

# **A.I.D. RESEARCH AND DEVELOPMENT ABSTRACTS**

Volume 1  
Number 4

**APRIL 1974**

ARC No. 017.1-A265f

A.I.D. Reference Center and Technical Assistance Bureau  
Agency for International Development  
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## INTRODUCTION

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**CEREAL CROPS**

**STORAGE OF IMPORTED CORN IN INDONESIA**

Do Sup Chun and Richard Phillips  
June 1973, 28 p. (ID-633.156-C559)

Kansas State University Food & Feed Grain Institute  
Manhattan, Kansas 66506

The Food and Feed Grain Institute at Kansas State University, under contract AID/csd-1588, Technical Assistance in Food Grain Drying, Storage, Handling and Transportation was originally requested by USAID/Indonesia to observe current rice marketing systems in Indonesia and to suggest a priority program for implementation of recommendations made in the final report of the Weitz-Hettelsater Study of Rice Storage, Handling and Marketing in Indonesia. In compliance with this request, Dr. Richard Phillips and Dr. Do Sup Chung of the Food and Feed Grain Institute spent three weeks in Indonesia during May of 1973. During this period, unexpectedly they were requested by USAID/Indonesia and BULOG, Indonesia to provide technical assistance on an urgent corn storage problem confronted in Indonesia. This report is to describe the corn storage situation in East Java, Indonesia, based on two inspection trips made with USAID and GOI officials and to reiterate suggestions and recommendations given to BULOG for managing the corn storage problem.

PN-AAA-310 \$2.10

**DEVELOPMENT OF A SIMPLE GRAIN STORAGE UNIT AND METHOD APPLICABLE TO HUMID AREAS.**

Do Sup Chung and Louis F. Fleske  
April 1973, 102 p. (631. 56-C559)

Kansas State University Food & Feed Grain Institute  
Manhattan, Kansas 66506

The broad objective of this study was to develop a simple and inexpensive grain storage unit or method which can effectively be used at farm and local levels in humid areas of developing countries. The approach taken was the possible uses of adsorbents to dry humid air surrounding the grain and to remove moisture from the grain. The grain used for the first series of tests was yellow corn at 12% moisture content purchased from a local elevator and for the last series of tests, newly harvested yellow corn at about 24% moisture content was used. Desiccants tested were lime, drierite, calcium chloride, salt and silica gel. The results showed that of the various drying agents tested, silica gel was the only one that may be effectively used for drying and storing corn in humid areas. The grain to adsorbent ratios needed to preserve the grain quality for 12, 15, and 20% initial moisture corn. Tests under these conditions showed no change in grain quality (visible mold and germination).

PN-AAA-311 \$7.55

**RESULTS OF THE THIRD INTERNATIONAL WINTER WHEAT PERFORMANCE NURSERY**

J.E. Stroike et al  
Nov. 1973, 131 p. ARC-No. (633.11-S921g)

University of Nebraska Department of Agronomy  
Lincoln, Nebraska 68503

The Third International Winter Wheat Performance Nursery was grown in 1971 at 38 sites in 24 countries. Data were reported from 36 sites. The nursery was restricted to 30 varieties. Thirteen new varieties were grown in 1971. Seventeen varieties were retained from the 2nd IWWPN. Twenty-nine varieties were winter wheats; one was a spring wheat. Data on grain yield, test weight, maturity, plant height, lodging, shattering, winter survi-

val, 1000 kernel weight, diseases, grain protein and lysine content for 1971 are reported. Two-year and three-year mean data summaries also are reported. Supplemental nursery information is reported for each nursery site. Phenotypic expression of the high protein trait over a wide array of environments was excellent. Atlas 66 and its derivative, NB68513, maintained their superiority for grain protein content. A winter triticale produced grain with high protein content that was also superior in lysine content. A negative correlation between grain protein and lysine was found in wheat varieties.

