, it was assumed that both were built up with similar units.

1163

Tan, K. H.
High and low molecular weight fractions of humic and fulvic acids. Plant and Soil. Department of Agronomy, University of Georgia, Athens, GA 30602, USA.

Vol. 48 1. English. p. 89-101. 1977.

Molecular weight fractionation of humic compounds isolated from surface samples of an ultisol (red yellow podzolic soil) and a spodosol (podzol) showed that fulvic acid (FA) was higher in ash and elemental content than humic acid (HA). With careful purification the amount of ash was reduced to a minimum, but not to zero. Sephadex gel filtration revealed that fine HA (obtained with fine membranes) was composed of smaller amounts of HA-I (high mol. wt.) and large amounts of HA-II (low mol. wt. fraction). Coarse HA (obtained with coarse membranes) had almost equal amounts of HA-I and HA-II. Fine or coarse FA yielded only low molecular weight components after elution through sephadex. Infrared spectra of the humic fractions were indicative for the presence of phosphoglyceric acid as a possible constituent of the low molecular weight fraction of humic compounds.

1164

Tan, K. H.
Variations in soil humic compounds as related to regional and analytical differences. Soil Science. University of Georgia, Athens, Georgia 30602, USA.

Vol. 125 6. English. p. 351-358. 1978.

Among the four soil orders studied, Mollisols, with the largest amounts of organic matter, were characterized by the highest concentrations of Na4P207-extractable Al and Fe in the A horizons. Vertisols contained high extractable Si and appreciable Fe and Al contents, suggesting that the humic compounds in the Vertisols might not only be associated with large amounts of extractable Ca, but that Si, Al, and Fe extractable by Na4P207 have also played an important role in their formation and accumulation. More humic (HA) than fulvic (FA) acid was isolated in the Mollisols and Vertisols than in the Alfisols and Ultisols. In the Ultisols six to seven times more FA than HA was extracted with Na4P207 in the A horizons. A negative correlation was found between total soil N, Na4P207-extractable Al and Si, and FA/HA ratios, confirming that N and extractable Al and Si contents were more closely associated with HA than FA. Analytical procedures and differences in soil groups have affected the

changes in infrared spectra. Na4P2O7 yielded HA with better resolved spectra than NaOH, and allowed for the definite distinction in HA spectra between soil groups. Differences in HA spectra between soil groups were attributed to inherent different soil conditions.

1165

**Tan, K.H.**
An evaluation of the complexity of soil taxonomy. International Congress of Soil Science, Transactions, 11th.

Vol. 1. p. 68-69. 1978.

(Abstract only).

1166

**Tancic, N.**
Composition and properties of humus in humic gley soils of Serbia. Arhiv za Poljoprivredne Nauke. Poljoprivredni fakultet - Beograd, Zemun, Yugoslavia.

Vol. 29 108. Serbo-Croat. p. 31-83. 1976.

Humic and fulvic acid composition, optical density, isoelectric point of coagulation, functional group composition and chromatographic behaviour of the humus in carbonate and noncarbonate humic gley soils, humic gley soils with surface salinization and humic gley soils not permanently wet are reported. For comparison, humus from a chernozem, a vertisol, a meadow soil and a mineral gley soil was also studied. Results are discussed in relation to pedogenetic processes.

1167

**Tate, R L III**
Nitrification in histosols: a potential role for the heterotrophic nitrifier. Applied Environ Microbiol. OTHER US.

Apr 1977. Vol.33 (4): 911-914. Ref.

1168

**Tate, R L III**
Cultural and environmental factors affecting the longevity of Escherichia coli in Histosols. Applied Environ Microbiol. OTHER US.

May 1978. Vol.35 (5): 925-929. Ref.

1169

**Tavernier, R; Wambeke, A van**
Determinacion del regimen hidrico de los suelos de Espana segun el modelo matematico de Newhall; Determination of the water moisture regime of soils in Spain according to Newhall's mathematical model. Agrochimica.

Spanish. July/Sept 1976. Vol.20 (4/5): 406-412. Map. Eng. sum.

1170

**Tavernier, R; Wambeke, A van**
Determination du regime hydrique des sols du Maghreb d'apres Newhall; Determination of soil moisture regimes of the Maghreb according to Newhall. Pedologie.

French. 1976. Vol.26 (2): 168-178. Eng. sum.

1171

**Taylor, M. S.**
The effect of soil aggregate size on seedling emergence and early growth. East African Agricultural and Forestry Journal. EAAFRO. Muguga, P.O. Box 30148, Nairobi, Kenya.

Vol. 40 2. English. p. 204-213. 1974.

Maize and sorghum were planted in seedbeds of five aggregate size fractions, from (2 mm to 11-21 mm, of a tropical Pellic Vertisol (Black Cotton Soil). In general, the finer the seedbed the earlier the initial emergence and the greater the rate of emergence and final emergence percentage. At "harvest" one month after first emergence, the weight of maize stems and leaves, and roots was found to have decreased with increasing aggregate size. Roots outyielded the aerial components fourfold for seedbeds finer than 4 mm. The influence of seedbeds on sorghum was less pronounced except for the coarsest seedbed in which many of the seeds had fallen through the interaggregate pore spaces and germinated from 12 cm depth. Aggregate size greater than 2 mm had no effect on soil bulk density at planting, however at harvest the bulk density of the finest bed had decreased whereas that of the other beds had increased. No significant advantages were gained by the (2 mm bed over that of 2-4 mm; it is concluded that, 2 mm aggregate size would be a satisfactory lower limit for seedbed preparation under field conditions for this soil type.

1172

**Tejedor Salguero, M L; Fernandez Caldas, E**
Andosoles canarios. V. Dystrandepts. Caracteristicas morfologicas y quimicas; Andosols of the Canar, Islands. V. Dystrandepts. Morphological and chemical characteristics. An Edafol Agrobiol.

Spanish. Ma,/June 1975. Vol.34 (5/6). 335-346. Ref. Eng. sum.

1173

**Tejedor Salguero, M L; Hernandez Moreno, J M; Cabezas Viano, D; Fernandez Caldas, E**
Materiales amorfos en Dystrandepts y Vitrandepts evolucionados. Amorphous materials in Dystrandepts and evolved Vitrandepts. Soil properties, Tenerife Island. An Edafol Agrobiol.

Spanish. Sept/Oct 1976. Vol.35 (9/10). 877-887. Ref. Eng. sum.

1174

**Tejedor Salguero, M L; Quantin, P; Rodriguez Pascual, C; Fernandez Caldas, E**
Andosoles canarios. VI. Dystrandepts. Caracteristicas mineralogicas. Interpretacion y clasificacion. Andosols of the Canary Islands. VI. Dystrandepts. Mineralogical characteristics. Their interpretation and classification. An Edafol Agrobiol.

Spanish. May/June 1975. Vol.34 (5/6). 347-357. Ref. Eng. sum.

1175

**Tejedor Salguero, M. L.; Quantin, P.; Fernandez Caldas, E.**
Climosequence in the southern part of Tenerife island (Canary Islands). 2. Mineralogical characteristics. Interpretation and classification. Cahiers ORSTOM, Pedologie. Centro de Edafologia y Biologia aplicada, Santa Cruz de Tenerife, Canary Islands.

Vol. 16 1. French. p. 83-106. 1978.

Clay and sand fraction mineralogy was determined in samples of andic brown soil, modic brown soil, fersiallitic soil, vertisol, chestnut soil and sodic soil. The climatic sequence, formed on phonolitic pyroclastic material overlying basic basaltic material, is discussed in relation to conditions of profile differentiation. For each soil type, the mineralogical characteristics are discussed in relation to French and US soil classification.

1176

**Terman, G. L.; Mortvedt, J. J.**
Nutrient effectiveness in relation to rates applied for pot experiments. 1. Nitrogen and potassium. Soil Science Societ, of America Journal. Soils and Fertilizer Research Branch, TVA, National Fertilizer Development Center, Muscle Shoals, AL 35660, USA.

Vol. 42 2. English. p. 297-302. 1978.

An N source experiment was conducted on infertile Mountview soil (Typic Paleudult) to evaluate four N sources at multiple rates of applied N and P. Granular ammonium nitrate (AN), sulfur-coated urea (SCU), oxamide (Ox), and isobutylidene diurea (IBDU) were evaluated for corn (Zea mays L.) at N rates of 0, 400, 800, and 1,200 mg/pot (5 g of soil), each at P rates of 0, 60, 120, 480, and 960 mg/pot. Yield response to applied N was in the order AN > SCU > Ox > IBDU at the higher rates of applied P. At 60 and 120 mg of applied P, P was too deficient for satisfactory evaluation of the N sources. In an experiment with flooded rice (Oryza sativa), P limited yields less than did N. In other N-P and P-K factorial experiments, rates of other nutrients and length of growth period also greatly affected crop response to applied N and K. Satisfactory evaluations of N or K sources are therefore possible only at adequate rates of nontest nutrients. Nutrient rates adequate for small greenhouse pots are much higher than rates equivalent to normal rates recommended for crops grown under field conditions. Length of growth period and other growth-limiting factors are equally important.

1177

**Tesic, Z**
Pour des principes taxonomiques uniformes dans la pedologie et la biologie; For the uniform taxonomic principles in pedology and biology. Trans Int Congr Soil Sci.

French. 1974. Vol.10th (v. 6, pt. 2). 506-512. Ref. Eng. sum.

1178

**Thai-Cong-Tung**
Soils of the ASPAC Region. Part 7. South Vietnam. Technical Bulletin, ASPAC Food and Fertilizer Technology Center. Agricultural Research Institute, Saigon, S. Vietnam.

Vol. No.16. English. p. 29 pp. 1973.

The country is divided into the following climatic, topographic and soil regions: The Mekong Delta (acid sulphate, organic and alluvial soils), the Eastern Region (gray podzolic and low humic gley soils), the Central Highlands (latosols, vertisols and red-yellow podzolic soils) and the Central Coastal Lowlands (mainly regosols and alluvial soils). (143,17).

1179

**Thomas, B R; Simonson, G H; Boersma, L**
Evaluation of criteria for separating soils with xeric and udic moisture regimes. Oregon. Soil Sci.

Sept/Oct 1973. Vol.37 (5) 738-741. Ref.

1180

**Thomas, G. J., Jr.**
Soil survey of Cobb County, Georgia. Washington, D.C., USA; US Department of Agriculture

English. p. 70pp. 1973.

