

A.I.D. RESEARCH ABSTRACTS

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CONTENTS

INTRODUCTION	iii
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- Purpose
- About 'A.I.D. Research Abstracts'
- How to obtain documents
- How to order from NTIS
- Loans to A.I.D. personnel

BIBLIOGRAPHIC LIST

- 010-019** Bibliographies and Catalogs
- 300-309** Social Sciences—General
(including Community, Rural, and Urban Development;
Population; Land Reform; Institution Building; Development
Planning)
- 330-339** Economics
(including Labor and Manpower; Natural Resources; Finan-
cial Institutions; Private Enterprise; Cooperatives)
- 350-359** Public Administration
- 370-379** Education
- 380-389** Commerce
(including Foreign Trade; Communications; Transportation
Services)
- 610-619** Medical Sciences
(including Public Health; Malnutrition)
- 620-629** Engineering
(including Public Works; Power; Mining)
- 630-639** Agriculture
(including Livestock; Fisheries; Forestry)
- 650-659** Business Enterprise
(including Business Management; Marketing)
- 660-699** Other Technologies
(including Food Technology; Building Processes; Manu-
facturing)

INTRODUCTION

PURPOSE

A.I.D. RESEARCH ABSTRACTS describes current research documents of interest to scholars, planners, and scientific investigators in developing nations. It is hoped that it will create an awareness of important new knowledge supportive of their activities and will thus stimulate an exchange of papers and ideas between development workers who find their interests are related.

ABOUT 'A.I.D. RESEARCH ABSTRACTS'

Each quarterly issuance is a bibliographic listing. Items are grouped by primary subject field according to the Dewey Decimal Classification System and are listed chronologically by A.I.D. Reference Center (ARC) numbers. Each item, or citation, is described by NTIS Document Order Number, NTIS Pricing Code, corporate author, title, ARC number, personal author, date, number of pages, availability statement, and abstract. It is planned that a consolidated issuance will be prepared biennially and will include four indexes—subject, personal author, corporate author, and contract and project number.

HOW TO OBTAIN DOCUMENTS

Requests for copies of papers herein described may be sent to the authors or the principle researchers. It is expected that in accordance with usual tradition in the scientific community, requested papers will be made available. In those cases where no papers or reprints are available from the author or his institution, the A.I.D. Reference Center and the Office of A.I.D. Research and University Relations, Technical Assistance Bureau, has made special arrangements with the National Technical Information Service, of the U.S. Department of Commerce, to provide paper copies or microfiche of documents described in this catalog. Documents may be ordered by following the instruction below.

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It is the policy of ARC not to lend documents to non-AID personnel. Non-AID personnel may use the ARC's collection in Room 1656, New State Building by arrangement with the appropriate AID/W technical office.

ANNOTATED BIBLIOGRAPHY OF AID RESEARCH

000. GENERAL (BIBLIOGRAPHIES, INFORMATION SYSTEMS)

PB-210 107 PC\$3.00
National Academy of Sciences, Washington, D.C.
SCIENTIFIC AND TECHNICAL INFORMATION FOR DEVELOPING COUNTRIES. (001.4-N277F)
Apr 72, 92p*

Scientific and technical information is an essential element in the economic development process. A rationale is needed to guide the formulation of assistance programs addressed to the problem of information resources in less developed countries. This report is intended as a first step toward meeting this need. The first portion elaborates the need for more effective use of scientific and technical information in development efforts, and then outlines a rationale for increased technical assistance in this area. A review is provided of the functions of the information transfer process and the necessary components of the information infrastructure. Consideration is given to specific information requirements of the developing countries in the areas of industrial technology, natural resources, and the scientific and technical disciplines. Finally, a series of recommendations are presented encompassing policy, priorities, programming, administration, and suggested action programs for technical assistance in scientific and technical information. (Author)

PB-219 712 PC\$9.25,
Georgia Univ., Athens.
A LITERATURE REVIEW AND RESEARCH RECOMMENDATIONS ON CASSAVA 'MANIHOT ESCULENTA CRANTZ'. (016.66423-H495)
C. H. Hendershott. Mar 72, 341p

In the fall of 1969, a team of scientists from the University of Georgia was commissioned by the Technical Assistance Bureau of the Agency for International Development to (1) compile on a systematic basis the available information about cassava and related research now in progress; (2) synthesize, appraise, and analyze the information gathered and to determine as near as possible the broad limitations and potential of cassava as a food and feed crop; and (3) to prepare a list of research needs in their order of importance, for the orientation of future research on cassava. This team, consisting of ten men, represented the areas of Agronomy, Animal Nutrition, Botany, Economics, Food Science, Genetics, Horticulture, Human Nutrition and Plant Pathology. Each of their reports appear as a separate chapter in this manuscript and in each case represents their own view on cassava in their particular area of speciality. (Author)

300. SOCIAL CONDITIONS AND CHANGE

PB-219 729 PC\$4.00
Michigan State Univ., East Lansing. Dept. of Agricultural Economics.
RESEARCH ON MIGRATION IN AFRICA, PAST, PRESENT AND FUTURE. (AFR-301.32-B993)
Derek Byerlee. Sep 72, 38p

The paper reviews the present knowledge of african rural-urban migration and suggests future directions for improved

theory and methodology for economic research on migration. The focus of the paper is on reviewing the recent literature, (particularly since independence) on rural-urban migration from an economist's perspective. The following topics are covered: Characteristics of migrants; the process of rural-urban migration; the rural-urban income differential; noneconomic factors in migration; distortion in factor markets; migration as a capital transfer; externalities associated with migration; improved theory; improved methodology and integrating migration research and policy analysis. (Author)

PB-219 733 PC\$3.75
Williams Coll., Williamstown, Mass. Center for Development Economics.
CAPITAL UTILIZATION: PHYSIOLOGICAL COSTS AND PREFERENCES FOR SHIFT WORK. (PK-309.2-W783)
Gordon C. Winston. Oct 71, 34p

Scarce industrial capital is used only a fraction of the time in poor countries though an increase in its utilization would act much like an injection of new capital -- it would increase output, its rate of growth and industrial employment. Extended capital utilization requires night time operation and night operation requires multiple shift working. This raises two questions for social policy: (a) what are peoples' preferences between day and night work and how can they be influenced and (b) is shift work humane. The paper examines evidence on the physiological, social and psychological effects of shift work, per se. These are the major determinants of preferences for day and night work; they influence the social costs of alternative schedules and patterns of shift work: and these are the areas of concern about the potential damage inflicted by shift working.

330. ECONOMICS (GENERAL)

PB-212 749 PC\$3.00
Harvard Univ., Cambridge, Mass. Center for International Affairs.
EQUITABLE DISTRIBUTION OF BENEFITS IN INTEGRATION SCHEMES AMONG THE LESS DEVELOPED COUNTRIES: THE ANDEAN GROUP. (330.15-M831)
David Morawetz. Apr 72, 67p

All economic integration schemes among less developed countries which have been established to date have foundered on the problem of how to equitably distribute the benefits arising from the existence of the scheme. The Cartagena Agreement of the Andean Group customs union (Bolivia, Chile, Colombia, Ecuador, and Peru) includes several measures bearing on this problem. The paper provides a theoretical analysis of the benefit distribution problem, and an evaluation of the benefit distribution provisions of the Cartagena Agreement. Consideration is given to the definition of an 'equitable' benefit distribution, some problems in measuring net benefits, and the presumptions as to whether benefits are likely to be equally or unequally distributed in integration schemes. A number of schemes which have been proposed and/or adopted to achieve equitable benefit distribution are then examined from a theoretical viewpoint. The measures contained in the Cartagena Agreement are analyzed in the light of this examination, and of the experience of other integration schemes with the benefit distribution problem.

PB-219 709 PC\$4.00,
Harvard Univ., Cambridge, Mass. Center for International Affairs.

ECONOMIC PROSPECTS FOR THE ANDEAN GROUP. (LAT-330.98-M831)
David Morawetz. May 72, 37p

Although the Andean Group integration scheme, recently formed by Bolivia, Chile, Colombia, Ecuador and Peru, will not solve its members' economic problems, it has considerable potential for bringing improvement. The paper discusses an alternative to which integration should be compared, outlines some major benefits to be expected from integration, and some factors which place bounds on the Andean potential for success. It analyzes some key issues which, once decided, will determine the extent to which the potential is realized. These issues concern the common external tariff, trade liberation, exchange rate policies, allocation of new industry, foreign private investment, the Andean Development Corporation, and Venezuelan entry into the union. (Author modified abstract)

PB-219 762 PC\$3.00
Harvard Univ., Cambridge, Mass. Center for International Affairs.

THE SOCIAL RATE OF DISCOUNT, TARGETS AND INSTRUMENTS. (330.16-M831)
David Morawetz. Apr 72, 11p

Recent contributors to the literature on the social rate of discount seem to be converging to the view that the appropriate discount rate to be used in evaluating public projects lies between the marginal social productivity of private investment and the social rate of time preference. In this note the Tinbergen targets-instruments principle is invoked to argue that this conclusion is based on an unnecessarily restrictive formulation of the problem, and that the outline of a more fruitful approach leading to a different conclusion has already been presented by Maglin and Feldstein. (Author)

PB-219 766 PC\$5.25
Harvard Univ., Cambridge, Mass. Center for International Affairs.

MODEL-BASED CONSISTENCY CHECKS ON MEDIUM-TERM GROWTH PROSPECTS IN PERU. (PE-330.985-T243)
Lance Taylor. Feb 73, 63p

The paper reports on some very preliminary applications of neoclassical growth models to problems of forecasting the medium term development pattern of Peru. The emphasis is on exploring possible responses of the economy to a rate of growth of foreign exchange receipts substantially lower in the first half of the 1970's than has been observed in the past. It is concluded that if a policy of fairly steady devaluation (at a rate of about three percent per year) is pursued, historical growth rates may be maintained and some of the surplus manpower of the country absorbed. These results, along with the models and data on which they are based, are extremely preliminary, but deserve further elaboration.

331. LABOR, MANPOWER, UNEMPLOYMENT

PB-219 700 PC\$4.00
Williams Coll., Williamstown, Mass. Center for Development Economics.

WAGE SPILLOVER AND UNEMPLOYMENT IN A WAGE GAP ECONOMY: THE JAMAICAN CASE. (JM-331.2-T558)
Gene M. Tidrick. Jun 72, 40p

There are two distinct employment problems in most less developed countries. The first, and more familiar, problem is how to accelerate the rate of growth of employment in the high-wage, modern sector. The second problem which is frequently perceived incorrectly to be the mere converse of the first, is how to reduce the stock of unemployment. The paper analyzes the second problem with reference to Jamaica. It argues that the level of unemployment is largely a function of the wage structure. The wage gap between the high-wage modern sector and the rest of the economy is shown to be a cause of both employment problems -- slow employment growth and high unemployment. The wage gap itself is the result, in most instances, of misguided policies aimed at sharing with workers the high profits of extractive and import substitution industries. If less developed countries are to make headway in solving their employment problems, they must take policy measures such as higher taxes or lower tariffs to spread the benefits of rising incomes more widely.

PB-219 716 PC\$3.00
Harvard Univ., Cambridge, Mass. Center for International Affairs.

MEASURING THE EFFECTS OF THE MISALLOCATION OF LABOR. (CO-331.12-D732)
Christopher Dougherty, and Marcelo Selowsky. Mar 72, 17p

Different studies have suggested that losses due to the misallocation of resources are unlikely to be substantial, even in the presence of severe market distortions. Under alternative assumptions about the degree of substitution among different categories of labor the present study attempts to measure the welfare cost of the misallocation of labor in Colombia. The results suggest that this welfare cost is less than two percent of aggregate output. The insensitivity of the level of output to the allocation of labor implies that the static first order conditions are of little relevance; it would appear that dynamic considerations, particularly the effect of labor (in efficiency units) on the rate of growth of output could be far more important.

PB-219 722 PC\$3.50
Yale Univ., New Haven, Conn. Economic Growth Center.
UNEMPLOYMENT AS A SOCIAL-WELFARE PROBLEM IN URBAN ZAIRE. (CG-331.137-MI21)
James L. McCabe. Nov 72, 30p

The unemployment problem in Zaire, like that of so many African countries, is essentially urban. There is a labor shortage in agriculture and a high urban open unemployment rate. Zaire has 2 important characteristics: a form of non-wage employment, and individual sharing units which extend in size well beyond the family. The size distribution of total income for Kinshasa is compared with that of cash wage income and the economic role of women is discussed. It is shown that

households with high open unemployment rates tend to cluster with households with low open unemployment rates. (Author Modified Abstract)

PB-219 728 PC\$4.75,
Michigan State Univ., East Lansing. Dept. of Agricultural Economics.