PN-AAA-312 \$9.70

**RESULTS OF SYSTEMATIC ANALYSES FOR PROTEIN AND LYSINE COMPOSITION OF COMMON WHEATS (TRITICUM AESTIVUM L.) IN THE USDA WORLD COLLECTION**

K.P. Vogel et al  
Nov. 1973, 27 p. (633.11-V878)

University of Nebraska Department of Agronomy Lincoln,  
Nebraska 68503

Protein and lysine contents of 12,613 common wheats of the USDA World Wheat Collection were determined in order to tentatively identify wheats that may be sources of genes for high protein and high lysine. It will be necessary to grow wheats identified as being high protein or high lysine in an array of environments in order to identify those which are genetically superior. Percent protein of the samples analyzed ranged from 6.9 to 22.0% with a mean of 12.9%. This wide range of protein indicates that significant genetic differences in protein content probably exist among the common wheats of the World Collection. Wheats with more than 17% protein have been tentatively identified as high protein lines. There are over 500 wheats in the World Collection with protein contents of over 17 percent. Lysine values (% of protein) were adjusted to the mean protein level to make comparisons of the lysine content of protein among wheats with different protein contents. Comparisons of unadjusted lysine values have little validity. Wheats with the highest adjusted lysine values were tentatively identified as being sources of genes for high lysine. Adjusted lysine values ranged from 2.28 to 3.71 percent of protein with a mean of 3.16%.

PN-AAA-313 \$2.00

**INFLUENCE OF SEEDLING AGE AT TRANSPLANTING ON RICE PERFORMANCE**

P.A. Sanchez and N. Larrea  
Dec. 1972, 7 p. (633.18073-5211)

North Carolina State University  
Agricultural Experiment Station, Raleigh, N. Carolina 27607

With the advent of high-yielding rice (*Oryza sativa* L.) varieties on the coast of Peru, the question arose as to how these short-statured plant types react to delays in transplanting, a common situation in the field because of uncertain water supply. A field experiment conducted in Lambayeque, Peru evaluated two short-statured varieties, IR8 and IR 5, with the tall, traditional Minabir variety at transplanting dates from 30 to 105 days after seeding and at three seedbed growth rates. IR8 produced the highest grain yield (12.0 tons/ha) when transplanted at 30 days after seeding. Yields decreased linearly at the rate of 125 kg/ha per day of delayed transplanting beyond 30 days. Minabir showed less-pronounced yield decreased up to 75 days after seeding. Slowing seedbed growth of IR8 through water and N stress produced significant yield increases when transplanted at 75 and 90 days after seeding. The experiment showed that the short-statured plant types are more sensitive to delays in transplanting than the tall ones, but that the new varieties can outyield the tall varieties when transplanted up to 90 days after seeding.

PN-AAA-314 \$1.95

## AGRICULTURE

### **INFLUENCE OF METHIONINE AND OTHER DIETARY ADDITIONS ON THE PERFORMANCE OF CHICKS FED BIRD RESISTANT SORGHUM GRAIN DIETS**

W.R. Featherston et al.  
Jan. 1973, 20 p. (636.5-A739)

Purdue University Department of Animal Sciences  
West Lafayette, Ind. 47907

Studies were conducted on the performance of chicks fed diets containing three bird resistant sorghums BR64 and IS8260 as compared to chicks fed diets containing the non-resistant sorghums RS610 and RS671 and to observe the effects on chick performance and leg scores of various dietary supplements. Feeding bird resistant sorghum grains BR64 and IS8260 resulted in significantly poorer growth and feed efficiency as compared to that noted when non-resistant sorghum grains RS610 and RS671 were fed. Supplementation of bird resistant sorghums BR64 and IS8260 with methionine resulted in a marked improvement in chick growth and feed efficiency to levels comparable to those noted with the non-resistant sorghums. Supplementation of the bird resistant sorghums with choline did not result in an improvement in chick growth or feed efficiency. Methionine supplementation did not overcome the growth depressing effects noted when 1.0% commercial tannic acid was added to the sorghum RS671 diet. Additions of 1.0% polyvinylpyrrolidone overcame the depressing effects of commercial tannic acid additions to sorghum RS617 diets as well as the tannin provided by the bird resistant sorghum BR64.