Nineteen series (mainly ultisols, entisols and inceptisols) are described and mapped at a scale of 1:15 840. Land use and management are recorded. Parent materials include gneisses, schist and quartzite

1181

**Thomas, W. A.**
Accumulation of rare earths and circulation of cerium by mockernut hickory trees. Canadian Journal of Botany. Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830, USA

Vol. 53 12 English p. 1159-1165 1975.

Mockernut hickory, (Carya tomentosa) trees on a Typic Paleudult underlain by dolomitic limestone accumulate the rare-earth elements in foliage in far greater concentrations than do other species (1350 ppm in ash, compared with less than 60 ppm by red maple, tulip tree, white oak, and black gum). Inoculation of hickory trees with 144Ce showed that this typical rare-earth element move slowly through woody tissues, with only a small percentage of total-tree cerium lost annually by leaf abscission. Slow decomposition of hickory litter further limits losses of rare earths from the tree-soil system. These processes create centres of rare-earth concentration that perpetuate themselves, exemplifying the role of accumulator species in determining the distribution of elements within ecosystems.

1182

**Thompson, C M; Girdner, C L; Holmgren, G**
Field kit provides on-the-spot solutions. Soil taxonomy. Soil Conserv. USDA.

U.S., Soil Conservation Service. Nov 1974. Vol.40 (4) 15-16.

1183

**Tiwari, K. N.; Pathak, A. N.; Upadhyay, R. L.**
Studies on Fe and Zn nutrition of rice at varying moisture regimes in a black clay soil of Uttar Pradesh. Journal of the Indian Society of Soil Science. Division of Soils and Agricultural Chemistry, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur, Uttar Pradesh, India.

Vol. 24 3. English. p. 303-307. 1976.

In a greenhouse study, with rice var. Sona grown in pots of a black clay soil, growth and Fe and Zn uptake were significantly affected by moisture regime and by Fe and Zn fertilizers. Fe and Zn were mutually antagonistic. The concentration of Fe in plant tissues was significantly higher under waterlogged conditions whereas that of Zn was higher under conditions of field capacity.

1184

**Tomar, K. P.; Bystrom-Brusewitz, A. M.**
Mineralogy of two soil profiles - a black beidellite soil and a red fireclay soil - from Madurai, India. Geologiska Foreningens Forhandlingar.

Vol. 99 3. English. p. 278-286. 1977.

1185

**Tomasek, M.; Knotkova, E.; Zuska, V.**
Microbiological activity in smonitsa. Rostlinna Vyroba.

Vol. 19 12. Czech. p. 1229-1234. 1973.

(145.33 161). Comparative data are reported on the mechanical composition, fractional composition, and respirometric values in a smonitsa and a typical chernozem. The smonitsa was characterized by a high respiratory activity, that decreased considerably with depth, the decrease being unaffected by the addition of mineral nutrients and/or glucose; it also possessed the highest absolute values of basal and potential respiration on addition of NP and glucose (33.85 mg CO2/100 g in the top horizon, as against 14.64 mg CO2 in the chernozem).

1186

**Tomasek, M.; Zuska, V**
Properties of smonitzas on Tertiary clays in north west Bohemia. Vedecke Prace Vyzkumnych Ustavu Rostlinne Vyroby v Praze-Ruzyni.

Vol. 18. Russian. p. 27-31. 1974.

Smonitzas on calcareous Tertiary clays were found to have deep humus horizons, high clay contents, and high humus and carbonate

contents. In the transitional horizon down to the substratum there was a carbonate enriched layer and the soil reaction was neutral to slightly alkaline. The CEC was high and the soils had a good supply of P2O5 and K2O.

1187

**Toquicas, H.**
Soil classification: taxonomic classification of soils in a zone of the Departament of Magdalena in accordance with the 7th approximation. Agricultura Tropicale.

Vol. 23, No. 3. Spanish. p. 141-155. 1967.

1188

**Torrent, J; Roquero, C**
The occurrence of an argillic Horizon in a late Neolithic settlement of northern Spain. Trans Int Congr Soil Sci.

1974. Vol.10th (v. 6, pt. 2): 354-361. Map.

1189

**Torrent, J.; Nettleton, W. D.**
Feedback processes in soil genesis. Geoderma. Escuela Tecnica Superior de Ingenieros Agronomos, Cordoba, Spain.

Vol. 20 3/4. English. p. 281-287. 1978.

Feedback can be defined as the returning of a part of the effects of a given process to its beginning or to a preceding stage so as to reinforce or modify that process. Feedback processes are self-accelerating because of continuous reinforcement of the causes initiating them. Up to a certain moment, reinforcement is proportional to the effects (or output) of the process. Later, de-acceleration and termination occur as one of several factors (or reactants) in the process become limiting, e.g., depletion of easily weatherable minerals, hence cessation of clay formation. In soils there are many feedback, self-terminating processes such as accumulation of organic matter in Mollisols, clay accumulation in Argids, and development of windows in duripans, and dayas in soils with petrocalcic horizons. The occurrence and constancy of some morphological features in many soil profiles and soilscapes can be explained by this concept.

1190

**Touchet, E. A.; Clark, H. L.; Redlich, C. M.; Roy, A. J.; Griffis, B. J.; Zaunbrecher, S. J.; Hollier, R. M.**
Soil Survey of Evangeline Parish, Louisiana. Washington, D.C., USA: US Department of Agriculture.

English. p. 68pp. 1974.

Thirty-two series (alfisols, mollisols and inceptisols) are described and mapped at a scale of 1:20 000. Parent materials include loess and alluvium.

1191

**Touchton, J. T.; King, L. D.; Bell, H.; Morris, H. D.**
Residual effect of liquid sewage sludge on coastal bermudagrass and soil chemical properties. Journal of Environmental Quality. University of Georgia Agricultural Experiment Station, College Station, Athens, Georgia 30602, USA.

Vol. 5 2. English. p. 161-164. 1976.

The purpose of this study was to investigate the residual effect of liquid sewage sludge on soil and sludge crust properties and on yield and elemental composition of Coastal Bermudagrass (Cynodon dactylon L. Pers.) grown on a Cecil sandy clay loam (Typic Hapludult). Several applications of sewage sludge were made in 1969 and 1970 at total rates of 6.9, 13.8, 20.0, and 40.0 cm. A mineral NPK treatment, applied from 1969 to 1973, and a control treatment were also included. In 1970 6.7 metric tons/ha of dolomitic limestone were broadcast on one subplot from each main plot. In 1973 4.5 metric tons/ha of dolomitic limestone were broadcast on the limed subplots which had received the two highest sludge rates. Yields for 1971 and 1973 showed no detrimental effect from sludge application. In 1973 treatments had no significant effect on concentrations of P, Mg, Cu, Fe, Cd, Cr, or Pb in forage except for the NPK treatment. The K concentration of forage was below the deficiency level (1.5%) except for forage receiving the NPK treatment. The Ca concentration in forage from sludge and NPK plots was significantly higher than in forage from control plots. Plant concentration of Mn was reduced and Zn was increased by sludge treatment. Lime decreased the Zn concentration in forage receiving high sludge rates. The depth of the sludge crust remaining on the soil surface increased with sludge rate up to 3.8 cm for the highest rate. Lime applications decreased concentrations of P, Fe, Zn, Cu, Pb, Cr, and Cd in the crust, but only Zn in the soil beneath the crust.

1192

**Travernier, R.**
The 7th approximation: its application in western Europe. Soil Science.

Vol. 96, No. 1, p. 35-40. 1963.

1193

**Trigoso, R.; Fassbender, H. W.**
Effect of applications of Ca + Mg, P, Mo and B on yield and nitrogen fixation in four tropical legumes. Turrialba. Universidad Tecnica de Piura, Peru.

Vol. 23 2. Spanish. p. 172-180. 1973.

(33:22). In a pot experiment with an andesitic soil (ultisol) from Costa Rica, response to lime by Phaseolus atropurpureus, Desmodium intortum, Glycine javanica and Centrosema pubescens was quadratic, the highest yields being obtained with 6 to 10 meq (Ca + Mg) per 100 g soil. There was also a positive response to P, yields still increasing at the highest level applied (400 ppm P). Mo and B had no definite effects on yields. Lime and P increased nodule production, but Mo and B had only negligible effects. Nitrogen fixation was markedly dependent on lime, P, B and Mo. Lime and Mo also increased N uptake.

1194

**Tripathi, R. P.; Ghildyal, B. P.**
Thermal properties of fine textured mollisols under varying moisture conditions. Journal of the Indian Society of Soil Science. Govind. Ballabh Pant University of Agriculture and Technology, Pantnagar, U.P., India.

Vol. 22 2. English. p. 103-108. 1974.

The specific heat of three soils, Phoolbagh clay loam, Beni silty clay loam and Haldi loam was calculated using the radiation calorimeter and found to be 0.231, 0.224 and 0.207 Cal g-0C-1 respectively. Thermal conductivity in all the soils increased rapidly with per cent saturation up to about 50% of pure saturation. The maximum value of the thermal diffusivity occurred around 50% pore saturation.

1195

**Tripathi, R. P.; Ghildyal, B. P.**
Hydraulic conductivity and diffusivity relations of the Mollisols of Tarai. Journal of the Indian Society of Soil Science. G.B.Pant Univ. of Agric. and Tech., Pantnagar, Nainital, Uttar Pradesh, India.

Vol. 24 4. English. p. 339-346. 1976.

Surface soil samples from a clay loam, a silty clay and a loam from the Pantnagar Farm were used in a study of the relationships between hydraulic conductivity and suction, and between diffusivity and volumetric water content.

1196

**Turenne, J. F.**
The dynamics of organic matter in cultivated soils. The effect of a catch crop of sorghum on irrigated vertisols. Cahiers ORSTOM, Pedologie. ORSTOM, B.P. 81, 97201 Fort-de-France, Martinique.

Vol. 14 3. French. p. 193-205. 1976.

In Martinique, the alternation of sorghum for various periods of time with vegetable crops increased the polycondensation of humic acids in magnesium vertisols

1197

**Turner, A. J.; Fox, R. E.**
Soil survey of Terrell County, Texas. Washington, D.C., USA; US Department of Agriculture.

English. p. 35pp. 1974.

(173.764) Nine series (aridisols, entisols, mollisols and one vertisol) are described and mapped on a scale of 1:31 680; land use and management are described. Parent materials include Cretaceous siltstone, claystone and limestones.

1198

**Uehara, G.; Ikawa, H.; Sato, H. H.**
Guide to Hawaii soils. Miscellaneous Publication, College of Tropical Agriculture, University of Hawaii. Proc. 2nd Int. Soil Class. Workshop.