RURAL EMPLOYMENT, MIGRATION AND ECONOMIC DEVELOPMENT: THEORETICAL ISSUES AND EMPIRICAL EVIDENCE FROM AFRICA. (AFR-331.763-B993)

Derek Byerlee, and Carl K. Eicher. Sep 72, 52p

The paper examines the employment problem in Africa with special emphasis on rural employment and migration within the context of overall economic development. It provides a framework for analyzing rural employment in development, uses the framework to analyze the empirical information from Africa and raises theoretical issues in analyzing rural employment and migration in economic development. (Author modified abstract)

PB-219 767 PC\$3.00
Harvard Univ., Cambridge, Mass. Center for International Affairs.

THE SHADOW WAGE RATE IN DEVELOPING COUNTRIES: LITTLE AND MIRPLEES FORMULATION RECONSIDERED. (631.29-W286)

Peter Warr. Feb 72, 15p

The report discussed the socially optimal shadow wage rate for use in planning and evaluating government investment projects when, as is generally the case in developing countries, industrial wage rates are several times greater than the marginal product of labor in agriculture. The paper derives a shadow wage from an explicit optimization model and shows that the Little-Mirrlees formula is based on very restrictive assumptions about the propensities to save of different social groups. (Author Modified Abstract)

PB-219 772 PC\$3.50/
Yale Univ., New Haven, Conn. Economic Growth Center.
RURAL-URBAN MIGRATION, URBAN UNEMPLOYMENT AND UNDEREMPLOYMENT, AND JOB RESEARCH ACTIVITY IN LDCS. (331.127-F461)
Gary S. Fields. Dec 72, 29p

A formal theoretical model is presented, with which the equilibrium allocation of the labor force between labor markets is analyzed. Following the model of Harris and Todaro, the focus is on the voluntary movement of workers between labor markets as the equilibrating force, instead of the more conventional mechanism of wage adjustment. Four additional factors are considered: a more generalized account of the process of search for urban jobs; favoring of educated workers over uneducated workers by employers in hiring; the possibility of unemployment in the so-called 'murky sector'; and recognition of labor turnover in a multiperiod framework. Results are compared with predictions by Harris and Todaro. Urban unemployment rates were found to be considerably lower than predicted by the Harris-Todaro model. The theory of quantity adjustment being the equilibrating mechanism in labor markets is considered. Results presented demonstrate that the resulting framework gives predictions that are closer to actual experience than the Harris-Todaro model.

332. FINANCIAL INSTITUTIONS

PB-219 684 PC\$3.00
Ohio State Univ., Columbus. Dept. of Agricultural Economics and Rural Sociology.

IS INEXPENSIVE CREDIT A BARGAIN FOR SMALL FARMERS: THE RECENT BRAZIL EXPERIENCE. (BR-332.7-1-A211A)

Dale W. Adams, Harlan Davis, and Lee Bettis. Jan 72, 16p

The authors discuss major credit distribution problems on the supply side of credit in Brazil as they affect the problem of extending credit to small farmers. They suggest that adjustments in current policies might substantially increase the flow of credit to small farmers through regular banking channels. Information from Brazil is used to illustrate the contention. The following topics are considered: background on agricultural credit in Brazil; interest rate policy; institutional agricultural credit; results from credit and interest rate policies; reasons for loan concentrations; conclusions; and policy recommendations. (Author Modified Abstract)

PB-219 692 PC\$3.50
Harvard Univ., Cambridge, Mass. Development Advisory Service.

CREDIT FOR SMALL FARMERS: INDONESIA, MALAYSIA, THAILAND. (ID-332.71-L849)

Millard Long. Jan 73, 28p

Privately administered credit programs for small farmers can be appraised at two levels: The first assesses differences between private and public sector administration of credit programs. The second examines the more fundamental issue of whether private or public credit programs are an efficient way of dealing with the problems of the small farmer. The report considers the costs and comparative efficiency of public and private credit programs for small farmers in three countries—Indonesia, Malaysia and Thailand, and considers the available evidence to determine which approach gives the more accurate description of conditions in Southeast Asia. (Author Modified Abstract)

PB-219 696 PC\$3.00
Ohio State Univ., Columbus. Dept. of Agricultural Economics and Rural Sociology.

CHANGES IN SMALL FARMER CREDIT USE IN SOUTHERN BRAZIL, 1965-69. (BR-332.71-A211)

Dale W. Adams, and Joseph L. Tommy. 11 Feb 72, 10p

The paper summarizes the results of a study in southern Brazil which was focused at determining the characteristics of farmers who received additional bank credit during the period 1965 to 1969. Information is also presented on changes in use of non-bank credit among farmers over the same period. Data were drawn from two sample surveys covering farm operation in 1965 and 1969 for 289 farms in southern Brazil. All of the units had 124 acres or less. Principle economic activities on the farms included various mixed enterprises of corn, beans, rice, wheat, hogs and dairy. Inducing banks to loan in a more socially efficient manner appears to be a major challenge. (Author Modified Abstract)

PB-219 776 PC\$3.75
 Harvard Univ., Cambridge, Mass. Center for International Affairs.
EFFECTIVE DEVALUATION AS AN EXPORT INCENTIVE IN LESS DEVELOPED COUNTRIES. (332.413-E14)
 Jonathan W. Eaton. Jul 72, 34p

The paper presents the results of regression analysis performed on time series of minor exports and real effective exchange rates to estimate export supply elasticities in seven less developed countries. It discusses the rather formidable econometric problems encountered in such analysis and how they may be dealt with. It also presents the results of the analysis itself from which three major conclusions are drawn. The significance of these results is noted for various policy issues such as the balance-of-payments, export promotion, protection, and the two-gap model. (Author Modified Abstract)

333. NATURAL RESOURCES

PB-219 777 PC\$3.75
 Harvard Univ., Cambridge, Mass. Center for International Affairs.
A SUBJECTIVE EQUILIBRIUM THEORY OF SHARE TENANCY. (333.53-W286)
 Peter Warr. Oct 72, 31p

An economic development report reviews the analytics of share tenancy for land reform and other aspects of agricultural policy in the developing nations. Section 1 discusses the comparative statics of resource allocation under share-cropping, fixed rent tenancy, and capitalist production using wage labor. The implications of production uncertainty are treated in section 2 and are related to the conclusions of the previous section. Production uncertainty is shown to modify the comparative static conclusions on resource allocation and to provide an explanation for the existence of share-cropping despite its alleged inefficiency. (Author)

338. PRODUCTION

PB-219 685 PC\$3.50
 Ohio State Univ., Columbus, Dept. of Agricultural Economics and Rural Sociology.
AN ANALYSIS OF SHIFTING RELATIVE PRICES AND MARKETING FACILITY INVESTMENTS IN THE CONTEXT OF TECHNOLOGICAL CHANGE IN THE DEVELOPING COUNTRIES. (338.13-J65)
 S. S. Johl. Oct 71, 27p

The author states that agricultural production growth of most of the developing countries in the last 3-4 years has very considerably decreased their dependence on imports, especially food grains. This shift from heavy dependence on imports to fast-increasing internal surpluses has created the need for new government regulations governing the control and operation of markets so that the domestic market becomes fully responsive to the production changes and at the same time keeps up the incentives for higher and better production. (Author)

PB-219 689 PC\$4.00
 Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Economics.

CAPITAL INTENSITY, ABSOLUTE SIZE AND GROWTH RATE OF THE SMALL INDUSTRIES SECTOR IN INDIA: A CRITIQUE OF OFFICIAL ESTIMATES. (IN-338.0954-V241)
 Jan H. van der Veen. Jul 72, 39p

The paper provides a criticism of official estimates of the capital intensity, absolute size, and growth rate of the small industries sector in India. In order to evaluate these estimates, it was necessary to examine the procedures adopted by the official agencies in collecting the data and to understand the assumptions made by those agencies in using the data upon which the estimates are based. (Author Modified Abstract)

PB-219 691 PC\$3.75/
 Williams Coll., Williamstown, Mass. Center for Development Economics.
TRADE AND EMPLOYMENT: INDUSTRIAL EXPORTS COMPARED. TO IMPORT SUBSTITUTION IN MEXICO. (MX-338.012-S539)
 John Sheahan. Dec 71, 35p

The study of Mexican trade patterns reported in the paper is an attempt to compare the actual consequences for employment of industrial exports and of substitution for industrial imports. Mexico is a semi-industrialized rather than an underdeveloped country, with a high rate of capital formation and slightly over half of its labor force in urban employment. But capital per worker in the industrial sector is only about a third as high as in the United States, which is Mexico's main export market and source of imports. A high proportion of its labor force is still caught in occupations of extremely low productivity and income. The number of unskilled workers in agriculture is rising at a rate of about 1.8 percent a year. If exports of labor intensive manufactures could be developed on a larger scale they could open up the country's development process to provide productive employment for many people who have so far been left out.

PB-219 697 PC\$5.00
 Williams Coll., Williamstown, Mass. Center for Development Economics.
SIZE OF FIRM AND EFFICIENCY IN COLOMBIAN MANUFACTURING. (CO-338.09861-T634)
 John E. Todd. Oct 71, 58p

One of the areas of controversy among policy makers in the less developed countries is whether large scale manufacturing enterprises are socially more efficient than small and medium size establishments. The purpose of this paper is to show that, in Colombian manufacturing, small and medium size establishments generate more output per unit of scarce resources than large establishments. A shift in the composition of manufacturing output by size of firm is apparently not precluded by serious sectoral or regional bottlenecks. (Author Modified Abstract)

PB-219 698 PC\$3.75
 Williams Coll., Williamstown, Mass. Center for Development Economics.
EMPLOYMENT, PRODUCTIVITY AND IMPORT SUBSTITUTION. (338.012-B913A)
 Henry J. Burton. Mar 72, 34p

The purpose of the paper is to examine the relationship between productivity growth and employment growth. This

examination has been done analytically and empirically. Some policy implications are discussed which are relevant to the employment problem and to the relationship between employment and productivity growth and the import substitution strategy of development. The general characteristics of import substitution have been detailed at length in preceding research memoranda in this series. Attention here has been concentrated on the implications of these characteristics for employment growth, and its relationship to productivity growth in countries pursuing such a strategy. (Author)

PB-219 705 PC\$4.25
Harvard Univ., Cambridge, Mass. Center for International Affairs.

SHORT-TERM POLICY IN OPEN DEVELOPING ECONOMIES: THE NARROW LIMITS OF THE POSSIBLE. (338.91-T243)

Lance Taylor. Jan 73, 41p

The paper develops a model to analyze short-term policy alternatives in semi-industrialized countries. The major points raised concern the elasticity of substitution in the traded goods sector, excess supply functions which have Walkasian stability, formally unstable economies, their balance of payments improvement may entail reductions in both real income and the labor share, and elasticities of excess supply functions with respect to the interest rate. (Author Modified Abstract)

PB-219 706 PC\$9.00
Iowa State Univ., Ames. Center for Agricultural and Rural Development.

GROWTH AND DEVELOPMENTAL EFFECTS OF FOOD SHIPMENTS UNDER PUBLIC LAW 480. (338.19-I64A)

Leo V. Mayer, and Earl O. Heady. Jul 72, 136p

The general indication of the study is that the world as a whole will not face widespread hunger if incomes increase slowly and populations grow relatively quickly. Only under high per capita income growth and an unlikely accompanying high population growth would there be a likelihood of worldwide excess demands by 1985, and only then in the absence of growth in land under cultivation and specialization in appropriate crops. It is noted that food aid can be utilized without adverse effects on the incentives of domestic producers in recipient countries under proper distributional methods. The issue of potential effects on third-country exporters is discussed and evaluated. (Author Modified Abstract)

PB-219 720 PC\$6.00
Iowa State Univ., Ames. Center for Agricultural and Rural Development.

UTILIZATION OF U.S. FARM SURPLUSES FOR WELFARE AND DEVELOPMENT PROGRAMS AT HOME AND ABROAD. (338.19-R727A)

Keith D. Rogers, Leo V. Mayer, and Earl O. Heady. Jun 72, 90p

The report examines the potential impact, both at home and abroad, of distributing surplus food commodities at concessional prices to provide direct benefits to low-income consumers in the short run, and to promote economic development and raise real income levels in the long run. Modifications currently under consideration for U. S. welfare programs

raise possibilities for using surplus food to finance work projects and to improve nutritional levels of low-income consumers in developed countries as well as developing countries. The basic economic considerations are examined. (Author Modified Abstract)

PB-219 725 PC\$4.25
Ohio State Univ., Columbus. Dept. of Agricultural Economics and Rural Sociology.

METHODOLOGY AND GENERAL DATA DESCRIPTION: FARM LEVEL CAPITAL FORMATION IN SAO PAULO, BRAZIL. (BR-338.1-W515)

Kelso L. Wessel, and William C. Nelson. Dec 71, 44p

The focus of the research paper is on the capital formation process on Brazilian farms, with special emphasis on the role of credit and technology in bringing about rapid changes in agricultural production and/or productivity. An agricultural survey was made of 383 farms in the state of Sao Paulo, Brazil, in 1970 in order to obtain the necessary farm level data. Several homogenous groups were identified which reflected farm characteristics of size, type, technology, tenure, market orientation, management level and mechanization. Analyses were made of farm organization, income, consumption, savings, investment and other distinguishing characteristics to show the production-income-growth process for each group. (Author Modified Abstract)

PB-219 736 PC\$3.50
Williams Coll., Williamstown, Mass. Center for Development Economics.