PN-AAA-315

\$1.95

### **FIRST INTERAMERICAN SORGHUM SYMPOSIUM**

Dallas L. Oswalt  
Aug. 1972, 16 p. (LAT-633.174063-068)

Purdue University Department of Animal Sciences  
West Lafayette, Ind. 47907

The full four-day workshop-type meeting in Brasilia, Brazil was well attended by 134 participants representing Brazil, Mexico, Honduras, Argentina, Venezuela, Puerto Rico, Costa Rica. The participants represented all but four major sorghum research centers in South America. Over 40 papers were formally presented. Six presentations were made representing the Purdue-AID work. They were summarized as three papers which are attached to the trip report. The attendance and discussion evolving from presentations demonstrated the immediate interest in sorghum improvement and production especially in Brazil. The requests for visual aids, germplasm and systems of uniform evaluations of the total sorghum plant performance and quality in a handbook form demonstrate the timeliness of this workshop and values of much of the information regarding techniques which were presented. The Brazilian establishment of an annual Brazilian Sorghum Workers Conference and the establishment at this conference of a committee for another such symposium in three years further demonstrates the continuing initiative of the symposium.

PN-AAA-316

\$1.95

### **RAT GROWTH RESPONSE RELATED TO GRAIN SORGHUM**

G. Srinivasan, and D.L. Oswalt  
Nov. 1972, 3 p. (599.3233-5774)

Purdue University  
Dept. of Agronomy, Lafayette, Ind. 47907

Feeding trials of 125 grain sorghum samples selected from the world collection were conducted to study the effect of amino acid content and polyphenols on weight gain in rats as a part of a grain sorghum protein quality improvement project. The 14-day feeding trials revealed that the weight gain in rats was significantly influenced by polyphenol content in grain sorghum. Slow growth

or even weight loss was found when the high polyphenol grain sorghum samples were fed with vitamin and mineral supplementation. The influence of the polyphenols masked the differences in protein level and other amino acid quality factors in the feed. Supplementation of grain samples high in polyphenols with soybean oil meal (0, 5, 10 and 15 percent soybean oil meal) greatly increased the amount of weight gain, but did not alter the comparative weight gain responses of individual samples in the high or low polyphenol groups. Correlations of amino acid, protein with weight gain in high and low polyphenol sorghum lines and removal of polyphenols by chemical dehulling and supplementation with individual amino acids were also studied.

PN-AAA-317

\$1.95

## FARM MECHANIZATION

### **METHODS OF SEEDING AND TRANSPLANTING OF RICE**

C.L. Padolina and F.E. Nichols  
August 1972, 14 p. (FEA-633.18-P124)

The International Rice Research Institute  
Los Banos, Laguna., Philippines

Labor requirements for producing rice vary with time and month of the year, method of planting, and locality. Tables 1 and 2 show the labor variations and respect to month and labor distribution of different operations for producing rice in Japan, considered the country having relatively the highest yield per unit area. Similar patterns exist for most rice producing areas. However, the monthly pattern will become more uniform at the higher levels as irrigation facilities increase for tropical rice producing countries. Table 3 presents the labor requirements for various methods of planting paddy as reported by Johnson. Results from experiments conducted on the use of the IRRI seeder show that its efficiency is relatively high compared to manual transplanting as shown in Table 4. Studies at IRRI show the high labor and energy input requirements for transplanting paddy. The results of these studies are shown in Table 5. Research in Japan shows that the labor requirements for manual and mechanical transplanting of paddy are almost the same, as shown in Table 6. The transplanter originated in Japan and is now being tested in many interested countries like Korea and Ceylon. Table 7 presents the results of tests conducted on six Japanese transplanters.