Vol. No. 83. English. p. 32 pp. 1971.

Descriptions are given of eight series representing hydrandepts, dystrandepts, eutrandepts, torrox, eutrostox and trophohumults. (173.969).

1199

**Uehara, G.**
Chemistry of soils with mixtures of pH-dependent and permenent charge minerals. First International Soil Classification Workshop Proceedings.

p. 9-15. 1978.

EMBRAPA-Servicio Nacional de Levantamento e Conservacao de Solos, Brazil.

1200

**Uehara, G.**
The chemistry and physics of low activity clays. First International Soil Classification Workshop, Proceedings.

p. 21-26. 1978

EMBRAPA-Servicio Nacional de Levantamento e Conservacao de Solos, Brazil

1201

**Uehara, G.**
Mineralo-chemical properties of oxisols. Second International Soil Classification workshop

Vol. 1. p. 45-60. 1979

Soil Survey Division, Land Development Department, Thailand

1202

**Unger, J. L.**
Vertisolen, Vertisols. Ned Heidemaatsch Tijdschr.

Dutch. May 1970. Vol.81 (5): 180-185.

1203

**Uriyo, A. P.; Kesseba, A.**
An evaluation of NH4F as a selective extractant for aluminium phosphate in two soils of the tropics. Geoderma. Department of Soil Science and Agricultural Chemistry, University of Dar es Salaam, Morogoro, Tanzania

Vol. 8 2/3. English. p. 207-220. 1972.

The results of a study of the effect of time of shaking on the extraction of P from a typic argiaquoll and a typic acrorthox showed that quantitative dissolution of Fe-P and Ca-P may take place. The dissolution of Al-P decreased linearly, that of Fe-P increased hyperbolically and that of Ca-P increased in an approximately linear manner with increasing pH of the NH4F solution. An NH4F solution of pH 8 was considered to offer the best compromise between the dissolution of Fe-P and Ca-P and the resorption of Al- and Fe-bound phosphate.

1204

**Uriyo, A. P.; Kesseba, A.**
Phosphorus studies in Tanzania. An evaluation of different methods of extraction for plant available phosphorus on an oxisol. African Soils. Dep. of Agric. Chem. and Soil Science, Univ. of Dar-es-Salaam, Tanzania.

Vol. 19 1. English, French. p. 1-28. 1974.

Rates of 0, 80, 100 and 120 kg P2O5/ha were combined factorially with 0, 40, 60 and 80 kg K2O/ha in a field plot trial with maize. Ten methods for determining available soil P were applied to soil samples taken after harvest. The Bray and Kurtz No. 1 method was considered to give the most satisfactory results

1205

**Uriyo, A. P.**
Response of sweet potato (Ipomoea batatas), to potassium fertilization on a red oxisol in Tanzania. Potassium in Tropical Crops and Soils, Proceedings, 10th Colloquium, International Potash Institute, Abidjan. Department of Soil Science and Agricultural Chemistry, University of Dar es Salaam at Morogoro, Tanzania.

English. p. 495-497. 1973

K fertilization significantly increased the yield of sweet potato tubers. Only the Na content was significantly affected by K applications.

1206

**Uriyo, A. P.**
Soya bean trials in the Morogoro region in Tanzania. Beitrage zur tropischen Landwirtschaft und Veterinarmedizin. Faculty of Agriculture, University of Dar-es-Salaam, Morogoro, Tanzania.

Vol. 12 1. English. p. 41-49. 1974.

In field trials on an oxisol, soya bean yields were significantly increased by P application. Nodulation was decreased by N. At high levels of P, application of Mo decreased yields.

1207

**Useche, C. R.; Rodriguez B., A.; Marcial, L. J.**
Two forms of application of N, P and K to irrigated rice on a vertisol. Agronomia Tropical. Estacion Experimental de Los Llanos, Calabozo, Venezuela.

Vol. 26 5. Spanish. p. 383-391. 1976.

Rice cv. IR-22 was given 13 combinations of 0, 40, 80 or 120 kg N, 0, 40 or 80 kg P2O5 and 0, 40 or 80 kg K2O/ha by 2 methods: all the P and K and 50% of the N (a) incorporated to a depth of 5 cm before sowing or (b) broadcast 25 days after sowing; in both (a) and (b) the remainder of the N was applied 45 days after sowing. Mean grain yield (5.21 t/ha) did not vary with application method. Responses to N were always positive, P increased yields slightly when applied in the combination of 120 kg N + 80 kg P2O5 + 40 kg K2O/ha, but no differences were found between the various K levels. The highest grain yields of 7.83 and 7.66 t/ha resulted from applying 120 kg N + 80 kg P2O5 + 40 kg K2O

or 120 kg N + 40 kg P2O5 + 40 kg K2O/ha, resp., by method (a).

1208

**Valadares, J.; Lepsch, I. F.; Kupper, A.**
Detailed pedological survey of the Jundiai Experimental Station, Sao Paulo. Bragantia Instituto Agronomico, Campinas, Sao Paulo, Brazil.

Vol. 30. Portuguese. p. 337-385. 1971.

An area of 142 ha, at an altitude of 680 to 760 m, was surveyed. The climate, geolog., vegetation and soils are described. Parent material consists mainl, of Pre-Cambrian schists and grass. Nine mapping units were identified, including inceptisols, ultisols, and oxisols. A detailed description is given of representative profiles, and the agricultural potential of the soils is discussed.

1209

**Valle, R. del, Jr., Fox, R. H., Lugo-Lopez, M. A.**
Response of soybeans grown in an ultisol to residual broadcast and banded P fertilizer. Journal of Agriculture of the Universit, of Puerto Rico. Pennsylvania State Univ., State College, Univ. Park, PA 16802, USA.

Vol. 61 2. English. p. 179-186. 1977.

Seeds of soybean cv. Hardee were sown at 100 kg/ha in an ultisol at Cidra, Puerto Rico in June 1973. This experiment was one of a series designed to stud, the relative efficiency of banded vs. broadcast P and of its residual effects on different successive crops, which were 2 maize and 1 rice experiment preceding the soybeans. There were no differences in soybean seed yields to previously broadcast or banded P, with or without lime, mean yield was 3.7 t/ha. Data on P, K, Ca, Mg, Mn, Al, Mo, Cu and Zn contents of leaves 42 days after sowing are presented. degree of accurac, by characterizing and classifying selected pedons in each landscape unit. This is achieved by carefu interpretation of the pedological expressions and classification in relation to landscape features and the other soil forming factors prevailing in the area. In this regard, toposequence studies ma, be a useful aid in designing more realistic soil mapping legends in order to facilitate soil survey operations and to produce reliable soil surve, maps for better and more diversified technical groupings of soil mapping units.

1210

**Valmidiano, A. T.; Arnold, R. W.; Derting, J. F.**
Soil-landscape relationships in a volcanic zone, Bicol region, Philippines. Kuala Lumpur, Malaysia: Malaysian Society of Soil Science, Philippines Bureau of Soils, FAO/UNDP, Philippines.

English. p. 18-19. undated.

Abstracts of Papers. CLAMATROPS, Conference on Classification and Management of Tropical Soils, Kuala Lumpur, Malays.a, August 1977. Only the soils of the upper part of the piedmont plain meet the requirements for the definition of andepts. They contain large amounts of amorphous materials, as indicated by their smear, consistenc,, have high cation exchange capacit,, low base saturation, low bulk density, and exceedingly high water retention, properties that are attributed to the nature and age of the parent material and to the prevailing high rainfall. The presence of welded tuff at depths of 1 m or more below the soil surface in the middle and lower piedmont plain retards percolation and causes large amounts of water to move laterally, thereby adding bases to the soils in the lower part of the plain. This is reflected in the sequence of soil distribution. Starting from the upper part, the soils are classified as hydric dystrandepts, rhodic tropudults, ultric tropudalfs, typic tropudalfs, and typic tropaqualfs. None of the soils in the broad continental river floodplain have properties suggesting an abundance of amorphous materials. They have a higher base saturation, higher cation exchange capacity and lower moisture retention than soils of the upper part of the plain. The soils are sticky, plastic and firm, and it is thought that the allophanic materials may have undergone weathering and resynthesis prior to their redeposition on the lower elevation landscape units. The soils on the natural river levee are classified as typic tropudalfs, those on the low alluvial terrace, as vertic tropaquepts, and those in the backswamp of slackwater area, as entic pelluderts. Topographic position in combination with other factors of soil formation greatly influence the pedological processes that cause the soil differences. Variations in soil properties between the landscape units are related to taxonomic soil classes and have significant meaning in terms of land use and land management. Study of the toposequence may be a useful tool in developing mapping legends for soil surveys. Potential soil map units which may correspond to landscape units in a toposequence can be predicted with a certain

1211

**Van Doren, D. M.**
Influence of long-term tillage and crop rotation combinations on crop yields and selected soil parameters for an Aeric Ochraqualf soil /; D. M. Van Doren, G. B. Triplett, and J. E. Henry. -. Wooster : Ohio Agricultural Research and Development Center,.

EXP STN.

1977. Vol.27 p. : map. -.

Cover title. Bibliography: p. 16.

1212

**Van Eck, W.A.**
West Virginia soils and the new comprehensive system of soil classification. West Virginia Academy of Science. Proceedings.

Vol. 33. p. 189-196. 1965 (publ. 1966).

1213

**Vanatta, E. S. Jr.; Stem, L. T.; Wittsdruck, W. H.; Pettry, D. E.; Spieth, J. W.**
Soil Survey of Pinellas County, Florida. Washington, D.C., USA, U.S. Department of Agriculture.

English. p. 64pp. 1972.

Twenty four series (mainly aquods, psamments, saprists and other aquic suborders) and six miscellaneous land types are described and mapped at a scale of 1:20 000. Parent materials are mainly sediments of Pliocene, Miocene and Pleistocene age and organic accumulations.

1214

**Veen, A. W. L.**
Evaluation of clay mineral equilibria in some clay soils (Usterts) of the brigalow lands. Australian Journal of Soil Research. Division of Soils, CSIRO, Glen Osmond, South Australia.

Vol. 11 2. English. p. 167-184. 1973.

(119.1).e. Compositions of soil solutions from soil samples with a montmorillonite-kaolinite-quartz mineralogy were plotted against equations for the montmorillonite-kaolinite, montmorillonite-quartz, and montmorillonite-kaolinite-quartz equilibria. A shallow surface zone of soil with a high pH and moderate Mg concentration was favourable for montmorillonite formation. In the deeper layers the soil solution was much closer to equilibrium with the mineral constituents owing to the low pH.s.