THE ELASTICITY OF SUBSTITUTION IN DEVELOPING COUNTRIES. (338.012-B913)

Henry J. Bruton. Apr 72, 30p

In recent years a number of efforts made to measure substitutability in various sectors of developing countries have been handicapped by lack of adequate data as well as by continuing conceptual and measurement difficulties. Enough results seem available, however, to merit a systematic review. It is the purpose of this report to present a series of new estimates as the result of this review. (Author Modified Abstract)

PB-219 737 PC\$3.75,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
MODELS OF ECONOMIC GROWTH AND LAND AUGMENTING TECHNOLOGICAL CHANGE IN FOODGRAIN PRODUCTION. (338.1731-M527A)

John W. Mellor. Dec 72, 33p

The author maintains in his paper that in low income countries the supply of labor or of labor services to both the agricultural or non-agricultural sectors is highly elastic with respect to the real wage rate, but that its mobilization requires an enlarged supply of wages goods. Economic growth is then perceived as a process of both productively employing more labor and of increasing the capital stock--the former achieved in part by allocating resources to producing wages goods, the latter by resource allocation to capital goods. The paper reviews various types of growth and dualistic models from the point of view of their relevance to technological change in agriculture; states and theoretical conditions of a major contribution of agriculture to economic growth and suggests lines along which

further development of models of economic growth might usefully proceed. (Author)

PB-219 744 PC\$9.00
Yale Univ., New Haven, Conn. Economic Growth Center.
THE RELEVANCE AND PROSPECTS OF SMALL SCALE INDUSTRY IN COLOMBIA. (CO-338.64-B534)
Albert Berry. 25 Apr 72, 139p

There is a shortage of documented information on Colombia's small scale industry. An approach utilized here focuses on, (1) the historical development (with emphasis on the last 20 years) of small scale production, (2) management performance in terms of the actual and potential efficiency with which converts resources into output, (3) the growth tendencies of plants and firms over a period of time according to their sizes, (4) the relative factor productivity compared to larger industry, and (5) possible strategies for the success of this form of production. The data indicate that small and medium plants are on somewhat higher output/capital ratios than larger ones. (Author Modified Abstract)

PB-219 750 PC-GPO
Economic Research Service, Washington, D.C.
CHANGES IN AGRICULTURAL PRODUCTION IN BRAZIL, 1947-65. (BR-338.1-H568)
Louis F. Herrmann. Jun 72, 98p
Paper copy available from GPO \$1.00 as A93.27:79.

Brazil increased agricultural output about 4.5 percent a year from 1947 to 1965, mainly by expanding the cultivated area, but it has the potential to double the area cultivated. Agricultural production grew more rapidly than population in the 1950's, but crop yields remained low and traditional practices were followed with low levels of fertilization. Human labor is the only source of power on three-fourths of the farms. Agricultural output increased rapidly enough to meet rising demands for farm products resulting from population and income growth and to permit some exports. Agriculture has remained the principal economic activity and source of foreign exchange earnings in Brazil with coffee being the major export. The agricultural labor force rose about 2 percent a year, and output per farm worker rose almost as fast. (Author Modified Abstract)

PB-219 757 PC\$4.75
Michigan State Univ., East Lansing. Dept. of Agricultural Economics.
ECONOMIC ANALYSIS OF AGRICULTURAL PRODUCTION AND LABOUR UTILIZATION AMONG THE HAUSA IN THE NORTH OF NIGERIA. (AFR-338.1-N842)
D. W. Norman. Jan 73, 53p

A case study examines the farming practices and production of Moslem farmers in the Zaria area of Northern Nigeria. Three Moslem villages were selected; Hanwa, which borders on Zaria itself, Doka, and Dan Mahawayi. The results of the study were derived from 42 farming families in Dan Mahawayi and 62 families in the other 2 villages. Data were secured on land and labor; seasonality of farming and off-farm occupations; farm capital goods and cash expenses; acres, yields and location of food and cash crops; composition of farm and family income; and comparative statistics for large and small farms in the three villages. (Author modified abstract)

PB-219 773 PC\$3.00
Harvard Univ., Cambridge Mass. Center for International Affairs.
DOMESTIC RESOURCE COSTS AND EFFECTIVE PROTECTION ONCE AGAIN. (338.013-B171)
Bela Balassa, and Daniel M. Schydrowski. Nov 71, 17p

The note examines some questions relating to the use of the domestic resource cost (DRC) and the effective rate of protection (ERP) measures for project selection and for evaluating the cost of protection (promotion). It is shown that while DRC and ERP give the same results under optimal policies, the choice between them becomes relevant in a nonoptimal situation. Moreover, if nonoptimal policies can be expected to persist during the life of the project, one needs to utilize shadow prices reflecting these policies in preference to first-best shadow prices. The paper finally considers the applicability of ERP and DRC under alternative assumptions. (Author)

339. DISTRIBUTION

PB-219 719 PC\$6.00
Iowa State Univ., Ames. Center for Agricultural and Rural Development.
IMPACT OF P. L. 480 AID ON INDIA'S MONEY SUPPLY AND EXTERNAL DEBT-SERVICE OBLIGATIONS: A LOOK AHEAD. (IN-339.26-I64)
Uma K. Srivastava. Dec 72, 83p

The primary objective of the study was to examine the issue of additional monetary expansion caused by P.L. 480 counterpart fund, including generation and use in a long-term perspective, and concentrating on the time when imports come to an end. To orient this analysis, the expansionary impact on money supply caused by P.L. 480 counterpart funds during the years when food imports were continuing has also been examined. The author considers the problems of debt management and the threat posed by increased debt and interest payments to continuing economic development in India. The analysis should be useful to groups associated with food aid programs and their contribution to economic development. (Author modified abstract)

PB-219 765 PC\$4.25
Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Economics.
ANALYSIS OF CONSUMPTION EXPENDITURE PATTERNS IN INDIA. (IN-339.4-D441)
B. M. Desai. Aug 72, 41p

The study examines the differences in the marginal rate of consumption and the elasticity, both with respect to income between income groups and corresponding land holding groups in rural India. This objective is analyzed by comparing : two data sources, the differences in rural and urban consumption functions for food grains, milk and milk products, and clothing; and consumption functions for 18 commodity categories. (Author Modified Abstract)

370. EDUCATION

PB-219 748
Yale Univ., New Haven, Conn. Economic Growth Center.

SOME EVIDENCE ON EDUCATIONAL RELATIONSHIPS IN CHILE. (CI-370.0983-G618)

Marsha Goldfarb. Nov 72, 60p

Availability: Available in microfiche only.

The report presents the results of two empirical investigations involving education in Chile. The first study estimates the importance of school and non-school variables to dropout rate differences among schools. The second study evaluates the impact on worker earnings of formal education, on the job training, other personal characteristics of the worker, and characteristics of the firm at which the worker is employed. The workers studied reside in Santiago and are employed in manufacturing.

PB-219 770

PC\$4.00

Harvard Univ., Cambridge, Mass. Center for International Affairs.

A DIMENSION OF THE TECHNOLOGY OF EDUCATION: RETENTION OF COGNITIVE SKILLS. (TS-370.15-S592)

John Simmons. Apr 72, 40p

To what extent do individuals retain or improve cognitive skills after they leave school. This is one dimension in the depreciation of human capital that has received little attention in the literature. Using data from a survey of urban young men from Tunisia, it is argued that the loss of cognitive abilities is so serious that about half the primary school graduates can neither read nor calculate when tested after several years out of school. It is also argued that while the length of time they are out of school is significantly associated with loss of cognitive ability, it is not a significant predictor of their ability to retain what they learned. Rather, a number of background factors mainly relating to the home environment are significant in explaining the variance in retention of knowledge.

380. COMMERCE, COMMUNICATIONS, TRANSPORTATION

PB-211 488

PC\$3.00

Harvard Univ., Cambridge, Mass. Center for International Affairs.

COMMON EXTERNAL TARIFF FOR THE ANDEAN GROUP. (LAT-382.7-M831)

David Morawetz. Feb 72, 58p

The Cartagena Agreement signed by members of the Andean Group (Bolivia, Chile, Colombia, Ecuador, and Peru) calls for member countries to agree by December 1975 on a common external tariff which they are to implement gradually from 1977 to 1980. This paper first discusses some historical and theoretical considerations underlying the design of a common external tariff structure, and then sets out two proposals for the common external tariff of the Andean Group. The proposed tariff structures are compared with prior Andean National Tariff systems and the Andean Common Minimum External Tariff, and some implications are discussed for policy on export subsidies, exchange rates, and non-tariff restrictions. (Author)

PB-219 743

PC\$4.25

Williams Coll., Williamstown, Mass. Center for Development Economics.

IMPORT SUBSTITUTION AND ECONOMIC POLICY: A SECOND REVIEW. (382.5-5539)

John Sheahan. Aug 72, 41p

Ways are examined in which import substitution for domestic production may conflict with, or be guided by considerations of international specialization and efficiency. Employment, wages, productivity and capital utilization issues are reviewed. Domestic income distribution questions and their relationships to alternative methods of import substitution are considered. Import substitution strategies are discussed with regard to neglect of opportunities for export expansion. Studies which bear directly on the import substitution-distribution of income relationship indicate that protection for substitution are likely to make the distribution of income worse, as it weakens efficiency. (Author Modified Abstract)

PB-219 756

PC\$4.00

Harvard Univ., Cambridge, Mass. Center for International Affairs.

PRACTICAL GENERAL EQUILIBRIUM ESTIMATION OF RESOURCE PULLS UNDER TRADE LIBERALIZATION. (382.3-L243)

Lance Taylor, and Stephen L. Black. Feb 72, 37p

The paper discusses the application of a model similar to the one developed in the problem of determining general equilibrium responses of the economy to changes in commercial policy. This method amounts essentially to specifying a log-linear approximation to the general equilibrium solution for the economy, and solving the resulting linear equations for changes in endogenous variables as functions of exogenous variable changes. A 35-sector model of the Chilean economy with labor as the only variable factor is presented. (Author modified abstract)

610. MEDICAL SCIENCES AND PUBLIC HEALTH

PB-219 703

PC\$3.00

Johns Hopkins Univ., Baltimore, Md. Dept. of Pediatrics.

REPORT ON WHEAT-OR OAT-SOY MIXTURES. (612-39-8-G739B)

George G. Graham. Dec 71, 16p

Much of the effort directed at improving the diets of needy people is centered on the improvement of the protein content and quality of cereals by the addition of protein-rich foods, protein concentrates, or essential amino acids. The combination of wheat and soy flours makes much sense as the second should correct the lysine deficiency of the first. Such a mixture is now being made available by our government in its international programs as WSB, or wheat-soy-blend. The study reports its evaluation in the diet of convalescent malnourished and normal infants and children. Included are results obtained with another wheat-soy blend and with an oat-soy blend. (Author Modified Abstract)

PB-219 732

PC\$3.50

Johns Hopkins Univ., Baltimore, Md. Dept. of Pediatrics.

LACTOSE-FREE, MCT-CONTAINING FORMULAS IN SEVERE MALNUTRITION. (612.3-G739C)

George G. Graham. Feb 73, 26p

Transient lactose deficiency is a common complication of severe diarrheal disease in infancy. In more prolonged and complicated cases other disaccharidases are also affected, and in extreme circumstances, secondary glucose and fructose malabsorption may further complicate dietary management. The availability of medium chain triglyceride (MCT) - containing formulas, without lactose, or with no disaccharides at all, broadens the number of choices available and should increase the percentage of complex cases that can be managed successfully by the oral route. The present report covers an evaluation of two such formulas in the management of complex nutritional problems. Lactose-free, MCT-containing formulas were found to be of great value in the dietary management of 18 severely malnourished infants and small children. Replacement of disaccharides with glucose may have been of further value in the treatment of severe diarrheal disease but this was not proven by these studies.

PB-219 763

PC\$3.00

Johns Hopkins Univ., Baltimore, Md.

GROWTH OF CHILDREN FROM EXTREMELY POOR FAMILIES. (PE-612.65-G739)

George G. Graham. Feb 73, 19p

The purpose of this study is to characterize the growth pattern of a group of children belonging to 115 very poor, primarily mestizo Peruvian families living in the peripheral slums of Lima, all of whom had at least one child who had been hospitalized for severe malnutrition. For both sexes mean height and weight follow fairly closely the 3rd percentile line of a U. S. growth standard after the second semester of life, the one just below, the other just above. Weight to height relationship is increased and indicative of overweight, consistent with the physical appearance. Other studies have shown that an improved environment and nutrition can produce dramatic linear growth; therefore the weight/height ratio observed cannot be considered indicative of adequate nutrition. Mean head circumference runs close to a line 2 S. D. below the mean of an international standard up to age 18 months, slowly increasing toward the mean thereafter. Growth of head is seemingly better preserved than linear growth in this population.