PN-AAA-318

\$1.95

### **DESIGN, DEVELOPMENT AND EXTENSION OF SMALL-SCALE AGRICULTURAL EQUIPMENT**

Bart Duff  
December 1972, 25 p. (FEA-631.3-D855)

The International Rice Research Institute  
Los Banos, Laguna, Philippines

Begun in 1967, the program of the agricultural engineering department at the International Rice Research Institute, has had as a major objective the design, development and extension of agricultural equipment tailored to meet the needs of the small rice farmer. Utilizing an approach similar to that of commercial research and development departments in industry, the department has sought to identify those operations in the rice production and processing sequence where the use of improved techniques will significantly alter and enhance the output and income opportunities of small farmers. Patterns of mechanization vary widely both in the Philippines and throughout tropical Asia. These patterns appear to be determined by three major criteria: (1) the profitability of machines in the performance of a particular task, which depends on the crop grown, factor and product prices and the cost of the technique relative to the cost of alternatives, (2) the institutional structure and organization of agriculture, particularly features related to farm size, the control and ownership of land and machines, and the long-term socio-

economic relationships governing the employment of labor and sharing of profits and cost, and (3) the range of techniques to each farmer.

PN-AAA-319 \$1.95

**“RICE FARMERS” RESPONSE TO THE INTRODUCTION OF INTERMEDIATE TECHNOLOGY (TABLE THRESHERS, ROW SEEDERS, AND GRAIN CLEANERS) IN THE LAND REFORM AREA OF NUEVA ECIJA**

Lorna P. Domingo  
December 1972, 37 p. (RP-631-3072-D671)

University of the Philippines Dept. of Agricultural Education  
Laguna, Philippines

Labor inputs presently constitute the largest cash cost in the production of rice. The increase in minimum wage for agricultural labor has also tended to augment the shares of total cash outlays going to labor. This creates an atmosphere within which an intermediate technology which will reduce costs or increase output and revenues becomes highly desirable. In response to this emerging need, the International Rice Research Institute (IRRI) is developing a number of machines, the table thresher, the seeder, and the grain cleaner, which are capable of providing increased labor productivity with low investment requirements without concomitant large-scale labor displacement or high operational costs. This social research study is a follow-up of the above-mentioned pilot program. The objectives of this study are: (1) to document and analyze the reactions of those who have tried and/or witnessed the operation of the intermediate technology, (2) to identify the variables or factors in the adoption of this kind of innovation, (3) to find out whether the existing cooperatives are effective avenues of introducing this technology, and (4) to provide a basis for formulating policies in the implementation of such kind of pilot programs.

PN-AAA-320 \$2.75

**FISHERIES**

**EXPLOITATION EFFECTS UPON INTERSPECIFIC RELATIONSHIPS IN MARINE ECOSYSTEMS**

Saul B. Saila and James D. Parrish  
January 1972, 11 p. (639.9-5132)

University of Rhode Island Graduate School of Oceanography  
Kingston, R.I. 02881

Due to man's continuing efforts to extract greater harvests of marine organisms from the world ocean, it is becoming increasingly important to be able to predict the consequences of exploitation on complex assemblages of organisms. These assemblages, or ecosystems, consist of predator and prey organisms in various interacting combinations. Preliminary evidence available from studies of marine invertebrate communities in coastal areas has indicated that removal of grazing herbivores or predators at various levels results in lower species diversity and greater instability of the ecosystem. In order to permit a quantitative evaluation of the effects of various rates and types of exploitation on interspecific relationships, model ecosystems were constructed utilizing a subset of graph theory as applied to network analysis. A basic ecological trophic unit was formulated, and these units were combined to form more complex model ecosystems. In particular, a hypothetical four species system of interacting predator and prey organisms was analyzed to demonstrate the consequences of varying certain model coefficients, especially rates of exploitation. It was shown that non-selective exploitation tended to maintain stability of the system better than highly selective exploitation. A hypothetical example

of an empirical approach for examining changes in community structure was also demonstrated.

PN-AAA-321 \$1.95

**FORESTRY**

**USE OF FOREST ATTRIBUTES IN SNOWPACK INVENTORY-PREDICTION RELATIONSHIPS FOR ARIZONA PONDEROSA PINE**

Peter F. Foliott and David B. Thorud  
June 1972, 3 p. (333.91-F437)

University of Arizona Department of Watershed Management  
Tucson, Arizona 85721

Inventory-prediction equations describing snowpack accumulations as functions of readily available or easily obtained measurements of forest density and land form were developed for use in Arizona ponderosa pine (*Pinus ponderosa* Laws.) Although empirical, these equations include forest density measurements assumed to index interception of input precipitation, obstruction of direct-beam solar radiation, and radiation emission from trees onto the snowpack. Measurements of land form factors index the quantity of direct-beam solar radiation.