1215

**Velazquez Loera, A; Cuanalo de la Cerda, H**
Los suelos de la planicie costera del Municipio de Tapachula, Chis; Soils of the coastal plain of the city of Tapachula, Chiapas Taxonomic classification of soils and their potentials for irrigation. Chapingo.

Spanish. July/Aug 1977. Vol.6: 29-37.

1216

**Velez, J; Blue, W G**
Pangola digitgrass response to high lime and phosphorus levels in an Entisol from Costa Rica. Proc Soil Crop Sci Soc Fla.

1974. Vol.33: 211-215. Ref.

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**Velez, J.; Blue, W. G.**
Effect of lime and extractable iron and aluminium, and phosphorus sorption in a tropical and a temperate soil. Proceedings. Soil and Crop Science Society of Florida. Soil Science Department, Florida Agricultural Experiment Station, Gainesville, USA.

Vol. 31. English. p. 169-173. 1971.

laboratory experiments the effects of $CaCO_3$ on amorphous Fe and Al (estimated by extraction with acid ammonium oxalate) and crystalline Fe and Al (estimated by extraction with citrate-dithionite-bicarbonate) in a tropical Entisol and a temperate Ultisol were studied. Liming increased amorphous Al and decreased crystalline Fe and Al forms. P sorption was mainly associated with crystalline Fe and Al and, in the tropical soil, with amorphous Al.

1218

**Venkatasubbaiah, V.; Venkateswarlu, J.; Sastry, V. V. K.**
Potassium supplying power of black soils of West Godavari, Andhra Pradesh. Bulletin, Indian Society of Soil Science. Agricultural University, Rajendranagar, Hyderabad, A.P., India.

Vol. No.10. English. p. 218-226. 1976.

Seventeen heavy black soils from the rice growing areas of West Godavari contained 229 to 498 (mean:328) ppm of exchangeable K with 0.95 to 2.32 (mean:164) per cent K-saturation and gave no response to applied K in pot experiments. However, by continually growing bajra the exchangeable K declined to a level of 96 ppm (range: 75-118) with 0.47 per cent K-saturation (range:0.34 to 0.54) after the sixth crop. There was an average response of 43 per cent at a level of 100 ppm applied potassium in the exhausted soils. The soil critical value below which responses could be expected was 95 and 100 ppm K, respectively for bajra and rice in the exhausted soils.

1219

**Verma, B.; Meyers, R. E.**
Influence of surface treatments on moisture, temperature and cracking in vertisols. Journal of the Indian Society of Soil Science. Texas Technological University, Lubbock, Texas, USA.

Vol. 23 1. English. p. 18-26. 1975.

Effects of soil mulch, gypsum (amendment), Sorghum bicolor mulch and sorghum admixture with surface soil on moisture content, temperature and cracking of a black clay soil (Udic Pellustert) were studied. Gypsum amendment was not effective in conserving more moisture, reducing diurnal soil temperature variation and reducing the extent of cracking as compared to control, while Sorghum bicolor stubble mulch was the most effective. Soil mulch and sorghum stubble admixed with surface soil are more effective than gypsum but less effective than stubble mulch treatment. A linear relationship has been established between depth and width of soil cracks.

1220

**Verster, E.**
Criteria for the recognition of oxisols - a preliminary examination. South African Journal of Agricultural Science.

Vol. 11, No. 1, p. 1-8. 1968.

1221

**Vicente-Chandler, J.**
Intensive management of pastures and forages in Puerto Rico. Soil Science Department, North Carolina State University, USA. Agricultural Research Service, USDA, Agricultural Experiment Station, Rio Piedras, Puerto Rico.

English. p. 409-433. 1975.

Soil Management in Tropical America. Proceedings, Seminar, CIAT, Cali, Colombia, February 1974 (Bornemisza, E.; Alvarado, A., Editors). Responses to N, P and K on Ultisols are described.

1222

**Vila, F J G; Martin, F**
Fraccionamiento de acidos humicos de vertisol por geles de sephadex: comportamiento segun los metodos empleados. Fractionation of humic acid Vertisols by using Sephadex gels: behavior according to methods employed. An Edafol Agrobiol.

Spanish. Nov/Dec 1977. Vol.36 (11/12). 1113-1124. ref. Eng. sum.

1223

**Villachica, A.; Bornemisza, E.; Arca, M.**
The effect of lime and phosphate treatments on yield and macronutrient content of pangola grass grown on a soil from Pucallpa, Peru. Agrochimica. National Agrarian University, Lima and Interamerican Institute of Agricultural Sciences, Lima, Peru.

Vol. 18 4. English. p. 343-353. 1974.

Lime requirement for the ultisol used in the pot experiments was estimated to be one half of the extractable acidity. Phosphorus absorption increased with application of fertilizer, and even more if lime was applied. Foliar K concentrations were influenced by liming, P application and by the lime potassium ratios present. Foliar Ca and Mg were also increased by liming.

1224

**Virgo, K. J.; Holmes, D. A.**
Soil and landform features of mountainous terrain in south Thailand. Geoderma. Hunting Technical Services Ltd, Boreham Wood, Herts., WD6 1SB, UK.

Vol. 18 3. English. p. 207-225. 1977.

The results of reconnaissance surveys over 2,000 km2 are used to describe mountainous terrain on granite, gneiss and pelite. Detailed morphological and laboratory analytical data are presented for soils derived from each of these rock types. The soils, which are classed as Paleudults, are acid, kaolinite-rich and deficient in nutrients. Soils formed on granite and gneiss have high proportions of coarse quartz particles (2.0-50.0 mm) ; the dilution effect of this inert material further reduces their effective nutrient status. The degree of weathering, as indicated by the silt:silt+clay ratio, increases with profile depth. Mean gradients recorded on the granite and pelite hillslopes are 27 deg and 20 deg , respectively. A greater uniformity of slopes was observed on pelites than on granites; the 'missing angle' technique was employed to identify 'natural' slope classes. Gradients tend to increase downslope, indicating a rapid removal of erosion products at the footslope and a rejuvenation of the valleys. A significant association was recorded between soil depth and slope gradient on pelite but not on granite or gneiss landforms.

1225

**Virgo, K. J.; Munro, R. N.**
Soil and erosion features of the Central Plateau region of Tigrai, Ethiopia. Geoderma. Hunting Technical Services Ltd., Elstree Way, Boreham Wood, Herts., UK.

Vol. 20 2. English. p. 131-157. 1978.

The results of reconnaissance soil surveys

covering 6000 km2 are used to describe the Central Plateau region, which lies at elevations of 2000 to 2800 m in northern Ethiopia. Landform and soil sequences on calcareous shales, dolerites and sandstones are described, in which the principal soil units are Lithosols, Luvisols, Cambisols, Arenosols and Vertisols. Detailed morphological and analytical data are presented for a profile representative of arable soils in each sequence. Small-scale subsistence cultivation of cereals is the dominant land use, all land which is physically cultivable is at present cultivated. Settlement patterns are closely related to soil type, nucleated settlement occurring on fine textured soils but dispersed settlement on coarser textured and more freely draining soils. Erosion and soil moisture features of the three landforms described were investigated and compared. Empirical methods and suspended sediment measurements indicate high rates of regional soil loss, accounted for by seasonally high rainfall erosivity, steep terrain and poor land use. The recent development of gully erosion is linked to the disintegration of waterfall tufas. Application of the universal soil loss equation to arable lands indicates potential annual soil losses in the range of 400 t ha-1 for Vertisols to 200 t ha-1 for Cambisols. Differences in rates are ascribed principally to differences in crop planting dates, which affect the degree of vegetative protection. Soil moisture is in the available range for less than three months in the year. The time at which moisture in the profile enters the available range differed between the three soils monitored and was found to be closely related to the crop planting date, thus indirectly affecting the erosion hazard.

1226

**Vlas, I. Stepanescu, E**
Proprietatile fizice si chimice si regimul umiditatii solurilor cu exces de umiditate din campia Mures-Crisul Repede; Physicochemical properties and moisture regime of soils with moisture excess in the Mures-Crisul Repede plain. Stiint Solului.

Rumanian. 1972. Vol.10 (1). 11-25. map. Eng sum.

1227

**Volk, B G; Sartain, J B**
Elemental concentrations of drainage water from Everglades Histosols as affected by cropping systems. Proc Soil Crop Sci Soc Fla. OTHER US.

1976. Vol.35. 177-183. Map.

1228

**Volk, B G; Zelazny, L W**
Infrared analysis of selected Florida Histosols. Soils. Proc Soil Crop Sci Soc Fla.

1974. Vol.33. 132-136. Ref.

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**Volk, B G**
Everglades histosol subsidence: 1. CO2 carbon dioxide evolution as affected by soil type, temperature, and moisture. Proc Soil Crop Sci Soc Fla.

1973. Vol.32. 132-135. Ref.

1230

**Voorhees, W. B.; Carlson, V. A.; Senst, C. G.**
Soybean nodulation as affected by wheel traffic. Agronomy Journal. North Central Soil Conservation Research Center, Agricultural Research Service, Morris, Minnesota, USA.

Vol. 68 6. English. p. 976-979. 1976.

Field experiments were conducted on a Nicollet silt, cla, loam (Aquic Hapludoll) to define the extent to which wheel traffic can affect nodulation of soybeans. Wheel traffic of tractors and implements during normal field operations for soybean culture in the northern Corn Belt was controlled to produce soybean rows with no wheel traffic on either side, and wheel traffic on only one or both sides. Measurements of nodule number and mass from undisturbed soil monoliths showed that rows with wheel traffic on both sides had from 20 to 30% fewer nodules and about 36% less total nodule mass than rows with wheel traffic on only one side. Wheel traffic increased the specific nodule mass in both the tracked interrow area and the adjacent nontracked row area. Nontracked interrows had a greater percentage of nodule mass in the upper 30 cm than did wheel tracked interrows.

1231

**Voorhees, W.B.**
Root distribution in the surface 30-cm of a mollisol soil of the northern United States as affected by tillage and wheel traffic compaction. International Congres of Soil Science, Transactions, 11th.

Vol. 1. p. 96-97. 1978.

(Abstract only) 2014 1978.

1232

**Voss, R.; Dykstra, G.; Suherman, T.**
P fixation by tropical ultisols. Kuala Lumpur, Malaysia, Malaysian Society of Soil Science. Weyerhaeuser International Inc., Singapore.