PB-219 699

PC\$3.25

Johns Hopkins Univ., Baltimore, Md. Dept. of Pediatrics.

LACTOSE INTOLERANCE IN PERUVIAN CHILDREN: EFFECT OF AGE AND EARLY NUTRITION. (PE-613.28-G739)

George G. Graham. Apr 72, 22p

Low levels of intestinal lactase activity are found in many otherwise healthy adults and children. Increasing consideration is being given to this problem in children and its implications for continued milk consumption. It has been suggested that continued milk intake is responsible for persistent enzyme activity. It is also possible that nutritional insults in early childhood may result in an inability to hydrolyze lactose. The author undertook a study of lactose intolerance in Peru to determine: (1) the prevalence of lactose malabsorption in Mestizo children; (2) the effect of a previous episode of marasmus or kwashiorkor; (3) the effect of being reared in a controlled environment, with an adequate milk-based diet; and (4) the influence of breastfeeding and continued milk consumption.

PB-219 704

PC\$3.25

Johns Hopkins Univ., Baltimore, Md. Dept. of Pediatrics.

NUTRITIONAL IMPLICATIONS OF LOW INTESTINAL LACTASE ACTIVITY IN CHILDREN. (613.28-G739)

George G. Graham. Feb 73, 23p

Nutritional and metabolic consequences of lactose ingestion by children with presumed low intestinal lactase activity have been investigated. Consumption of moderate amounts of lactose results initially in a notable increase in stool weight, water, dry weight, and electrolyte content. These manifestations can easily result in rejection of lactose-containing foods by susceptible populations, without waiting for the adaptation which probably occurs and which was already evident by the end of the 9-day period of study. The initial increase in stool nitrogen which was observed was probably not of major consequence but a persistent increase in urine nitrogen and phosphate was suggestive of decreased protein synthesis, possibly the result of calorie inadequacy. Stool fat and calcium were little affected but there was an unexplained increase in urine calcium and a decrease in serum alkaline phosphatase. The nature of the 'adaptation' or 'acquired tolerance' to unabsorbed lactose requires further investigation.

PB-219 717

PC\$3.00

New Mexico Univ., Albuquerque. Dept. of Biology.

MALARIA IMMUNITY AND VACCINATION. (614.532-S587A)

Paul H. Silverman. Dec 72, 19p

The ultimate objectives of the work are to develop methods for the large-scale production of malaria antigens, and to ascertain efficient means of immunizing mammals, utilizing rodent and primate testing systems. The current effort is based on a previous demonstration that it is possible to induce resistance in mammals (rodents and primates) to prevent malaria infection and also to enhance the suppression of malaria in an infected animal. The report summarizes efforts conducted in conventional and aseptic mosquito rearing that contribute to research involving primary tissue cell cultures. In addition, various mammalian cells which have already been adapted to in vitro culture procedures are being tested for their ability to host the various intracellular stages of malaria. Cell lines being established for additional experimentation are bone marrow, liver, spleen and kidney of hamster and mouse origin. Also in hand are human lung (WA-38) and Fat-Head Minnow cells. Both mouse-sporozoite and primate malaria systems used in antigen testing are described in the report.

PB-219 718

PC\$4.00

Center for Disease Control, Atlanta, Ga.

THAILAND MALARIA OPERATIONAL RESEARCH UNIT. (TH-614.532-C397A)

William Chin. 30 Jun 72, 38p

Drug studies began initially with surveys for chloroquine-resistant falciparum malaria in six different areas of Thailand which showed resistance rates ranging from 69-94%. To develop an alternative treatment regimen against these strains, the evaluation of sulfalene-trimethoprim and sulphamethoxine-pyrimethamine was accomplished which showed no significant difference between the two treatment regimens. Subsequent studies of sulphor-methoxine-pyrimethamine showed that cure rate were at least 90% and that primaquine was

required to counter the demonstrated lack of sporontocidal effect of the combination. Based on these results, the MNEP adopted the use of sulphormethoxine-pyrimethamine as the standard treatment for falciparum malaria in Thailand. The evaluation of alternative treatment regimens against falciparum strains 'resistant' to sulphormethoxine-pyrimethamine based on quinine alone or in combination with other drugs was also accomplished. The results showed possible quinine resistance (to seven days treatment) and suggested that quinine in combination with tetracycline may provide additive effect.

PB-219 726

PC\$8.00

Center for Disease Control, Atlanta, Ga.

CENTRAL AMERICA MALARIA RESEARCH STATION. (LAT-614.4323-D419A)

Geoffrey M. Jeffrey. 30 Jun 72, 120p

Central America was selected as the site for a research station because the malaria programs of the region had been facing numerous problems. Among the first work initiated by CAMRS were intensive studies on the ecology of the malaria vectors. The information from these continuing studies on activity patterns, breeding cycles and habitats, and vector associations with man has guided the selection and timing of anti-mosquito activities including dry-season larviciding of river habitats, water-management practices in coastal estuaries, exterior spraying of houses, ULV spraying, and release of sterile male mosquitoes. The results of a pyrimethamine-primaquine mass distribution field trial enabled CAMRS to recommend against an expensive change-over of drugs and, in addition, yielded information on the reasons for the low acceptance in mass drug distribution programs.

PB-219 761

PC\$3.00

Public Health Service, Savannah, Ga.

LETHAL EFFECTS OF AQUEOUS FORMULATIONS CONTAINING FATTY AMINES OR ACIDS AGAINST EGGS AND LARVAE OF AEDES AEGYPTI. (614.4323-C641)

Richard E. Cline. Feb 72, 6p

Various aqueous ovicidal formulations, some of which pose minimum hazards for higher organisms, are described for use against *Aedes aegypti* (L.). These ovicides appear to attack mainly layers of the eggshell which resist water permeability. Humidity effects were studied before and after treatment. Basic and acidic formulations containing both nonpolar and polar compounds were found effective against either dry or moist eggs exposed to ambient conditions after treatment. The basic mixture contained a nonpolar long-chain aliphatic amine such as octylamine emulsified in an aqueous solution of a polar compound such as ethanolamine or urea, and the acidic mixture contained a nonpolar fatty acid such as octanoic acid in aqueous polar mercapto acid. Nonpolar compounds alone in water were ovicidal under special conditions. An emulsion of fatty acid in water was effective against eggs exposed to high humidity before or after treatment, and aqueous fatty amines were ovicidal for eggs exposed to high humidity after treatment. Fatty amines, ranging widely in chain length and polarity, were evaluated against both larvae and eggs. Relative larvicidal activities correlated roughly with ovicidal activities.

PB-219 764

PC\$7.50

Center for Disease Control, Atlanta, Ga.

TECHNICAL DEVELOPMENT LABORATORY. (614.4323-D419A)

Herbert F. Schoof. Jun 72, 110p

Studies have been oriented toward problems encountered in the many national malaria eradication programs. The findings on methods, materials and procedures have enabled the programs to improve the efficiency and economy of their operations. Results of some studies such as those dealing with specifications for an testing of pesticides, spray equipment, and pesticide containers, have benefited all those purchasing and using these items. Reductions in cost have come both through lower initial prices and through more uniform and longer lasting products. Likewise, research on new insecticide formulations, improved insecticide delivery systems, biologic control methods, and vector dynamics have benefited the world-wide effort in general. In addition, specific requests from developing countries for assistance relating to mosquito resistance, chemical testing, mosquito rearing, equipment testing, and local insecticide formulation procedures have been answered with solutions to immediate problems and frequently have led to training nationals to deal with similar problems in the future.

PB-219 771

PC\$5.50

Center for Disease Control, Atlanta, Ga.

SEROLOGIC DIAGNOSIS OF MALARIA. (614.532-C397)

Dec 72, 67p

Microscopists in malaria programs examine millions of blood slides each year. In areas with a low incidence of infection, few positive blood films are found, and more sensitive epidemiologic tools are needed. The main objective of the project was to develop simple, rapid, accurate methods for the serologic diagnosis of malaria for use in malaria programs. Diagnostic techniques based on malaria serology were known in principle, but were not developed for field use to meet the large scale case finding and investigational needs of malaria programs. The use of the indirect hemagglutination (IHA), indirect fluorescent antibody (IFA), and complement fixation (CF) tests and other serologic techniques had to be examined. Another objective was to produce antigens from monkey and human malaras and to evaluate the sensitivity and specificity of such antigens for the diagnosis of human malaria. The third objective was to determine the operational use of serologic techniques for epidemiologic and diagnostic purposes.

620. ENGINEERING

PB-208 550

PC\$4.50

National Academy of Sciences, Washington, D.C.

SOLAR ENERGY IN DEVELOPING COUNTRIES: PERSPECTIVES AND PROSPECTS. (621.47-N277)

Mar 72, 60p

This is a report of an ad hoc Advisory Panel, made up of specialists from the United States and abroad, to: (1) Assess the state of the art in utilizing solar energy for developing countries and review current practical applications; (2) identify promising areas for research and development; and (3) examine the desirability of establishing an international solar energy institute in North Africa, to carry out solar energy research and development.

PB-219 745 PC\$8.50
Utah State Univ., Logan. Dept. of Agriculture and Irrigation Engineering.
TRICKLE IRRIGATION SALINITY PATTERNS AS INFLUENCED BY IRRIGATION LEVELS AND APPLICATION RATES. (627.52-T878)
Philip David Tscheschke. 1973, 130p

Experimentation using cherry tomatoes was conducted to determine the effects of different irrigation treatments on the distribution of salts and water within the soil profile under trickle irrigation. The four different treatments were: alternate day irrigation 13% under, equal to, and 20% over the evapotranspiration and daily irrigation equal to evapotranspiration. The tomatoes were planted in eight lysimeters thus providing one replication of each irrigation treatment used. Two-dimensional contour patterns are reported for both the saturation extract conductivity and soil water potential of the soil profiles between two lines of emitters. Differences between irrigation treatments and recommendations are provided concerning the application of the results to the management of trickle irrigation systems. (Author)

PB-219 754 PC\$4.74
Colorado State Univ., Fort Collins. Engineering Research Center.
STEADY AND UNSTEADY FLOW OF FRESH WATER IN SALINE AQUIFIERS. (627.52-MI77)
David B. McWhorter. Jun 72, 55p

Problems of flow involving fresh water overlying saline water in aquifers and methods for their analysis are reviewed. Equations amenable to mathematical solution generally involve the idealization of treating the fresh water as a distinct zone separated from the underlying saline water by a sharp interface. The criterion for interface stability is derived in this study and its practical significance is described. A new solution describing up-coning of saline water below horizontal tile drains is derived and used to calculate approximate optimum depth of drain placement. A procedure for estimating performance of collecting wells is outlined. (Author Modified Abstract)

PB-219 774 PC\$9.25
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
PLANNING SMALL WATER SUPPLIES IN DEVELOPING COUNTRIES. (628.72-L384)
Donald T. L'auria. 1972, 141p

The research included two principal objectives: (1) develop a theoretical planning model for deciding water supply timing and scale in small communities of developing countries; (2) initiate field studies to obtain data on the parameters of the model to make it operational. The work of model development had to focus on several communities instead of only one. Additionally, time in the model had to be made discrete because budgets are imposed at fixed points in time. Finally, the model had to include the considerations of Manne's model pertinent to developing countries: economies of scale, water supply benefits, increasing demand, the discount rate, etc. While the first research objective is theoretical, the second is primarily applied. It was proposed to obtain at least preliminary information on water demand patterns in small communities, costs of water system construction, the economies of scale of water

systems abroad, an by imputing, the benefits of publicly supplied water. All of the field data were obtained from Central America. (Author)

630. AGRICULTURE (GENERAL)

PB-212 187 PC\$6.00
Michigan State Univ., East Lansing.
A GENERALIZED SIMULATION APPROACH TO AGRICULTURAL SECTOR ANALYSIS, WITH SPECIAL REFERENCE TO NIGERIA. (NI-630.9669-M275)
Thomas J. Manetsch, Marvin L. Hayenga, Albert N. Halter, Tom W. Carroll, and Michael H. Abkin. 30 Nov 71, 378p

Because of the difficulties and uncertainties involved in solving economic development problems, researchers have turned to system simulation as a possible means of providing decision makers with information about the likely consequences of alternative resource allocations. A simulation study provides a group of time histories, each representing the outputs of a particular set of assumptions, exogenous variables, and policies. This report describes efforts to develop a general simulation approach to studying agricultural development. The requirements for practical implementation of this kind of model in developing countries are discussed.