PN-AAA-322 \$1.95

**INSECTS AND PESTS**

**REGIONAL MEDITERRANEAN FRUIT FLY CONTROL PROJECT FOR NORTHERN AFRICA**

A.K. Burditt, E.J. Harris and J.F. Howell  
June 1973, 13 p. (AFR-632.774-B951)

Economic Research Service U.S. Department of Agriculture  
Washington D.C. 20250

The U.S. Agency for International Development (USAID) was asked to help develop and implement a medfly control program in Northern Africa. Goals were to: show that sterile male insect release techniques would work under Northern African conditions; and train personnel to carry on the program. USAID contracted with the U.S. Department of Agriculture to conduct the project on a regional basis in Tunisia and Morocco. The regional project complemented work done previously by consultants and bilateral projects. Three season's field experience and modification of procedures were needed to achieve adequate control in a Tunisian test area. Results were sufficiently promising that an economic study of feasibility and further development of technology were recommended. The project in Morocco was prematurely terminated at the request of the Moroccan government, based on evaluations of current medfly control measures and losses, and priorities in use of resources.

PN-AAA-323 \$1.95

**CROP PROTECTION IN THE MEDITERRANEAN BASIN**

George E. Cavin et al.  
October 1972, 82 p. (632-C382)

University of California  
Berkeley, California 94720

This study is a multi-disciplinary study team report describe the crop protection measures being undertaken in the following countries of the Mediterranean Basin: Portugal, Spain, Tunisia, Jordan and Lebanon. A general description of research, control and survey in the fields of entomology, nematology, plant diseases and weed science is provided. A detailed description is made of the major pests (insects, nematodes, plant diseases, weeds), pest losses and control measures being undertaken in each country. General recommendations are made by the study

## AGRICULTURE

team for improvement of crop protection programs for all countries in the Mediterranean Basin.

PN-AAA-324 \$6.10

### FOODS OF THE RED-WINGED BLACKBIRD IN BROWN COUNTY, SOUTH DAKOTA

Donald F. Mottetal  
July 1972, 6 p. (632.9072-M921)

U.S. Department of the Interior Fish and Wild Life Service  
Denver, Colorado 80225

An analysis of the gizzard contents of 702 red-winged blackbirds (*Agelaius phoeniceus*) collected from 1959 through 1965 during the spring, summer, and early fall in northeastern South Dakota showed that a weed seed, bristle grass (*Setaria* spp.), occurred most frequently (68 percent of the gizzards) and in the largest quantity (23 percent of the volume) Corn (*Zea mays*) was eaten more frequently (30 percent) and in larger amounts (11 percent) than all other cultivated grains. Oats (*Avenasativa*), wheat (*Triticum aestivum*), and millet (*Panicum miliaceum*) made up most of the total volume eaten, with the greatest incidence and volume (96 and 45 percent) being recorded during the nesting period. Grit accounted for 14 percent of the volume eaten.

PN-AAA-325 \$1.95

### COMPARATIVE TOXICITY OF SEVENTEEN PESTICIDES TO THE QUELEA, HOUSE SPARROW, AND RED-WINGED BLACKBIRD

E.W. Schafer Jr. et al.  
March 1973, 4 p. (632.95-5296)

U.S. Department of Interior Fish and Wildlife Service  
Denver, Col. 80225

A sparrow-sized African finch known as the red-billed weaver, black-faced dioch, or simply quelea (*Quelea quelea*) has the distinction of being one of the most numerous and destructive birds in the world. Quelea range over 20% of Africa's land area and affect the economy of 25 African nations. Crops affected include millett, grain sorghum, rice, and wheat. Since 1950, many methods of controlling quelea have been tried; currently the most widely used are explosives and aerial sprays of insecticides (primarily parathion and fenthion) in communal roosting and nesting sites. Quelea are so numerous, however, that killing hundreds of millions each year has apparently not resulted in any appreciable decrease in either populations or damage, except in a few local areas. The acute po LD50 values of 17 commercial or experimental pesticides were determined for quelea (*Quelea quelea*), house sparrows (*Passer domesticus*), and red-winged blackbirds (*Agelaius phoeniceus*), and the acute dermal LD50 values for quelea and house sparrows. Close correlations suggested that po toxicity data for red-winged blackbirds and dermal toxicity data for house sparrows can be used as preliminary indicators of po and dermal toxicity to quelea, respectively.