English. p. 26. undated.

Abstracts of Papers, CLAMATROPS, Conference on Classification and Management of Tropical Soils, Kuala Lumpur, Malaysia, August 1977. Phosphate fixation in typical tropical ultisols occurring in East Kalimantan was evaluated using growth and uptake of P by Pinus caribaea var. hondurensis seedlings, chemical extraction procedures and equilibrium with P solutions. Triple superphosphate (TSP) increased seedling growth as increasing rates of P were applied to a sandy ultisol. Rock phosphate (RP) was only effective in increasing growth when mixed with the sandy ultisol. Foliar P concentration increased linearly with increasing rates of P from TSP only. When extracted with ammonium acetate, the soils had only small amounts of recoverable P, but it was correlated with both growth and tissue P concentration. Double acid extraction succeeded in removing large amounts of the P from RP, but less than 25% of the P from the TSP was recovered from the soil. Leaching loss was negligible. When the soil was equilibrated with P solutions of up to 1200 ppm P (soil basis) for times of up to six days, 55% to 100% of the applied P was retained by the soil. Of this, only 3% to 8% was ultimately recoverable by ammonium acetate extraction.

1233

**Wada, H**
Method and approach in the 7th approximation. Soil classification. Pedologist.

Japanese. June 1971. Vol.15 (1): 31-42. Ref.

1234

**Wada, H.**
A possible classification of paddy soils according to the 7th approximation. Pedologist.

Vol. 10, No. 2. Japanese. p. 141-146. 1966.

1235

**Wada, H.**
An application of the 7th approximation to the classification of soils consisting of an organic soil layer with a thin mineral soil cover. Pedologist.

Vol. 12. Japanese. p. 126-129. 1968.

1236

**Wada, K.; Kawano, T.**
Use of Jeffries acid oxalate treatment in particle-size analyses of Ando soils. Geoderma. Faculty of Agriculture, Kyushu University 46, Fukuoka 812, Japan.

Vol. 20 3/4. English. p. 215-224. 1978.

This treatment for breaking up the sand- and silt-size aggregates bound by allophane, allophane-like constituents and hydrous iron oxides was compared with sonic-wave oscillation for nine Ando soil samples with different clay-mineral compositions and organic-matter contents. There were minor differences in the sand contents obtained by the two treatments, but the clay contents were higher and the silt contents were lower after Jeffries acid oxalate treatment. Characterization of the silt-size separates by an X-ray powder method, water vapor adsorption and electron microscopy indicated that the lower silt contents after Jeffries acid oxalate treatment were mainly due to dissolution of allophane and allophane-like constituents, whereas the silt-size separates after sonic-wave treatment still contained these mineral constituents. The Jeffries procedure for particle-size analysis was also useful for two ferruginous soils representing the Hydrandept and Torrox.

1237

**Wada, K.; Wada, S.**
Clay mineralogy of the B horizons of two Hydrandepts, a Torrox and a Humitropept in Hawaii. Geoderma. Faculty of Agriculture, Kyushu University, Fukuoka, Japan.

Vol. 16 2. English. p. 139-157. 1976.

The mineralogy of the clay fractions separated from the B horizons of two Hydrandepts (Hilo and Akaka soils), a Torrox (Molokai soil) and a Humitropept (Kolekole soil) was determined by a combination of methods. The Hydrandept B horizons were characterized by predominance of hydrous non-crystalline alumina and iron oxides associated with considerable amounts of humus and with very small amounts of silica. Allophane, allophane-like constituents and imogolite were present but in minor amounts. Gibbsite, goethite, chlorite and illite were also present as accessory minerals. The Torrox and Humitropept B horizons were characterized by predominance of kaolinite, hematite and goethite. The iron oxide minerals were present as fine particles (40-80 A diameter) often clustered to form large aggregates. Neither imogolite nor allophane and allophane-like constituents were detected. Considerable amounts of dithionite-citrate soluble Al and humus were, however, present in the Humitropept B horizon, which may reflect the effect of an admixture of volcanic ash to the parent material.

1238

**Wada, S.I.**
Synthetic allophane and imogolite (Clay constituent in Ando soils or Andepts). The Journal of soil science.

v. 30 (2). English. p. 347-355.- ill., 3 plates. June 1979.

Oxford. ~Clarendon Press.

1239

**Wagner, B. J.; Thomas, J. R.; Harris, E. R.; Deleon, E.; Ford, C. G.; Kelley, J. D.**
Soil survey of Erath County, Texas. Washington, D.C., USA; US Department of Agriculture.

English. p. 82pp. 1973.

Thirty-seven series (mainly mollisols, alfisols and inceptisols) are described and mapped at a scale of 1:20 000. Land use and management of the soils are recorded. Parent materials include Pennsylvanian sandstones and shales, Cretaceous limestones, calcareous marls and sands, and alluvium.

1240

**Wahab, A; Talleyrand, H; Lugo-Lopez, M A**
Rooting depth, growth and yield of sorghum as affected by soil water availability in an Ultisol and an Oxisol. J Agric Univ P R.

July 1976. Vol.40 (3): 329-335.

1241

**Wahab, A; Talleyrand, H; Lugo-Lopez, M A**
Rooting, depth, growth and yield of corn as affected by soil water availability in an Utisol and an Oxisol. J Agric Univ P R.

July 1976. Vol.40 (3): 316-328.

1242

**Wahab, M. A.; Hanna, F. S.; Mady, F.; Abdel-Samie, A. G.; Hamdi, H.**
Studies on the formation of some soils in the Nile valley. Egyptian Journal of Soil Science. Ain Shams University, Cairo, Egypt.

Vol. 12 1. English. p. 31-40. 1972.

The arid climate of this region gives rise to soils saturated with Ca++ and to free CaCO3 in the profile. The downward and upward movement of irrigation water leads to the redistribution of salts and to the formation of CaCO3 concretions and even of a calcic horizon in some of these soils. Gley and natric horizons were associated with a relatively high water table. An Ap horizon was found in the cultivated soils, due to old cultivation and addition of organic matter. The soils in the area belong to the orders Entisols, Vertisols and Aridisols with master horizons (A)p, Ap, C and G and calcic and natric diagnostic horizons.

1243

**Walsh, M.; Coninck, F. de**
Study of soils in the drumlin belt of north central Ireland. "Pseudogley and Gley" Transactions of Commissions V and VI of the International Society of Soil Science. Soil Survey, An Foras Taluntais, Johnstown Castle, Wexford, Irish Republic.

English. p. 237-245. 1973.

Three aquepts occurring on drumlins and an aquept and an orthod, occurring on associated rockland were studied, and differences between the two groups of soils discussed. The low porosity of the drumlin soils brought about by pressure from the ice mass as opposed to the better drainage of rockland soils developed on morainic material deposited by melt water, is suggested as the explanation of the different behaviour of the two soil groups. (141.61).

1244

**Wambeke, A van**
A mathematical model for the differential movement of two soil constituents into illuvial horizons: application to clay ratios in argillic horizons. J Soil Sci.

Mar 1976. Vol.27 (1): 111-120.

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**Wambeke, A van**
Les proprietes agricoles des oxisols; Agricultural properties of oxisols. Pedologie.

French. 1974. Vol.24 (2): 191-195. Eng. sum.

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**Wambeke, A Van**
Concept of oxisols - report on results of questionnaire. Second International Soil Classification Workshop, Proceedings.

Vol. 1. p. 25-36. 1979.

Soil Survey Division, Land Development Department, Thailand.

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**Wambeke, A. Van**
Soil bodies and soil classification. Soils and Fertilizers.

Vol. 29, No. 6, p. 507-510, 1966.

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**Wambeke, A. Van**
Recent developments in the classification of soils of the tropics. Soil Science.

Vol. 104, No. 5, p. 309-313, 1967.

1249

**Wambeke, A. Van**
Agricultural properties of Oxisols. Pedologie. Institut Geologique, Universite de l'Etat, Gand, Belgium.

Vol. 24 2, French, p. 191-195, 1974.

The physical and chemical properties depend on the mineralogy of the oxic horizon. A very stable structure is typical. The relations between water-holding capacity, and texture, the role of physico-chemical properties in the response to fertilization and liming, the N cycle, and N - fertilizer reactions are discussed.

1250

**Wambeke, A. Van**
Management properties of Oxisols in savanna ecosystems. Soil Science Department, North Carolina State University, USA. Geology Institute, University of Ghent, Belgium.

English, p. 364-371, 1975.

Soil Management in Tropical America. Proceedings, Seminar, CIAT, Cali, Colombia, February, 1974 (Bornemisza, E.; Alvarado, A., Editors).

1251

**Wambeke, A. Van**
Formation, distribution and consequences of acid soils in agricultural development. Ithaca, New York, USA, Cornell University Agricultural Experiment Station. Dep. of Agronomy, Cornell Univ., Ithaca, New York 14853, USA.

English, p. 15-24, 1977.

Plant Adaptation to Mineral Stress in Problem Soils. Proceedings of a workshop, Beltsville, Maryland, USA; November 1976 (Wright, M.J. - editor). The role of clays and sesquioxides in determining chemical properties of the soil solution, and the effect of various soil genetic conditions (leaching, illuviation, weathering) on the clay and oxide composition of the soil are discussed. Oxisols, Alfisols, Ultisols and Inceptisols (Dystrandepts) are the major acid soil groups of the world and reflect varying degrees of the processes of leaching, illuviation and weathering. Charge characteristics of these soils are related to soil genetic processes and in turn control the behaviour of nutrients in the soil solution. Oxisols are most prone to Mn toxicity, Ca deficiency and P immobilization; Ultisols to Al toxicity; Alfisols to nutrient deficiency and poor physical properties; and Inceptisols to P fixation.

1252

**Wanasen, A; Gray, F; Morrison, R.D**
Correlation of engineering and soil characteristics in selected mollisols. Okla Acad Sci Proc.

1972, Vol.52, 105-112.

1253

**Wann, S. S.; Uehara, G.**
Surface charge manipulation in constant surface potential soil colloids: II. Effect on solute transport. Soil Science Society of America Journal. Department of Agronomy and Soil Science, University of Hawaii, Honolulu, Hawaii, 96822, USA.

Vol. 42 6, English, p. 886-888, 1978.