PB-219 693 PC\$4.50
Minnesota Univ., St. Paul. Dept. of Agricultural and Applied Economics.
INDUCED INNOVATION: A CRITICAL REVIEW OF THE THEORY AND CONCLUSIONS FROM NEW EVIDENCE. (630-B614)
Hans P. Binswanger. Dec 72, 46p

Theoretical models of induced innovation and their weaknesses are discussed in the first part and the second section is devoted to a review of the empirical evidence now available. The basic idea of the induced innovation hypothesis is that biases are not determined outside the economic system, but depend on the conditions prevailing within each economy. As an example, a comparison is made between agricultural development in the U.S. and Japan. The results indicate that the biases are endogenous to some extent. (Author Modified Abstract)

PB-219 701 PC\$4.25
Minnesota Univ., St. Paul. Dept. of Agricultural and Applied Economics.
THE MEASUREMENT OF BIASED TECHNICAL CHANGE IN THE MANY FACTORS CASE: U.S. AND JAPANESE AGRICULTURE. (JA-630.952-B614)
Hans P. Binswanger. Dec 72, 44p

A way to measure factor saving biases of technical change or of efficiency gains with more than two factors of production is provided. The methodology is applied to the agricultural sectors of the U.S. (1912-1968) and Japan (1893-1962). The purpose of measuring biases in the 2 countries is to test the induced innovation hypothesis at a very basic level. Highly sophisticated statistical methods are used, and mathematical models are set up to show the proportionate values of the various factors in the agricultural economic development of the

U.S. and Japan in the indicated years. (Author Modified Abstract)

PB-219 731 PC\$12.50
Michigan State Univ., East Lansing. Dept. of Agricultural Economics.

KOREAN AGRICULTURAL SECTOR ANALYSIS AND RECOMMENDED DEVELOPMENT STRATEGIES, 1971-1985: KOREAN AGRICULTURAL SECTOR STUDY TEAM 1972. (KS-630.95195-M624)

George E. Rossmiller, Tom W. Carroll, Sang Gee Kim, Young Sik Kim, and Thomas J. Manetsch. Jan 73, 210p

A 15-year planning horizon was used for projecting the consequences of following three alternative policy strategies for agricultural development. Alternative I was based on the Third Five-Year Plan for 1972-76. Alternative II was based on improved allocation of resources among programs, coupled with a higher rice price policy. Alternative III was based on an allocation of resources among programs consistent with a free market policy regarding the price of domestic and imported food grains. Examination of the consequences of the three alternatives led to the development of a fourth strategy for Korean agricultural development. (Author Modified Abstract)

PB-219 738 PC\$4.00
Kansas State Univ., Manhattan. Food and Feed Grain Inst.
AN EVALUATION OF INDECA'S (NATIONAL INSTITUTE OF AGRICULTURAL COMMERCIALIZATION) ROLE IN THE LOAN PAPER COMPLIANCE AND ORGANIZATIONAL EFFORTS OF THE GUATEMALA RURAL DEVELOPMENT PROGRAM. (GT-630.97287-L5534)
James W. Lemley. 25 Feb 72, 37p

The report deals primarily with the recently formed organization known as INDECA, the National Institute of Agricultural Commercialization. This organization's obligations cover price stabilization, operation of public grain warehouse facilities, application of the National Warehouse Law, and quality control and development of markets for fruit, vegetables, flowers, and other products manufactured in the rural area such as weaving, ceramics and silver. (Author modified abstract)

PB-219 751 PC\$19.50
Agency for International Development, Washington, D.C.
EVALUATION OF PERUVIAN AGRICULTURE RELATIVE TO USAID ASSISTANCE. VOLUMES I AND II. (PE-630.98-5-A265)
Jun 71, 347p

The purpose of this inquiry is to evaluate the Peruvian agricultural sector plan in order to identify areas where the technical or financial resources at AID's disposal could be most effectively brought to bear in support of the policies already established. In this undertaking the primary requirement is isolation of those elements which are the primary or sole responsibility of the government and at the same time essential to the success of any attempt by a foreign or international agency to contribute to the development process. The study provides an indication of the historic performance of Peruvian agriculture, including land area and use and land potentials, and human and technical resources requirements for improved production and marketing. (Author)

PB-219 778 PC\$8.25
Economic Research Service, Washington, D.C.
AGRICULTURAL DEVELOPMENT AND FARM EMPLOYMENT IN INDIA. (IN-630.954-S798)
William J. Staub. Jan 73, 122p

The 'green-revolution' has come to Asia, but Indian workers have nothing to fear from technology. This study finds increased use of modern purchased inputs generates an increase in the amount of labor employed per farm. The various inputs investigated are: (1) farm size, (2) irrigation expenses, (3) investment in farm machinery, (4) bullock labor, (5) expenses for seed and fertilizer, (6) percentage of high-yield varieties used, (7) price of the dependent variable, and (8) the amount of human labor employed other than that included in the dependent variables. These factors were applied to Ferozepur and Thanjavur in the States of Punjab and Tamil Nadu, respectively, because of their similarity to other regions in India. (Author modified abstract)

631. FARMING

PB-212 974
National Academy of Sciences, Washington, D.C.
SOILS OF THE HUMID TROPICS. (631.4072-N277)
Jun 72, 229p
Paper copy available from the National Academy of Sciences, Printing and Publishing Office, 2101 Constitution Ave., N.W., Washington, D.C. 20418. PC\$7.95.

Throughout the world there are approximately 1.6 billion hectares of potentially arable land that is not now under cultivation. Half of this uncultivated land lies in the tropics where climatic and soil conditions offer a high potential for crop production. If only 2 percent of this land could be cultivated under modern technological principles, enough food would be produced to feed the current population of Latin America. A committee of soil scientists under the auspices of the Agricultural Board of the National Research Council has prepared *Soils of the Humid Tropics*, a report that identifies research priorities and offers recommendations for better use of this agricultural resource. (Author)

PB-213 787 PC\$3.00
Massachusetts Inst. of Tech., Cambridge. Dept. of Nutrition and Food Science.
EXTENDING PROTEIN CONCENTRATES FOR CHILD FEEDING BY ADDITION OF INEXPENSIVE SIMPLE NITROGEN SOURCES. (631.28-S434A)
Nevin S. Scrimshaw. Oct 71, 63p

A series of studies has been undertaken to determine the extent to which the concentration of essential amino acids in dried milk can be extended by the addition of non-specific nitrogen without influencing the nutritional value of the protein. The results of the studies, which were conducted in children and young men, are summarized in this report. The non-specific nitrogen source used was a mixture of glycine and diammonium citrate. The results support the conclusion that at any time that it is necessary to extend the 'protein' content of milk supplies for the supplementary feeding of population groups, inexpensive non-specific nitrogen sources may be used to an extent of at least 10% without impairing the ability of the milk to meet any normal protein needs.

PB-219 683 PC\$12.75
 North Carolina State Univ., Raleigh. Dept. of Economics.
A GENERALIZED CROP-FERTILIZER PRODUCTION FUNCTION. (631.88-R988)
 James Garrett Ryan. 1972, 211p

The problem examined in this study is the derivation of a generalized crop-fertilizer production function describing the response relation between measured soil characteristics, applied nutrients, weather and crop yield. It is hypothesized the function can be used to generate specific fertilizer recommendations to farmers based on soil analysis. The data come from potato-fertilizer experiments conducted on 65 farm locations over a seven year period in the Sierra Region of Peru. A quadratic model was chosen as the most appropriate form to describe the response relationships in these data. (Author Modified Abstract)

PB-219 690 PC\$3.75
 Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
ORGANIC PHOSPHORUS IN SOILS WITH SPECIAL INTEREST IN SOILS OF THE TROPICS. 631.4-R645
 K. J. Roberts, and R. M. Weaver. Jan 73, 34p

It is the purpose of this study to review and summarize the existing knowledge and literature on organic phosphorus in highly weathered soils of the tropics. This review includes many references which are concerned primarily with organic phosphorus as present in soils of temperate regions. This is included to serve as a starting point for investigations in tropical areas. The three major topics covered are: identification and determination of specific forms of organic phosphorus; mineralization of organic phosphorus; and determination of total organic phosphorus. Less attention is given to microbiological aspects of the problem. Specifically, the author discusses and reviews the following topics: inositol phosphates; phospholipids; nucleic acids; correlation with organic nitrogen and carbon; effects of cultivation and presence of plants; effects of soil organic phosphorus-clay mineral interactions; extraction methods; ignition methods and comparative studies of extraction versus ignition methods. (Author)

PB-219 694 PC\$3.50
 Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
CHEMICAL AND CLAY MINERAL PROPERTIES OF A HIGHLY WEATHERED SOIL FROM THE COLOMBIAN LLANOS ORIENTALES. R (CO-631-42-W363)
 R. M. Weaver. Oct 72, 29p

The author presents the results of quantitative clay mineralogical investigations on a soil from the Llanos Orientales (Eastern Savannas) region of Columbia, South America and discusses some possible agronomic effects of Al-chlorite presence in highly weathered soils in the humid tropics. The soils of this region are largely acid, highly leached and weathered. To Columbia, this region represents an important area for future agricultural development. Detailed knowledge of the chemical and mineralogical composition of these soils is needed to facilitate this development. The results of this study is of importance not only to Columbia, but may also be of value to other countries in humid tropical regions that have large acreages of highly leached and weathered soils. The author provides detailed analyses of the following topics: soil chemical analyses; particle size distribution; chemical values used in mineralogical allocation and the mineralogical composition of the clay size fraction. (Author)

PB-219 695 PC\$3.50
 Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
NITROGEN FERTILIZATION IN THE HUMID TROPICS. (631.8-F793)
 Richard H. Fox. Nov 72, 27p

In the humid tropics, as in temperate areas, sustained high production of nonleguminous crops can be accomplished only by the addition of N to the soil. Two years ago, field experiments were started in Puerto Rico to determine the most efficient means of supplying N fertilizer to non-leguminous crops. The author discusses the following topics in this research study: the need for and use of N fertilizers; sources of fertilizer N; placement and time of application of fertilizer N; fertilizer N recovery; N-losses; NO₃ retention; soil test methods; fertility maintenance; nitrogen fertilization experiments in Puerto Rico; and conclusions. The most salient findings of the N fertilization experiments with corn and sorghum are given. (Author Modified Abstract)

PB-219 702 PC\$3.25
 International Rice Research Inst., Los Banos, Laguna (Philippines). Agricultural Engineering Dept.
DEVELOPMENT OF AGRICULTURAL MECHANIZATION TECHNOLOGIES AT THE INTERNATIONAL RICE RESEARCH INSTITUTE. (FEA-631.3-K45)
 Amir U. Khan, and Bart Duff. Jan 73, 25p

The Institute recognizes the urgent need for suitable farm machines for tropical agriculture and the catalytic role that machinery design and development activities can play in the establishment of an indigenous farm equipment manufacturing industry in the South and South-East Asian region. The IRRI program of machinery development is therefore sharply focused towards providing designs of agricultural machines for the production and processing of rice with two major objectives in mind. One, the machines must meet the requirements of the 2-to 10-hectare farmers who can neither afford to use imported mechanization technology nor work efficiently with traditional methods. Two, the machinery designs must use to a maximum extent, locally available manufacturing methods, materials, labor and other resources of the region. (Author Modified Abstract)

PB-219 708 PC\$3.50
 Kansas State Univ., Manhattan. Food and Feed Grain Inst.
TOUR OF SOME U. S. GRAIN STORAGE FACILITIES FOR ENTENTE FUND OFFICIALS. (AFR-631.23-C559)
 Do Sup Chung. May 72, 27p

A four day tour of grain storage facilities for Entente Fund officials was conducted by Kansas State University. Fundamental principles concerning condensation and problems related to condensation in metal storage buildings were discussed. The following aspects were considered to be important in reducing the possibility of condensation in metal storage facilities for bagged grains: (1) adequate ventilation (2) white paint used to paint the exterior, (3) do not stack grain bags against the walls, and (4) cover the grain pile with a plastic sheet, or put insulation on the roof inside of the storage building, thus creating at least a twenty-degree F. temperature differential between the interior and exterior air. (Author Modified Abstract)

PB-219 711 PC\$3.00
Utah State Univ., Logan. Dept. of Agricultural and Irrigation Engineering.
ECONOMIC ASPECTS OF IRRIGATION FROM GROUND WATER. (BR-631.7-H279A)
George H. Hargreaves. 1972, 23p

Typical examples of economic analysis of ground water development in Brazil are discussed, citing specific data for Bolivian conditions with conversion to Cruzeiro values, but without a detailed knowledge of commodity prices and costs in Brazil. Use of ground water can produce both irrigation and drainage benefits -- pumping from underground reservoirs has alleviated many drainage problems. Typical irrigation systems were selected, designs developed, and costs estimated. From theoretical considerations, and from available crop, moisture-yield relationships developed in other areas, the supply of adequate moisture properly distributed throughout the growing season should at least double production for cotton, sugar cane, soy beans, wheat, forage crops, and others with similar water requirements. Irrigation costs are analyzed. (Author Modified Abstract)