PN-AAA-326 \$1.95

### BIRD DAMAGE TO PEANUTS AND METHODS FOR ALLEVIATING THE PROBLEM

Donald F. Mott et al.  
March 1972, 3 p. (632.682-M921)

U.S. Department of the Interior Fish and Wildlife Service  
Denver, Col. 80225

Investigations from 1969 through 1971 of bird damage to peanuts in south-central Oklahoma have shown that losses are caused

mainly by common grackles (*Quiscalus quiscula*). These losses, as high as \$36 per acre, have been reduced primarily through the use of exploders and early harvesting of crop. A fright-producing chemical, 4-aminopyridine, was also effective in scaring grackles from windrowed peanut fields. Banding has shown that many of these grackles breed in western Nebraska and Kansas and winter in northeastern Texas.

PN-AAA-327 \$1.95

### A MINIATURE 30-MHz COLLAR TRANSMITTER FOR SMALL ANIMALS

George W. Corner and Erwin W. Pearson  
April 1972, 6 p. (639.9-C813)

U.S. Dept. of the Interior Fish and Wild Life Service  
Denver, Colorado 80225

The construction of a miniaturized pulsing transmitter, modified from an earlier design is described. The transmitter with its antenna collar has a volume of 0.7 cc, weighs 1.5 grams and costs about \$25.50, including labor. An instrument package for rats containing transmitter, collar, 350-Miliamperehour (mah) battery, and waterproof covering weighs 6.5 grams, has a volume of 1.4 cc, and normally transmits signals for 800 to 1,700 feet over rolling grasslands for 18 to 30 days. The package appears to cause no gross behavioral changes in instrumented rodents as small as 60 grams body weight.

PN-AAA-328 \$1.95

### A MULTIPLE-USE WILDLIFE TRANSMITTER

A.L. Kolz et al.  
1973, 14 p. (639.9-K816)

U.S. Department of the Interior Fish and Wildlife Service  
Denver, Col. 80225

A versatile wildlife monitor has been developed by combining a 164-megahertz radio-frequency transmitter with two digital integrated circuits. The design provides a basic pulsing transmitter for normal location monitoring, but simple circuit changes provide additional capabilities: monitoring of the animal's temperature, movements, or death (through either cessation of movement or drop in body temperature), and delayed turn-on. A fully assembled circuit weighs about 11 g; adding batteries, potting antenna, and an attachment device results in a package weighing 50-350 g, depending on operating time.

PN-AAA-329 \$1.95

### A RADIO-FREQUENCY BEACON TRANSMITTER FOR SMALL MAMMALS

A.L. Kolz et al.  
Jan. 1972, 3 p. (639.9-K81a)

U.S. Department of the Interior Fish and Wild Life Service  
Denver, Colorado 80225

A lightweight (1.4 grams with 8-day battery), short-range (90-200 feet), radio-frequency beacon transmitter is described for use on small mammals that have limited ranges. The unit does not contain a tuned antenna, and collar size is not critical. In preliminary tests with 12, 15- to 25 gram rodents, locations and individual body movements could be detected.