Potassium breakthrough curves from soil columns containing samples from an oxic horizon of a Typic Torrox shifted to the right as the sample was treated with increasing levels of P. The shift in the breakthrough curve was significantly related to a lowering of the zero point of charge. The lowering of the zero point of charge was in turn related to levels of applied P. The anion accompanying K also had a marked effect on the position of the breakthrough curve. When the accompanying anion was Cl, S, and P respectively, the K concentration in the effluent attained one-half of influent concentration at 4.25, 5.30, and 8.20 pore volumes.

1254

**Wann, S. S.; Uehara, G.**
Surface charge manipulation of constant surface potential soil colloids. 1. Relation to sorbed phosphorus. Soil Science Society of America Journal. Department of Agronomy and Soil Science, University of Hawaii, Honolulu, HI 96822, USA.

Vol. 42 4, English, p. 565-570, 1978.

A significant correlation was found between the zero point of charge and the quantity of phosphorus applied to soil material from an Oxisol. Sorbed phosphorus lowered the zero point of charge and increased surface charge density at any pH above the zero point of charge. The soil was treated with 0, 100, 500, and 1,500 ppm P as $(NH_4)_2HPO_4$. For the soil with no added phosphorus, low concentration of monovalent electrolyte and within two pH units of the zero point of charge, diffuse layer theory adequately predicted surface charge. For high electrolyte concentration and high pH, the Stern theory with specific adsorption energy predicted the experimental results. The calculated results indicated charge reversal in the high-phosphorus samples.

1255

**Weaver, R. M.; Bloom, P. R.**
Solution activities of aluminum and silicon in highly weathered soils that contain gibbsite and kaolinite. Soil Science Society of America Journal. Dep. of Agronomy, New York State College of Agric. and Life Sciences, Cornell Univ., Ithaca, 14853, USA (P.R.B.)

Vol. 41 4. English. p. 814-817. 1977.

Solute activity functions of pH+1/3 pAl and pSi(OH)4 in dilute acid suspensions of six Brazilian Oxisols that contained both kaolinite and gibbsite, did not reflect the presence of the latter minerals. The solute activity functions could, however, be rationalized in terms of dissolution of a surface component of variable composition.

1256

**Webb, A. A.; Crack, B. J.; Gill, J. Y.**
Studies on the gilgaied clay soils (Ug 5.2) of the Highworth land system in east-central Queensland. 1. Chemical characteristics. Queensland Journal of Agricultural and Animal Sciences. Agric. Chemistry Branch, Queensland Dep. of Primary Industries, Biloela, Australia.

Vol. 34 1. English. p. 53-65. 1977.

Some chemical and physical properties of the gilgaied clays of the Highworth land system have been described. Data for surface and profile increments are presented and discussed. Differences in soil properties were found between three distinct areas. Major features of the soils are the high soluble salt content in the subsoil, high exchangeable sodium levels and acid pH trend. Extractable P values in the surface are highly variable; exchangeable K values indicate sufficiency for plant growth. Some differences were noted in soil properties between virgin, cleared and cultivated sites.

1257

**Weber, H. L.**
Soil survey, of Leelanau County, Michigan. US Department of Agriculture.

English. p. 90pp. 1973.

Thirty-five series (mainly histosols, spodosols, inceptisols, entisols and alfisols) are described and mapped at a scale of 1:20 000. Parent materials include glacial till, outwash deposits, lacustrine deposits and organic material. Soil suitability for farming, woodland and range is indicated and engineering properties are given.

1258

**Webster, R.,**
Fundamental objections to the 7th approximation. Journal of Soil Science.

Vol. 19, No. 2. p. 354-366. 1968.

1259

**Weise, K**
Kennzeichnung des Feuchteregimes von Bodenformen durch Berechnung aus Boden- und Witterungsdaten mit Hilfe eines Einschichtmodells; Characterizing the moisture regime of soil series by calculation from pedological and meteorological parameters (singlelayer modal). Arch Acker- Pflanzenbau Bodenkd.

German. 1976. Vol.20 (2): 149-158. Eng. sum.

1260

**Weisenberger, B. C.; Dowell, C. W.; Leathers, T. R.; Oder, H. B.; Richardson, A. J.**
Soil survey of Boone, Campbell, and Kenton Counties, Kentucky. US Department of Agriculture.

English. p. 97pp. 1973.

Twenty-eight soil series (mainly alfisols, ultisols, mollisols, entisols and inceptisols) are described and mapped at a scale of 1:15840. Parent materials include glacial till, alluvium, lacustrine deposits, limestone, calcareous shale and siltstone. Use and management of the soils are also discussed.

1261

**Werchan, L. E.; Lowther, A. C.; Ramsey, R. N.**
Soil Survey of Travis County, Texas. Washington, D.C., USA; US Department of Agriculture.

English. p. 120 pp. 1974.

Thirty-five series (mainly inceptisols, mollisols, alfisols, vertisols and entisols) are described and mapped at a scale of 1:20 000. Parent materials include limestone, clay and alluvium.

1262

**Westin, F. C.**
Organic phosphorus changes over a growing season in some Borolls and associated Aquolls of South Dakota. Soil Science Society of America Journal. Plant Science Dep., South Dakota State Univ., Brookings, 57006, USA.

Vol. 42, 3. English. p. 472-477. 1978.

Changes in soil organic P were studied for five members of a soil catena over a growing season. Three horizons of each of five pedons were sampled at noon at 2-week intervals (April-October), and temperatures were recorded using a dial thermometer. Precipitation was also recorded between sampling periods. Soil samples were analyzed for total, organic and available P, pH, CEC, exchangeable cations, total N and organic C. Catena members appeared to have seasonal changes in organic P but the change was significant only for the north-facing member. When examined for each sampling date the organic P changes were significantly related to precipitation for the sloping Borolls but not in the Borolls occupying level positions nor the associated Aquolls.

1263

**Westin, F.C.**
The use of the seventh approximation in new areas. Soil Science Society of America, Proceedings.

Vol. 27, No. 2. p. 222-223. 1963.

1264

**Westin, F.C.**
Soil phosphorus in South Dakota. II. Phosphorus fractions of some borolls and ustolls. Soil Science Society of America, Proceedings.

Vol. 31, No. 4. p. 521-528. 1967.

1265

**Wheeler, F. F.**
Soil Survey of Donlitree County, Texas. Washington, D.C., USA, US Department of Agriculture.

English. p. 47 pp. 1973.

Thirteen series (ustolls and other ustic soils) are described and mapped at a scale of 1:20 000, and engineering and land-use interpretations are given. Parent materials consist mainly of unconsolidated calcareous deposits.

1266

**Wheeler, L. D., Jr.; Williams, J. A.**
Soil Survey of Long Valley Area, Arizona. Washington, D.C., USA; US Department of Agriculture.

English. p. 78pp. 1974.

Thirty-eight series (mainly entisols, aridisols, mollisols and alfisols) are described and mapped at a scale of 1:31 680. Engineering and land-use interpretations are given. Parent materials include basic igneous rock, limestone, sandstone and unconsolidated deposits.

1267

**Whitaker, D. J.; Cox, F. R., Jr.; Converse, H. T., Jr.; Taylor, J. L.; Bentley, J. V., Jr.; Jacobs, E. H.**
Soil Survey of Grayson County, Kentucky. Washington, D.C., USA; US Department of Agriculture.

English. p. 81pp. 1972.

Twenty-five series (mollisols, ultisols, alfisols and inceptisols) are described and mapped at a scale of 1:20 000. Parent materials are mainly loess and alluvium.

1268

**Wilkes, R. L.; Johnson, J. H.; Stoner, H. T.; Bacon, D. D.**
Soil survey of Bryan and Chatham Counties, Georgia. Washington, D.C., USA; US Department of Agriculture.

English. p. 71pp. 1974.

Twenty-six series (mainly ultisols, spodosols and entisols) are described and mapped on a scale of 1:20 000; use and management of the soils are discussed. Parent materials are all transported materials and include sandy, clayey, and mixed sediments.

1269

**Williame, P**
Etude comparee des proprietes hydriques et des caracteristiques hydrodynamiques de trois familles de sols du Liban nord; Comparative study of water properties and of characteristics of hydrodynamics of three soil families of North Lebanon. Beirut.

French. 1971. Vol.35 p. illus.

English summary. Bibliography. p. 34-35.

1270

**Williams, J. C.; Welker, A. J.; Wheeler, F. F.; McEwen, H. F.**
Soil Survey of Hemphill County, Texas. Washington, D.C., USA; US Department of Agriculture.

English. p. 55 pp. 1974.

Twenty-two series (mainly inceptisols, mollisols, alfisols and entisols) are described and mapped at a scale of 1:24 000. Parent materials are mainly cenozoic deposits and alluvium.

1271

**Williams, L. H.**
Soil Survey of the Marion County Area, Oregon. Washington, D.C., USA; United States Department of Agriculture.

English. p. 132pp. 1972.

Forty-one series (mainly xerolls, xeralfs, humults, umbrepts, andepts and their hydromorphic associates) are described and mapped at a scale of 1:20 000. Parent materials include alluvium, colluvium and glacial till.

1272

**Williamson, H. F.; Shively, J. L.**
Soil Survey of Spencer County, Indiana. Washington, D.C., USA; US Department of Agriculture.

English. p. 79 pp. 1973.

Thirty-seven series (alfisols, entisols, inceptisols, mollisols and ultisols) are described and mapped at a scale of 1:15 840; engineering and land-use interpretations are given. Parent materials include loess, alluvial and lacustrine deposits, sand-stones and shales.

1273

**Wiseman, I G; Nathanson, K; Graven, E H**
Effects of phosphate carrier, phosphate placement, and level of lime applicaton on plant growth on two Oxisols in Natal. Grassland Soc S Afr Proc.

1972. Vol.7: 105-111. Ref.

1274

**Wolf, J. M.; Drosdoff, M.**
Soil water studies in Oxisols and Ultisols of Puerto Rico: I. Water movement. Journal of Agriculture of the University of Puerto Rico. Department of Agronomy, Cornell University, Ithaca, New York, USA.

Vol. 60 3. English. p. 375-385. 1976.