PB-219 715 PC\$6.50
North Carolina State Univ., Raleigh. Dept. of Soil Science.
SOILS OF THE COLOMBIAN LLANOS ORIENTALES-COMPOSITION AND CLASSIFICATION OF SELECTED SOIL PROFILES. (CO-631.47-G935)
Ramiro Guerrero. 1971, 90p

Seven Soil profiles of the Llanos Orientales (Eastern Plains) of Colombia, near Orocué and south of the Meta River, were selected to study their composition and classification. The area studied is representative of the tropical, treeless, nonflooded, savannas of Columbia. The parent material for all soils were mixed alluvial acid sediments. The soils are very acid, have a low cation exchange capacity, very low base retention, low percent of base saturation, high amount of exchangeable aluminum, and relatively high contents of free iron oxides and organic carbon. Surface layers are very low in available phosphorus and low in micronutrient content. (Author Modified Abstract)

PB-219 721 PC\$3.25,
Kansas State Univ., Manhattan. Food and Feed Grain Inst.
DEVELOPMENT OF A SIMPLE STORAGE UNIT AND STORAGE METHOD APPLICABLE FOR HUMID AREAS IN DEVELOPING COUNTRIES. (631.23-C559)
Do Sup Chung. 30 Jun 72, 24p

The development of a simple, inexpensive grain storage unit and storage method which can be used at farm and local levels in humid areas in order to preserve the quality of grain is discussed. Losses result from inadequate facilities and improper handling of food grains. Efforts are devoted to the development of storage that would not require electricity, and that could be easily maintained and operated by unskilled labor. Materials, methods, time and partial results are discussed. The grain used in this preliminary report was corn. A silica-gel adsorbant appears feasible, but cheaper drying agents are needed. (Author modified abstract)

PB-219 723 PC\$5.00
International Rice Research Inst., Los Banos, Laguna (Philippines). Agricultural Engineering Dept.
AGRICULTURAL EQUIPMENT DEVELOPMENT RESEARCH FOR TROPICAL RICE CULTIVATION. (RP-631.3-I61B)
Amir U. Khan, Fred E. Nichols, and Bart Duff. Dec 72, 59p

The major objectives of the contract continue to be the design, development, testing and extension of agricultural machinery for use by small-and medium-scale rice producers and processors in the tropics. Response from manufacturers now producing and those contemplating production of the 4-6 hp power tiller has been encouraging. Two manufacturers are now building a total of 200 power tillers a month in the Philippines. Evaluation of various machine concepts for the application of non-selective herbicides in rice and upland crops was initiated. The design of the axial-flow thresher neared completion. High output, multicrop use, simplicity in design, and ease of local manufacture should make it widely acceptable in most Asian countries. The second prototype of the PTO thresher is approaching completion. Following final testing and evaluation, it will be released to manufacturers for production. Simple lifting-finger mechanisms for harvesting lodged crops were installed on the stripper harvester. Field trials with the stripper harvester indicate that grain losses with the field machine have been reduced to 6 percent. Additional modifications should further reduce these losses. (Author)

PB-219 724 PC\$3.00
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
NITROGEN-SUPPLYING POWER OF SOME TROPICAL SOILS OF PUERTO RICO AND METHODS FOR ITS EVALUATION. (RQ-631.42-L355)
D. J. Lathwell, H. D. Dubey, and R. H. Fox. Feb 72, 5p

The study is an evaluation of the N-supplying power of 10 representative Oxisols and Ultisols of Puerto Rico which was made by continuous cropping in the greenhouse. Four chemical extraction methods as well as aerobic incubation procedures were used to obtain an index of N availability in these soils. Nitrogen produced during incubation was highly correlated with N released to the crops. Nitrogen extracted by all the chemical methods used, especially total N extracted by 0.01 M CAC1 sub 2 solution and potassium sulfate, was highly correlated with N uptake by plants. These results showed that substantial quantities of N can be removed from these soils upon cropping. It was also shown that laboratory chemical methods as well as incubation procedures provide a reliable means for evaluating the N-supplying power of these soils. (Author)

PB-219 727 PC\$3.00
Colorado State Univ., Fort Collins. Dept. of Political Science.
THE PROBLEM OF WATER SCHEDULING IN WEST PAKISTAN: RESEARCH STUDIES AND NEEDS. (PK-631.7-J77A)
Garth N. Jones. Nov 71, 43p

The capacity to build and maintain the irrigation system has exceeded the capacity to manage the allocation of water for maximum agricultural production. The irrigation system was not designed to supply total crop water needs plus leaching requirements, but rather to provide sufficient water during the

growing season to avoid complete crop failure and famine. In recent years the irrigation system has been substantially modified by increasing its storage capacity and by tubewells which utilize the storage capacity of the vast Indus aquifer. Consequently, it is now possible to consider the development of irrigation scheduling based upon crop and soil needs. (Author Modified Abstract)

PB-219 730 PC\$3.75
Michigan State Univ., East Lansing. Dept. of Agricultural Economics.

MICRO-LEVEL FARM MANAGEMENT AND PRODUCTION ECONOMICS RESEARCH AMONG TRADITIONAL AFRICAN FARMERS: LESSONS FROM SIERRA LEONE. (SL-631.09664-S745)

Dunstan S. C. Spencer. Sep 72, 35p

The paper describes experiences in collecting data in West Africa for planning as well as other purposes. Suggestions are made as to how some methodological problems can be handled. Lessons are drawn mainly from a study of rice production in Sierra Leone. A stratified area sampling technique involving 240 farmers was used to secure input-output data for a linear programming study of the rice industry. General recommendations are made on methods of farm management and production. (Author modified abstract)

PB-219 735 PC\$3.00
National Fertilizer Development Center, Muscle Shoals, Ala.
POTENTIAL FERTILIZERS FOR DEVELOPING COUNTRIES. (631.8-T297A)
Aug 72, 20p

The report presents a brief summary of tests recently made or in progress for production of several potential fertilizer materials that may have application in developing countries. Such materials include urea-phosphate rock, urea-single superphosphate based materials, urea-ammonium sulfate, granulated rock phosphate and improved urea. Emphasis is placed on the use of urea since it is now and will continue to be the most important nitrogen source in developing countries. Tests thus far are promising for development of a coating material which will improve the physical characteristics of urea used under tropical conditions. (Author Modified Abstract)

PB-219 741 PC\$6.50
North Carolina State Univ., Raleigh. Dept. of Soil Science.
SOIL NITROGEN: SUPPLY PROCESSES AND CROP REQUIREMENTS. (631.42-B287)
W. V. Bartholomew. Oct 72, 87p

Nitrogen use in modern agriculture has increased greatly with the growth of population and in turn the need for increased food production. Of all the soil elements essential for plant growth, nitrogen is the most likely to limit crop growth. Attention is focussed on some of the principles affecting nitrogen availability and use which provide for maximum efficiency in the production of cereal crops. In forecasting fertilizer nitrogen needs, several use factors are collectively evaluated. Crop requirements are determined first. The kind of crop, expected yield, amount of nitrogen absorbed and used by the plants at the projected yield level. Expected yield levels depend mostly on soil properties and climatic factors. The

amount of nitrogen expected from the soil and natural resources are assessed through mineralization, biological fixation, and additions from rainfall. An evaluation of all these processes are obtained by measuring the yield of a crop when no nitrogen fertilizer has been applied. (Author Modified Abstract)

PB-219 742 PC\$4.00,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
SOIL FERTILITY REQUIREMENTS TO ATTAIN EFFICIENT PRODUCTION OF FOOD CROPS ON THE EXTENSIVE DEEP, WELL-DRAINED BUT RELATIVELY INFERTILE ACID SOILS OF THE HUMID TROPICS. (631.42-C814)
Matthew Drosdoff. 1972, 36p

In the humid tropics it is estimated that there are 1.5 billion acres of uncultivated land due to the infertile nature of the soil. Research conducted in these highly weathered and leached soils indicate that potential productivity can be achieved at a relatively low cost with the judicious use of fertilizers and lime in combination with good management practices. The soils are deep and well drained with good physical properties. The most effective and economic amounts and methods of application of nitrogen, phosphorous, potassium, liming materials, and micronutrients are examined. Study of clay mineralogy indicate valuable information on the reactions of applied nutrients in the soil and their availability to plants. (Author Modified Abstract)

PB-219 753 PC\$7.25,
Kansas State Univ., Manhattan. Dept. of Grain Science and Industry.
ORGANOPHOSPHATE PESTICIDES FOR USE AS GRAIN PROTECTANTS IN INDIA: DEGRADATION OF THEIR RESIDUES DURING MILLING AND COOKING OF CEREAL GRAINS. (631.56-L817)
Leonard Merrick Lockwood. 1973, 104p

Samples of rice, wheat, and sorghum were treated with different concentrations of malathion, gardona, and sumithion as protection against insect infestation during storage. Bioassay tests were conducted to determine the effectiveness of treatments in protecting the grain against insect attack. The intermediate levels of treatment and high levels of treatment protected the grain over the full test period of two months. The amount of residues in the treated grain were analyzed before and after milling. Samples of milled products were cooked by traditional Indian methods. Food preparations which involved boiling or steaming resulted in complete degradation of the residues of all three insecticides. Most of India's grain harvest is retained at the farm and village level. Any program aimed at reducing waste due to insect damage during storage must provide methods which can be used for small scale storage existing regulations to allow the use of malathion as a grain protectant to be admixed with stored grain up to a limit of 8ppm. Results indicate that the breakdown of residues during milling and cooking by typical Indian methods are comparable to the breakdown observed in the cooking and milling processes studied in the U. S. and Europe.

PB-219 755 PC\$5.75,
Harvard Univ., Cambridge, Mass. Center for International Affairs.

TRACTOR MECHANIZATION AND RURAL DEVELOPMENT IN PAKISTAN. (PK-631.372-G684)

Carl H. Gotsch. Dec 72, 72p

The author reviews the present status of mechanization in Pakistan with summaries on the following topics: tractors by number, use and location; government policies toward mechanization; research on the economics of mechanization and the direct and indirect social costs and benefits. Mechanization and the urban interests are reviewed as well as the reform and maintenance of the social structure in the development of a more rational mechanization policy. (Author modified abstract)

PB-219 758

PC\$15.75

North Carolina State Univ., Raleigh. Dept. of Soil Science. A REVIEW OF SOILS RESEARCH IN TROPICAL LATIN AMERICA. (LAT-631.4072-N864)

P. A. Sanchez, W. V. Bartholomew, S. W. Buol, F. R. Cox, and E. J. Kamprath. 1972, 272p

The publication is a comprehensive review of the available literature on soils research in the American tropics. This area comprises all countries of Latin America and the Caribbean excluding Argentina, Chile and Uruguay. A search was made of biological abstracts for work in the region. Approximately 1,000 abstracts were obtained on research published since 1960. Additional materials were obtained from Tropical Abstracts, the Latin American Bibliography of Agriculture and the authors' personal files. Emphasis is placed on the main food and feed crops of tropical America grown by small and medium sized farmers. The review covers the following topics of soil research: soil genesis, morphology and classification; soil physical properties; soil management under shifting cultivation; soil nitrogen in the tropics; nitrogen fertilization; soil acidity and liming; potassium; phosphorus; sulfur; and micronutrients. (Author)

PB-219 759

PC\$3.00

Cornell Univ., Ithaca, N.Y. Dept. of Agronomy. RELATIONSHIPS AMONG PHYSICAL AND CHEMICAL PROPERTIES OF REPRESENTATIVE SOILS OF THE TROPICS FROM PUERTO RICO. (RQ-631.42-P555)

Warren R. Philipson, and Matthew Drosdoff. Mar 72, 6p

In an investigation of the extent to which predictive soil property relationships can be relied upon in characterizing soils of the tropics classified at the reconnaissance level, 9 to 15 soil properties, of 370 horizons, from 84 Puerto Rican profiles, were studied by correlation and multiple linear regression. The soils represented six orders of the new U.S. Soil Taxonomy (7th Approximation): Vertisols, Mollisols, Alfisols, Inceptisols, Ultisols, and Oxisols. Multiple regression equations were formed from the data of each order, with 15-bar moisture content, CEC, organic carbon, extractable iron, and base saturation as dependent variables. 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. (Author)

PB-219 760

PC\$3.25

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Economics.

NEW SEED VARIETIES AND THE SMALL FARM. (IN-631.521-S346)

M. Schuller, and John W. Mellor. Jun 72, 22p

The study explores the relationship that exists between adoption of the new seed varieties and size of farm for the small farmer in India. In this analysis a farmer is defined to have 'adopted' if he has put any part of his acreage under the new varieties. Tables are provided summarizing the results of the linear regression between proportion of farmers adopting the farm size for 70 cases. This analysis has been largely oriented to the adoption problems of the small farmer. Particular in the rice areas, among adopting farmers, the larger farmers seem to adopt on a smaller proportion of their acreage than the smaller farmers. The authors also discuss tenancy, irrigation, credit and uncertainty as factors affecting adoption. (Author Modified Abstract)

PB-219 768

PC\$4.00;

Ohio State Univ., Columbus. Dept. of Agricultural Economics and Rural Sociology.

TECHNOLOGICAL CHANGE AND THE TRADITIONAL SMALL FARMER OF RIO GRANDE DO SUL, BRAZIL. (BR-631-R225)

Norman Rask. Jun 72, 37p

The paper concerns research on the determination and evaluation of capital formation and the relationship of this process to technological change and economic development for the small farmer of Rio Grande Do Sul in Brazil. The author provides a general background of the geographic region and settlement patterns and a general description of small farm agriculture as it is practiced in this Brazilian state. The study reports on rates of technological change on farms as related to farm size, technology available, and institutional settings. Findings are related to those for large farms. A case study of more than 6500 small farms located in the municipio of Lajeado is presented. (Author Modified Abstract)

PB-219 775

PC\$3.50

Utah State Univ., Logan. Dept. of Agricultural and Irrigation Engineering.

IRRIGATION REQUIREMENTS AND GROUND WATER DEVELOPMENT. (BR-631.7-H279)

George H. Hargreaves. Dec 72, 28p

The paper presents a moisture availability index that is suggested for use in evaluating water balance conditions. It further presents a method for estimating irrigation requirements that has been evaluated using Brazilian climatic data. Comprehensive tables are provided including a detailed explanatory use of the tables on the following topics: (a) Mean monthly values of extra terrestrial radiation expressed as equivalent evaporation in millimeters per month at 20 degrees C; (b) Crop coefficients, K; and (c) Moisture availability analysis including climatic data. (Author Modified Abstract)

633. FIELD CROPS

PB-219 686

PC\$10.00

Nebraska Univ., Lincoln. Agricultural Experiment Station.

RESULTS OF THE SECOND INTERNATIONAL WINTER WHEAT PERFORMANCE NURSERY. (633.11-S921D)

J. E. Stroike, V. A. Johnson, J. W. Schmidt, and P. J. Mattern. Sep 72, 160p

The data presented in this research bulletin No. 248 was derived from winter wheat grown in 1970 at 38 sites in 23 countries. Four of the sites were in the southern hemisphere. The same 39 varieties evaluated in the first nursery were grown in the second nursery. Twenty-eight varieties were winter wheats; two were spring wheats. Data on grain yield, test weight, maturity, plant height, lodging, shattering, winter survival, diseases, grain protein content and lysine content for 1970 are reported. Bezostaia again was the most productive variety over all reporting sites.. It exhibited an unusually wide range of adaptation. Western European varieties as a group exhibited highly specific adaptation to the environments for which they were developed. Heine VII had the broadest adaptation among the Western European varieties. Hard red winter wheat varieties from the USA and Bezostaia produced the highest test weight grain in the second nursery. Phenotypic expression of the high protein trait over diverse production environments was excellent. Lysine expressed as percent of protein was negatively correlated with protein. Varietal differences in maturity, plant height, lodging, disease resistance and other agronomic traits are discussed. (Author Modified Abstract)

PB-219 688

PC\$3.25

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Economics. **SOME ASPECTS OF THE SUITABILITY OF HIGH YIELDING RICE AND BAJRA VARIETIES FOR THE SMALL FARM, THANJAVUR AND MEHSANA DISTRICTS, INDIA. (IN-633.18-S346)**

Michaël G. G. Schuller, and Richard W. Longhurst. Oct 72, 23p

In order to evaluate farmers' response to the new rice and bajra varieties, the Indian Institute of Management at Ahmedabad undertook an intensive study of two districts--Mehsana District in Gujarat for a study of hybrid bajra, and Thanjavur District in Tamil Nadu, for a study of ADT-27, a new high yielding rice variety. In each district, use of inputs, yields and prices were collected from approximately 60 farmers who had adopted the new varieties of seed on some part of their acreage, and approximately 40 who had grown only the traditional varieties. A regression framework is used to examine factors affecting the extent of adoption of ADT-27 in Thanjavur. This is supplemented by comparative production function analysis of ADT-27 and traditional rice varieties. Hybrid and local bajra are compared, again with production function analysis. Finally, an assessment is made of ADT-27 and hybrid bajra as to their suitability for the small farmer. (Author Modified Abstract)

PB-219 707

PC\$9.25

Nebraska Univ., Lincoln. Coll. of Agriculture and Home Economics.

IMPROVEMENT OF THE NUTRITIONAL QUALITY OF WHEAT THROUGH INCREASED PROTEIN CONTENT AND IMPROVED AMINO ACID BALANCE. (633.11-N362B)

V. A. Johnson, and P. J. Mattern. 31 Dec 72, 142p

Useful new analytical procedures have been developed and are described on sample grinding, sample blending, moisture equilibrium of samples, sample weighing, protein determinations, lysine determinations, complete amino acid determinations and in vitro nutritional assay. Research results are reported on the world wheat collection, protein and nutritional value, kernel morphology, kernel anatomy, effect of environment on protein and lysine content, soil fertility and protein content, physiological processes associated with high grain protein, genetic studies of high protein and high lysine, breeding for improved nutritional value and the International Winter Wheat Performance Nursery.

PB-219 710

PC\$3.00

Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Economics. **PRELIMINARY OBSERVATIONS ON THE PRODUCTION OF NEW HIGH YIELDING RICE VARIETIES AND TRADITIONAL RICE VARIETIES IN SUPHAN BURI, THAILAND. (TH-633.18-B974)**

William R. Burton, and Tongruay Chungtes. Feb 72, 16p

The research paper discusses field research in Thailand on certain economic aspects of new rice technology, particularly the new high yielding rice varieties and associated inputs. The actual location of the study area was in Suphan Buri Province, some 100 kilometers northwest of Bangkok, Thailand. A total of 153 rural households in six villages cooperated in the study. Forty of the rice farms were located in a deep water, broadcasted area where floating rice varieties are grown. The remaining 93 rice-farms were in a transplanted rice area where many farmers were growing the new high yielding rice varieties. The authors provide summary tables on the following topics: table of farms; planted area and varieties grown; farmers growing new varieties; area and variety planted for the 1970 and 1971 seasons. They include summary discussions of high yielding varieties other new rice technology, research and costs of production. (Author Modified Abstract)

PB-219 713

PC\$4.50

North Carolina State Univ., Raleigh. Dept. of Soil Science. **AGRONOMIC PRACTICES FOR OPTIMIZING THE YIELD POTENTIAL OF SHORT-STATURED RICE VARIETIES IN LATIN AMERICA. (LAT-633.18-S211)**

Pedro A. Sanches. Oct 71, 47p

The purpose of this paper is to illustrate the varietal response to specific cultural practices as examples of the kind of information needed for optimizing yields in each rice growing area in Latin American countries. Time of planting in relation to weather patterns is discussed for upland rice and irrigated rice. Planting systems, seed density and spacing are explained for upland rice systems, direct seeded-irrigated systems, and transplanted systems. Nitrogen response and response to other nutrients are described under rice fertilization. Weed control and harvest timing are included as important cultural practices. Examples of cultural practices interactions, total production costs and revenues and the effects of nitrogen levels are provided under economic considerations. The author concludes that the possibility of increasing rice yields throughout the different cropping systems in Latin America seem excellent if proper agronomic practices are adopted. (Author)

PB-219 714 PC\$3.00
Purdue Univ., Lafayette, Ind. Agricultural Experiment Station.

THE STATUS OF DEVELOPMENT OF MAIZE WITH IMPROVED PROTEIN QUALITY. (633.15-B347)

L. F. Bauman, and E. T. Mertz. Apr 72, 8p

Nutritional studies have confirmed the potential value of opaque-2 maize in helping to solve the world's human and animal nutritional needs. Today, it is apparent that opaque-2 types must, to some degree, overcome their generally-observed deficiencies when compared with normal maize. These deficiencies include (1) lower yield, (2) greater susceptibility to ear rot, (3) harvest and storage problems, (4) higher moisture content at harvest, and (5) soft starch, which is unacceptable for some areas or uses. This report discusses the analytical and nutritional aspects first, then breeding and genetics. (Author Modified Abstract)

PB-219 734 PC\$5.00
National Fertilizer Development Center, Muscle Shoals, Ala.
TAILORING OF FERTILIZERS FOR RICE. (633.18-T297B)
O. P. Engelstad, J. G. Getsinger, and P. J. Stangel. 1972, 57p

The agronomic activities under this project included basic research and preliminary evaluation of new fertilizers for rice at TVA in Alabama and by field studies in India, Thailand, Ceylon, the Philippines, Peru, Brazil and Columbia. The materials tested included various forms of nitrogen, phosphate and zinc. (Author Modified Abstract)

PB-219 746 PC\$3.25
Nebraska Univ., Lincoln. Dept. of Agronomy.
PROGRESS IN BREEDING FOR PROTEIN IN WHEAT: STATUS OF PROTEIN QUALITY IMPROVEMENTS IN WHEAT. (633.11-M435A)
Paul J. Mattern. Dec 72, 22p

The paper presents the current status of protein quality improvement in wheat. The author discusses the progress being made on the following topics: genetic variation found for protein and lysine in wheat; sources of high protein and high lysine in the breeding program; identification of best recipient genotypes; current hybrid populations of special interest; biological evaluations to identify improved protein sources and plant physiology studies. The nitrate reductase step in the metabolism of nitrogen is thought to be the rate limiting reaction for the eventual synthesis of protein. Lines and varieties are being identified for nitrate reductase activity. All high protein lines to date have been found to be high in nitrate reductase activity. Fortunately, a recent break through now permits the quantitative measurement of this rate-limiting enzyme in live tissue. In addition, factors can be accurately identified affecting the process of nitrate reduction. Leaf protease levels are being studied to identify varieties capable of translocating larger quantities of amino nitrogen to the grain for protein synthesis. (Author)

PB-219 747 PC\$4.75
National Fertilizer Development Center, Muscle Shoals, Ala.
MORE WHEAT FROM FALLOW FARMING. (TU-633.1-1-H529)
Homer M. Hepworth. Jan 73, 55p

Statistics show that wheat production varies widely even in areas of the same climatic conditions. Research conducted by National Wheat Improvement Center provides necessary information and production sources for optimum wheat production in the shortest possible time. It is observed that moisture conservation in soil (fallow system) with other improved agronomic practices can produce the optimum yield capacity. An effective fallow system involves storing water when it comes as rain or snow and minimizing losses prior to planting the crop. Research and training programs are designed to adapt improved technology to local conditions. Also presented is an analysis of the approach taken to facilitate the transfer of technology to local conditions in Turkey. (Author Modified Abstract)

PB-219 749 PC\$4.75
Nebraska Univ., Lincoln. Agricultural Experiment Station.
WINTER WHEAT CULTIVAR PERFORMANCE IN AN INTERNATIONAL ARRAY OF ENVIRONMENTS. (633.11-S921E)
J. E. Stroike, and V. A. Johnson. Oct 72, 51p

The data presented in this research bulletin No. 251 concerns the performance stability of 28 cultivars grown in an International Winter Wheat Performance Nursery in 1969 and 1970. The nursery was grown at 20 sites in 14 countries in 1969 and at 35 sites in 23 countries in 1970. The stability parameters indicated the existence of wide cultivar differences in response to environment as well as in predictability of response. The mean grain yield of a Russian cultivar, Bezostaia, was consistently the highest among the 28 cultivars studied. Bezostaia also responded strongly and predictably in yield to changes in environment. Moderately short, lodging-resistant straw of Bezostaia contributed to its superior performance. Three cultivars known to possess genes for high grain protein in content were included in the study. The range in the lysine content of protein was small among the cultivars studied. None of the cultivars is known to be inherently different for lysine. Lysine expressed as percent of protein was negatively correlated with protein. (Author Modified Abstract)

PB-219 769 PC\$19.75
Nebraska Univ., Lincoln. Agricultural Experiment Station.
PROCEEDINGS OF INTERNATIONAL WINTER WHEAT CONFERENCE (1ST) HELD IN ANKARA, TURKEY, ON 5-10 JUNE 1972. (633.11-N362A)
V. A. Johnson. 10 Jun 72, 351p

The report is a compilation of the proceedings of the International Winter Wheat Conference held in Ankara, Turkey June 5-9, 1972. A total of 97 wheat researchers representing 24 countries participated in the conference. The purpose of the conference was to evaluate improved winter wheat varieties from different countries and identify promising winter wheat germplasm for use in breeding programs. An assessment was made of the significance of nursery findings and procedures were developed to accelerate the agronomic and nutritional improvement of winter wheat. The texts of 51 reports presented at the conference are included in this proceedings. (Author)