Soil water experiments were conducted to determine the water supplying characteristics of two clayey Ultisols, a clayey Oxisol, and a sandy Oxisol. Water infiltration into all soils was very rapid, reaching 9 cm/hr after 1 hr of continuous flooding. The strong structural stability of the clay soils permitted infiltration rates in excess of that for the sandy soil. Lateral water movement, downslope, was a significant factor in observed high rates of water infiltration and may partially account for downslope movement of nitrates. Values of soil water tension after 2 to 3 days of free drainage did not exceed 20 to 80 cm of water (roughly 1/50 to 1/12 bar). Field capacity was established to be 1/15 bar for the sandy Oxisol and 1/20 bar for the clayey Oxisol and Ultisols. Two avenues of soil water movement were postulated: Capillary pores (between soil particles) and non-capillary pores (between soil aggregates). Because of water movement in non-capillary pores, flow characteristics of the clay soils resembled those of the sand. In terms of soil water release characteristics, the clays and the sand were similar.

1275

**Wolf, J. M.; Drosdoff, M.**
Soil water studies in Oxisols and Ultisols of Puerto Rico: II. Moisture retention and availability. Journal of Agriculture of the University of Puerto Rico. Department of Agronomy, Cornell University, Ithaca, New York, USA.

Vol. 60 2. English. p. 386-394. 1976.

The two Oxisols studied, one very sandy (Bayamon) and the other high in clay (Catalina), tended to dewater at low tensions, whereas soil water release in the Ultisols extended over a wider range of tensions. The sandy soil failed to release appreciable water above 1 bar of tension. Field capacity was established at 1/15 bar for the sandy soil and 1/20 bar for the clayey soils. The available water stored in the top 30 cm of the soil

profile was determined to be 3.6, 5.0, 5.5, and 6.0 cm for Bayamon, Humatas, Torres, and Catalina, respectively. For Bayamon and Catalina, the two Oxisols, the bulk of the water was released between field capacity and 1 bar. In contrast to the Oxisols, a high proportion of the water in the Ultisols, Humatas and Torres, was available only at tensions above 1 bar. The Catalina soil was by far the best in terms of water supplying characteristics, while Humatas and Bayamon were the worst.

1276

**Wolf, J. M.; Drosdoff, M.**
Soil water studies on Oxisols and Ultisols of Puerto Rico. III. Capillary conductivity. Journal of Agriculture of the University of Puerto Rico. Dep. of Agronomy, Cornell Univ., Ithaca, New York, USA (M.D.).

Vol. 60 4. English. p. 508-512. 1976.

Values of capillary conductivity were calculated for the Humatas clay and Bayamon sand soils. These were found to be highly dependent on water content. Using values of capillary conductivity, it was estimated that 10% of the water required for evapotranspiration might be supplied by upward water movement from the profile below the root zone.

1277

**Wolf, J. M., Drosdoff, M.**
Soil water studies on Oxisols and Ultisols of Puerto Rico. IV. A comparison of techniques to determine water retention at various tensions. Journal of Agriculture of the University of Puerto Rico. Dep. of Agronomy, Cornell Univ., Ithaca, New York, USA (M.D.).

Vol. 60 4. English. p. 513-515. 1976.

An overestimation of soil water storage would be made by employing either disturbed samples at low tensions or undisturbed core samples at high tensions. To avoid this, undisturbed core samples should be used to measure water retention in the wet range (0 to 1 bar) and disturbed samples, to measure water retention in the dry range (1 to 15 bars). It is suggested that soil water release curves should be developed by relating field measurements of soil water tension with results from gravimetric sampling.

1278

**Wolf, J. M.**
Soil-water relations in Oxisols of Puerto Rico and Brazil. Soil Science Department, North Carolina State University, USA. Agricultural Engineering Department, Cornell University, Ithaca, N.Y., USA.

English. p. 145-154. 1975.

Soil Management in Tropical America. Proceedings, Seminar, CIAT, Cali, Colombia, February 1974 (Bornemisza, E.; Alvarado, A., Editors). Most of the available water is released at tensions of 0.1 to 1.0 bar, and the release of this water should be measured in the field. The soil structure of Oxisols is more important than their texture for predicting water release and other soil water properties. The properties of the soil water are similar in sandy and clayey Oxisols. The top 30 cm of three Oxisols contained 36-60 mm of water.

1279

**Woodward, L.; Harvey, J. L.; Donaldson, K. M.; Shiokazi, J. J.; Leishman, G. W.; Broderick, J. H.**
Soil Survey of Salt Lake Area, Utah. Washington, D.C., USA; US Department of Agriculture.

English. p. 132 pp. 1974.

Thirty-five series (mollisols, alfisols and inceptisols) are described and mapped at a scale of 1:20 000. Parent materials include alluvium, lake sediments, sandstones, limestones and shales.

1280

**Woodyard, S. O.; Preator, R. E.; Moreland, R. E.; McCullough, M. B.**
Soil survey of Baca County, Colorado. Washington, D.C., USA; US Department of Agriculture.

English. p. 55pp. 1973.

Twenty-nine series (mainly mollisols, entisols and aridisols) are described and mapped at a scale of 1:20 000. Land use and management are recorded. Parent materials include loess, aeolian sand, alluvium, Tertiary outwash, limestone and shale, sandstone, and basalt.

1281

**Worster, J. R.; Harvey, E. H.; Hanson, L. T.**
Soil Survey of Woodbury County, Iowa. Washington, D.C., USA; United States Department of Agriculture.

English. p. 87pp. 1972.

Forty-two series (mainly udolls, aquolls and fluvents) are described and mapped at a scale of 1:15 840. Parent materials comprise loess, alluvium, glacial till and aeolian sand.

1282

**Wunsche, W A; Bohnen, H**
Avaliacao da dissolucao de varias fracoes de calcario dolomitico em oxisol do Rio Grande do Sul. Appraisal of the disintegration of various fractions of dolomitic limestone in Oxisol of Rio Grande so Sul. Soil conditioners, soybeans. Agron Sulriograndense

Portuguese. 1976. Vol 15 (2). 173-178. Eng sum

1283

**Wyrley-Birch, E. A.; Yen-Tze Shao**
Cocoa and soils in the state of Sabah, Malaysia. Jabatan Pertanian Sabah, Malaysia. Department of Agriculture, Sabah, Malaysia.

Vol. Ma, English. p. 22pp. 1971

Analytical data are reported of red-brown ferralsols derived from Quaternary basaltic lava, red-brown latosols derived from andesitic ash, red-yellow podzolic soils derived from river level lacustrine and riverine alluvia, rendzinas developed from Pliocene and Quaternary, corraline, vertisols, and red-brown ferralsols derived from ultra-basic materials. The potential and fertilizer requirements of these soils for cocoa are discussed.

1284

**Yaalon, D. H.; Brenner, I.; Koyumdjisky, H.**
Weathering and mobility sequence of minor elements on a basaltic pedomorphic surface, Galilee, Israel. Geoderma. Department of Geology, Hebrew University, Jerusalem, Israel.

Vol. 12 3. English. p. 233-244. 1974

Twenty one samples of several soil profiles of a young pedomorphic surface on basalt ranged from red basaltic litnosols to lithic red Mediterranean soils and montmorillonitic grumusols (xerorthents, lithic xerochrepts, chromoxererts). Sr and to a lesser extent Ba are lost during the weathering of the feldspars; Sr continues to be leached out on the slope. Ti concentrates in the non-clay residue and follows Fe during its redistribution on the slope. Mn is more mobile than Fe. Co is partially correlated with Mn, and like Ni, Cr, Cu and V it shows no definite trend and appears to be fairly immobile.

1285

**Yamane, V K; Green, R E**
Adsorption of ametryne and atrazine on an oxisol, montmorillonite, and charcoal in relation to pH hydrogen-ion concentration and solubility effects. Soil Sci Soc Amer Proc.

Jan/Feb 1972. Vol.36 (1): 58-64. Ref.

1286

**Yeck, R. D.; Gray, F.**
Phytolith size characteristics between Udolls and Ustolls. Soil Science Society of America Proceedings. Oklahoma State University, Stillwater, USA

Vol. 36 4. English. p. 639-641. 1972

Opaline phytoliths were isolated from the 5 to 20 mu, 20 to 35 mu and 35 to 50 mu soil fractions of 4 soils. More 5 to 20 mu phytoliths and fewer 35 to 50 mu phytoliths occurred in the ustoll than the udoll soil. The udoll-ustoll intergrades contained intermediate quantities of the 35 to 50 mu phytoliths, but not of the other grades. The results supported the hypothesis that the size of phytoliths was related to the moisture regime under which they were formed.

1287

**Yepez, H; Blue, W G**
Growth response of creeping beggarweed (Desmodium canum (Gmel.) Shintz and Thellong) to lime and fertilizer on a Florida Spodosol. Proc Soil Crop Sci Soc Fla. OTHER US.

Nov 1976 (pub. 1977). Vol.36: 79-84. Ref.

1288

**Yost, R. S.; Kamprath, E. J.; Lobato E.; Naderman, G.**
Phosphorus response of corn on an Oxisol as influenced by rates and placement. Soil Science Society of America Journal. Dept. of Agronomy & Soil Science, University of Hawaii, USA.

Vol. 43 2. English. p. 338-343. 1979.

Phosphorus deficiency and high P sorbing capacities are a major limitation to intensive cropping of many soils in the Cerrado area of Central Brazil. A field study comparing rates and placement of P for corn (Zea mays) was conducted to determine initial and long-term P fertilization requirements. Rates of broadcast P were 70, 140, 280 and 560 kg P/ha and banded rates were 35, 70, and 140 kg P/ha. In addition, combination treatments of 140 or 35 kg P/ha broadcast and banded rates of 35 kg/ha per crop were used. Broadcast treatments gave greater yields than band treatments at the same rates for the first crop. At the end of four crops, however, total yields and P uptake were very similar for broadcast and band treatments in which the same total amount of P had been applied. Marked residual effects were observed with the higher rates of broadcast P. A greenhouse study was conducted in which a given amount of P was mixed with varying proportions of the total soil volume. Corn growth and P uptake were a function of both the concentration of P in the portion of the soil fertilized and the percent of the total soil volume that was fertilized. These results tend

to explain the increase with time in relative yields of the banded treatments. The best method for applying P to these high adsorbing soils appears to be an initial broadcast application of 140 kg P/ha and a band application of 35 kg P/ha to each crop. This treatment maintained the available soil P at the critical soil test level and produced 80 to 85% of the maximum yield.

1289

**Yost, R.S**
Contribution of mycorrhizae to P (phosphorus) nutrition of (food and forage) crops growing on an Oxisol. Agronom. Journal

v. 71 (6). English. p. 903-908. - (11). Nov/Dec 1979

Madison, Wis. - American Societ. of Agronomy

1290

**Younger, D. R.; Gilmore, J. M.**
Studies with pasture grasses on the black cracking clays of the Central Highlands of Queensland. 2. Sowing methods. Tropical Grasslands. Dep. of Primary Industries, Emerald, Qld., Australia 4720

Vol. 12 3. English. p. 163-169. 1978.