636. LIVESTOCK AND DOMESTIC ANIMALS

PB-219 687 PC\$15.50
 Florida Univ., Gainesville. Dept. of Animal Science.
LATIN AMERICAN TABLES OF FEED COMPOSITION.
 (LAT-636.085-C555)
 William C. Christianson, Jenny Eggleston, Lee R. McDowell,
 Joe E. Conrad, and Lorin E. Harris. Jun 72, 270p

These Latin American tables of feed composition have been prepared using data collected from analyses of feed stuffs from most countries of Latin America. The tables include also appropriate analytical data from the U.S. and Canada. These data are used for a particular feed stuff when Latin American information is not available to make more meaningful tables. This publication should be of assistance to feed manufacturers, research specialists, teacher, students, extension specialists, farmers and others concerned with formulating livestock and poultry rations throughout Latin America. It should also be of value to others throughout the World who are interested in feed composition, especially tropically grown feeds. (Author Modified Abstract)

639. FISH AND FISHERIES

PB-219 739 PC\$5.75
 Auburn Univ., Ala. Dept. of Fisheries and Allied Aquacultures.
AQUACULTURAL SURVEY IN JAPAN. (JA-639.3-S355)
 H. R. Schmittou. 1 Feb 72, 73p

The purpose of this survey was to assess the value of Japan's aquacultural methods in terms of direct or indirect application in other countries, and to evaluate present and future status of aquacultures in Japan. The aquacultures discussed are: Ayu, Japanese eel, Yellowtail, Japanese oyster, and the Japanese Kuruma shrimp. Japan is faced with serious problems in most of its aquacultures. Only few of the methods of culture developed can be applied in other countries. If present methods are continued, many cultures will suffer limited growth and some may decline. The most serious problem and the ultimate limiting factor is the cost of production. Feed and labor are the two primary cost items of all cultures. Pollution is another problem. Another problem is having to depend on natural populations for young animals for stocking. A potential disease problem results from the feeding of uncooked trash fish also, and this particular problem has manifested itself in the yellowtail culture. Various stocking programs and ways to artificially reproduce fish stocks are discussed. (Author Modified Abstract)

650. BUSINESS ENTERPRISE

PB-219 752 PC\$6.50
 Michigan State Univ., East Lansing. Latin American Studies Center.
FOMENTING IMPROVEMENTS IN FOOD MARKETING IN COSTA RICA. (CS-658.80963-H319)
 Kelly Harrison, and James D. Shaffer. Jan 72, 88p

Results of a preliminary diagnostic analysis in regard to Costa Rica's agricultural marketing problems indicate that the traditional marketing system is not adjusting effectively to rapid changes in production, urbanization, consumer incomes, and customs. Marketing costs are high, and the situation will worsen if extensive changes are not instituted. Improvements can be achieved through (1) development of improved physical facilities; (2) provisions for facilitative laws, regulations, policies and public programs; and (3) adoption of effective managerial-technological methods. In order to sustain long-term public action, recommendations are made for a permanent task force of marketing systems specialists to deal with both rural and urban aspects of the food marketing system and a commission of policy-makers to provide guidance and realistic links between the investigations, policy formulations and their implementation. Specific recommendations are stated. (Author Modified Abstract)

660. CHEMICAL TECHNOLOGY

PB-213 769 PC\$3.00
 Kansas State Univ., Manhattan. Food and Feed Grain Inst.
IMPROVING THE NUTRITIVE VALUE OF CEREAL BASED FOODS. (664.72-K16)
 1 Jun 72, 37p

A review is presented of research to improve the nutritional value of cereal based foods in North Africa and Pakistan by supplementation and process modification without decreasing the food acceptability to the consumers in those areas. The foods considered were protein fortified wheat based bread, chapatis, and couscous using soy flour, chickpea flour, and broadbean flour. The fortified foods met the nutritive guidelines established by the project and prove acceptable to small consumer panels. Many other protein resource materials were evaluated. A system of developing and evaluating protein fortified foods was evolved. (Author)

PB-219 740 PC\$3.75
 National Fertilizer Development Center, Muscle Shoals, Ala.
AMMONIA-UREA SOLUTION FOR AMMONIATION-GRANULATION IN BRAZIL. (BR-668.62-A179)
 Frank P. Achorn, and Owen W. Livingston. Jun 72, 35p

Many countries are considering alternative methods for increasing the output of fertilizers and fertilizer intermediates. Numerous studies have been made for various countries surveying alternative production schemes which could be utilized. The report gives details of granulation process based on the ammoniation of superphosphates with ammonia-urea solution in a rotary-type drum granulator. Granulation is a process whereby rounded or spherical particles are produced through a fusion, solution, crystallization, or cementing process between various materials. To obtain spherical particles, it is necessary to impart a rolling-type action to nuclei; these nuclei serve as a base for building larger particles which grow to product size. Information for this report is based on actual experience during startup and operation of a plant in Porto Alegre, Brazil. The ammoniation-granulation plant there consists of a volumetric-type solid feed system, ammonia-urea solution feed system, TVA drum ammoniator-granulator, dual pan granulators, dryer, cooler, and screening system. Data are given to illustrate the possibility of grades that can be made for a plant of this type. (Author modified abstract)

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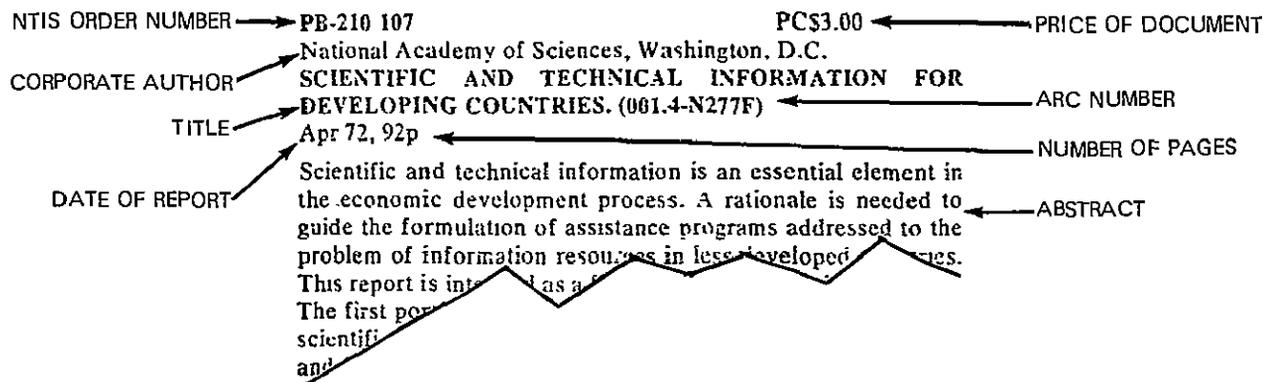
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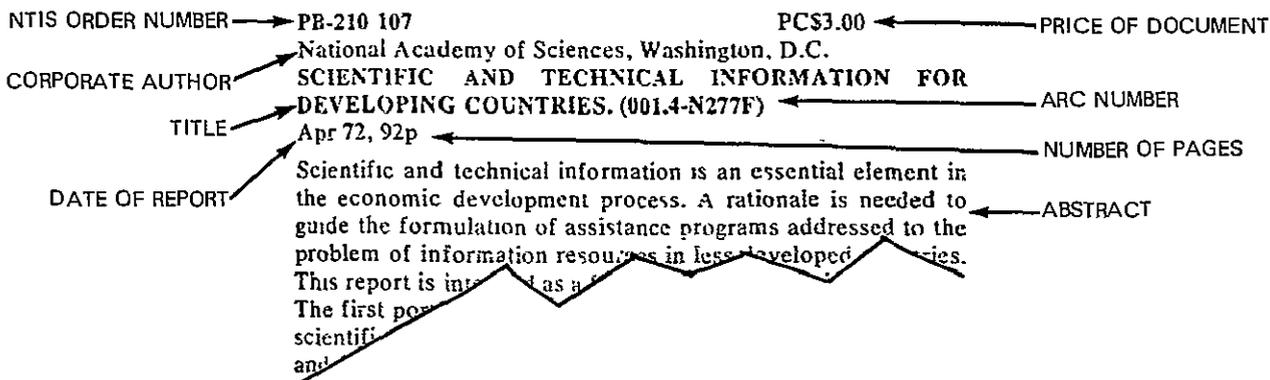
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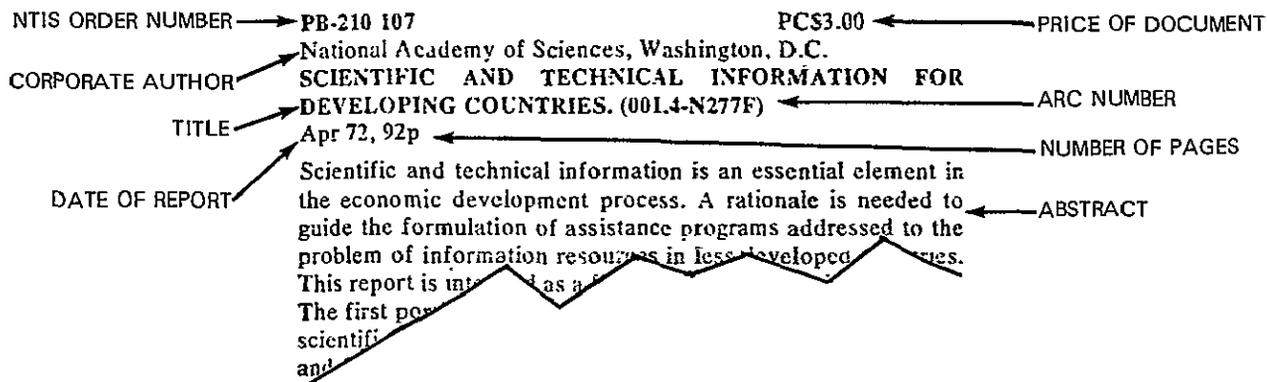
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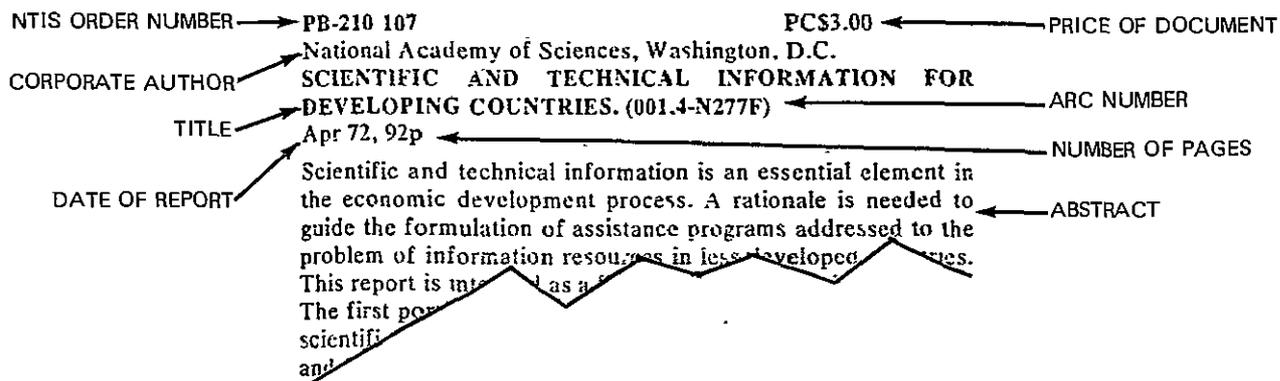
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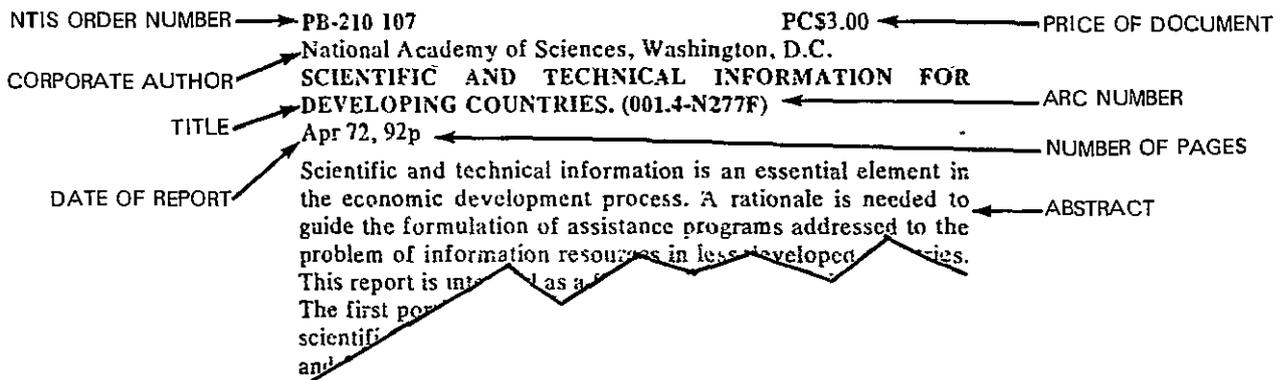
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