In field trials in 1971-4 on the black self-mulching cracking clay soils of the Central Highlands, seed pelleting with superphosphate reduced emergence of Cenchrus ciliaris cv. Nunbank but increased DM yield from 4.37 to 5.11 t/ha. Cultivating 3 times after surface sowing reduced emergence of pelleted seed, while mulching with 3.0 t wheat straw/ha increased establishment and DM yield. Presoaking the seeds or sowing in a wet seedbed had no significant effect on establishment or DM yield, nor did sowing at a depth of 5 cm as opposed to surface sowing. In further trials with Panicum maximum, Urochloa mosambicensis cv. Nixon, Bothriochloa insculpta cv. Hatch and Cenchrus ciliaris cv. Nunbank and Molopo, sowing into barley stubble followed by slashing increased establishment of all cv. compared with sowing into bare soil followed by harrowing or sowing into barley stubble followed by cultivation.

1291

**Younger, D. R.; Gilmore, J. M.**
Studies with pasture grasses on the black cracking clays of the Central Highlands. 1. Species evaluation. Tropical Grasslands. Dep. of Primary Industries, Emerald, Qld., Australia 4720.

Vol. 12 3. English. p. 152-162. 1978.

A range of grasses was evaluated for establishment, persistence, soil covering properties and yield on the heavy black self-mulching open downs soils of central Queensland in a series of row and sward plantings. Bothriochloa insculpta cv. Hatch was shown to be a potentially useful grass. Following rainfall after sowing, reasonable stands of Cenchrus ciliaris cv. Nunbank, Panicum coloratum var. makarikariense cv. Pollock, Urochloa mosambicensis and Dichanthium aristatum were also obtained. The establishment of these grasses was satisfactory, resulting in post-harvest ground cover of 50-60% 30 months after sowing. The initial total ground cover, before harvesting, of B. insculpta was outstanding at 82% 4 months after sowing. Observations on ground cover were recorded in 1977 after burning and in 1978 after grazing. B. insculpta produced the highest DM yield of 17.0 t/ha in 1974 and the highest total yield of 26.5 t/ha from 1972-74. C. ciliaris produced the highest DM yields in 1972 and 1973 of 6.5 and 5.25 t/ha, resp. The highest yield response to applied N was shown by B. insculpta, with yield increases of 26 and 12% in 1973 and 1974, resp.

1292

**Yuan, T L**
Composition of the amorphous materials in the clay fraction of some Entisols, Inceptisols, and Spodosols. Florida. Soil Sci.

Apr 1969. Vol.107 (4): 242-248.

1293

**Yuan, T L; Robertson, W K; Littell, R C**
Soil pH hydrogen-ion concentration adjustment by the double-buffer method for pearl millet (Pennisetum typhoides (Berm.) Staph and Hubbard) on an ultic haplaquod Liming. Proc Soil Crop Sci Soc Fla. OTHER US.

1978. Vol.37: 208-212.

1294

**Yuan, T L**
Chemistry and mineralogy of Andepts. Soils. Proc Soil Crop Sci Soc Fla.

1974. Vol.33: 101-108. Ref.

1295

**Yuan, T. L.; Littell, R. C.; Lucas, R. A.**
Buffering capacity of Florida sandy soils as related to other soil characteristics. Proceedings, Soil and Crop Science Society of Florida. Soil Science Department, University of Florida, Gainesville, 32611, USA.

Vol. 36. English. p. 96-100. 1977.

The buffering capacities of 218 surface soils and 54 subsoils from 4 Soil Orders were determined by the double buffer method and were related statistically to other soil characteristics. Soil acidity (the amount of acidity neutralized to the equilibrium pH by the pH7 buffer used in the double buffer method for the determination of the lime requirement), CEC, and the organic matter content of the soils were very significantly correlated with the buffering capacity, which was expressed as meq acidity released by 100 g soil when the pH was increased by one unit. For both surface and subsoils, soil buffering capacity was correlated more highly with soil acidity and CEC than it was with clay content and organic matter content. Linear regression analysis showed that the buffering capacities of soils from different Soil Orders varied considerably for each unit of acidity measured by the pH 7-buffer. The Spodosols had the highest value followed in decreasing order by Entisols, Alfisols, and Ultisols. These differences suggested that estimation of buffering capacity of a soil from its acidity may not be accurate. However, in routine lime requirement determinations, the buffering capacity value as required by the double buffer method (Yuan, 1976) for the lime adjustment may be obtained from the acidity instead of by using the second buffer. The error introduced in the total lime requirement would be very small.

1296

**Yuan, T. L.; Zelazny, L. W.; Ratanaprasatporn, A.**
Potassium status of selected paleudults in Lower Coastal Plain. Soil Science Society of America Journal. Florida Agricultural Experiment Station, Gainesville, USA.

Vol. 40 2. English. p. 229-233. 1976.

The three Paleudults under study had a K saturation ( 3%. Cold H2SO4- and hot HNO3-extractable K were also low. However, there was a K reserve of 1,500-2,800 kg/ha in each 15-cm thickness throughout the profiles. Slightly ( 50% of the K was in K-feldspar form and most of the rest probably was in micaceous minerals.

1297

**Yuan, T.L.**
Characteristics of surface and spodic horizons of some Florida spodosols. Soil and Crop Society of Florida. Proceedings 26th Annual Meeting.

p. 163-179. 1966.

1298

**Yuan, T.L.**
Response of soybeans and oats to lime, phosphorus, and potassium on a Paleudult (Ultisols, crop yields, in north and west Florida). Proceedings.Soil and Crop Science Society of Florida.

v. 38. English. p. 116-121.- ill. 1979.

n.p., -The Society.

1299

**Zahner, RR.**
Moisture release characteristics of forested sand entisols in northern lower Michigan. Soil Science Society of America. Proceedings.

Vol. 30. No. 5. p. 647-649. 1966.

1300

**Zalazny, L.W.e**
Physical, chemical, elemental, and oxygen-containing functional group analysis of selected Florida histosols. Histosols, their characteristics, classification, and use.

No. 6. p. 63-77. 1974.

Soil Science Society of America, Special Publication.

1301

**Zein el Abedine, A; Robbnson, G H; Tyego, J**
A study of certain physical properties of a Vertisol in theGezira area, Republic of Sudan. Soil Sci.

Nov 1969. Vol 108 (5): 359-366.

1302

**Zein el Abedine, A; Robinson, G H**
A study on cracking in some vertisols of the Sudan. Geoderma.

Apr 1971. Vol.5 (3): 229-241. map.

1303

**Zekovic, P; Zogjani, A**
Prilog proucavanju efikasnosti Afalona S-50 i Gesagarda 50 u suzbijanju korova u suncokretu na kosovskoj smonici; The conribution to the study of Afalon S-5 and Gesagard 50 efficiency in sunflower weed control on Kosovo vertisol. Agrohemija.

Croat. 1974. Vol.7/8: 323-326. Eng. sum.

1304

**Zelany, L. W.; Calhoun, F. G.; Caldwell, R. E.**
Soil components contributing to acidity measured in selected Florida paleudults. Proceedings. Soil and Crop Science Society of Florida. Soil Science Department, Florida University, Gainesville, USA.

Vol. 33. English. p. 228-232. 1974.

Neither pH measured in water nor pH measured in 1N KCl was significantly correlated with total acidity, indicating the inability of intensity measurements for predicting total acidity or subsequent lime requirement of the soil. Multiple regression equations show the relationships of acidic characteristics to soil components for the surface and subsoil horizons.

1305

**Zelazny, L W; Carlisle, V W**
Physical, chemical, elemental, and oxygen-containing functional group analysis of selected Florida histosols. SSSA Spec Publ (Soil Sci Soc Am).

1974. Vol.6: 63-78. Map. Ref.

1306

**Zelazny, L. W.; Carlisle, V. W.**
Mineralogy of Florida aeric haplaquods. Proceedings. Soil and Crop Science Society of Florida. Soil Science Department, Florida University, Gainesville, USA.

Vol. 31. English. p. 161-165. 1971.

minerals identified by X-ray diffraction an[illegible]sis and DTA in seven profiles were mainly [illegible] and kaolinite, and gibbsite in lower h[illegible]13.

1307

**Zonn, S.V.**
Application of the new American system of soil classification to mountain forest soils of the USSR. Soviet Soil Science. Experientiae.

No. 6. English. p. 582-584. 1965. Vol.13 (2):201-217. Ref.

Translated from the Russian: Pochvovedeniya, No.6, p.28-29, 1964.

1308

**Zuccardi, R. B.; Fadda, G. S.; Caceres, M. R.**
Water regime of an argiudoll. Revista Agronomica del Noroeste Argentino. Universidad Nacional de Tucuman, Argentina.

Vol. 9 2. Spanish. p. 347-365. 1972.

Results of a four-yr study of the monthly variations in soil-water content at different depths in a typic argiudoll (silty-clay loam) in the humid region of Tucuman are reported. May to October and November to April generally corresponded to the periods of negative and positive water balance, respectively. Soil water reserves were lowest in October and highest in February (for the 0-50 cm layer) or March-April (0-100 cm). Values lower than the wilting point were observed only occasionally for the 0-20 cm layer between September and mid-November.

1309

**Zuccardi, R. B.; Fadda, G. S.**
Soil survey map of Tucuman province. San Miguel de Tucuman, Argentina, Universidad Nacional de Tucuman.

Vol. Special Publication No. 3. Spanish. p. 99 pp. 1972.

The physiography, geology, climate, vegetation and soils of the area are described. The soils include: entisols (fluvents, orthents, psamments); aridisols (orthids); mollisols (aquolls, udolls, ustolls, xerolls); and alfisols (udalfs). Detailed descriptions are given of representative profiles. (173(82)).

1310

**Zuccardi, R. B.; Fadda, G. S.**
The temperature regime of an argiudoll. Revista Agronomica del Noroeste Argentino. Universidad Nacional de Tucuman, Argentina.

Vol. 9 2. Spanish. p. 367-381. 1972.

Data recorded over a three-yr period show that soil temperature in a typic argiudoll in Tucuman was greater than air temperature from February to July down to a depth of 100cm, and from March to September down to 300cm. The mean annual soil temperature at the 80-cm depth was 21 deg C. The difference in the mean soil temperature between summer and winter was 9 deg C at 50 cm.

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