PN-AAA-330 \$1.95

### AN AUTOMATED ODOR TEST FOR RATS

Stephen A. Shumake et al.  
1973, 4 p. (632.693233-5562)

U.S. Department of the Interior Fish and Wildlife Service  
Denver, Colorado 80225

The odor-testing apparatus described consists of a circular

open-field area opening into four glass tubes, each with an odor source at the far end. When a rat is introduced, each grid (sampled each odor), the tubes automatically open and recording of preference behavior starts. Two measures of preference are recorded by a photocell outside each tube, the number of visits and the time spent near the odor source. A uniformity test with food odor in all tubes showed that the apparatus did not promote position bias. In two separate sensitivity tests, one with food odor and one with estrous female urine odor, male rats significantly preferred an attractive odor in one tube to odorless controls. The apparatus yields relatively sensitive and reliable odor preference determinations by ensuring sampling of each odor before data are recorded and by eliminating visual, auditory and gustatory cues.

PN-AAA-331 \$1.95

## **INFLUENCE OF STERILE MALES ON FECUNDITY OF A RAT COLONY**

James J. Kennelly et al.  
January 1972, 6 p. (632.96-K36)

U.S. Department of the Interior Fish and Wildlife Service  
Denver, Col. 80225

Eighty-five percent of the males in one of two colonies of Norway rats (*Rattus norvegicus*) were surgically sterilized. The control treated colonies produced 130 and 110 young, respectively. The greatest difference noted was in the number of pregnant juveniles at necropsy; nine were pregnant in the control colony but only three in the treated colony. The total number of pregnancies was 38 for the controls and 39 for the treated rats. The results suggest that an antifertility compound exerting an effect similar to vasectomy and affecting many, but not all, if the males in a rat colony would be ineffective in limiting population size.

PN-AAA-332 \$1.95

## **FIELD TRIAL OF MULTIPLE BAITING WITH ZINC PHOSPHIDE TO PROTECT GROWING RICE FROM DAMAGE BY RATS (*RATTUS RATTUS MINDANENSIS*)**

Richard R. West et al.  
May 1972, 6 p. (RP-632.951-W519)

U.S. Dept. of the Interior Fish and Wildlife Service  
Denver, Colorado 80225

Three intensive baitings along dikes in growing rice with bait containing 1% zinc phosphide did not cause a measurable effect on the rat populations or reduce damage. Inked tracking tiles were used to index animal abundance in six, nine-paddy blocks, each centered in a different 20-hectare area that was baited three times during the study, and in six similar blocks where control was left to the discretion of the owners. The mean percentage of tiles showing tracks was not significantly reduced with any of the baitings. Surveys of cut tillers at harvest showed damage was as great in the 54 test paddies (average 5.0 percent) as in the 54 reference paddies (average 5.3 percent). The baiting technique was inexpensive and incorporated several refinements of methods presently used by farmers, but appeared to be no more effective than the aggregate of local control methods. Bait acceptance may be a major factor limiting the effectiveness of acute toxicants as now used for rodent control in Philippine ricefields.

PN-AAA-333 \$1.95

## **CONTROL OF VAMPIRE BATS BY TOPICAL APPLICATION OF AN ANTICOAGULANT, CHLOROPHACINONE**

Samuel B. Linhart et al.  
1972, 8 p. (MX-632.964-L755)

U.S. Department of the Interior Fish and Wildlife Service  
Denver, Col. 80225

Common vampire bats were mist-netted, topically treated with an anticoagulant paste (chlorophacinone), and released. They returned to their roosts, where they contaminated other vampires. Control by this method in caves and on ranches reduced local vampire bat populations by about 97 per cent.

PN-AAA-334 \$1.95

## **IRRIGATION**

### **A BIBLIOGRAPHY AND LITERATURE REVIEW OF GROUNDWATER GEOLOGY STUDIES IN THE INDUS RIVER BASIN**

Alfred J. Tamburi  
April 1973, 41 p. (IN-016.33391-T156)

Colorado State University Engineering Research Center  
Fort Collins, Colorado 80521

A bibliography of studies of groundwater geology in the Indus Basin is presented, together with discussions of the regional geology and geography. A review of historic trends in groundwater development in the area is presented, and major contributions are indicated.

PN-AAA-335 \$3.05

### **A STRATEGY FOR OPTIMIZING RESEARCH ON AGRICULTURAL SYSTEMS INVOLVING WATER MANAGEMENT**

Jack Keller et al.  
July 1973, 25 p. (630.72-K29)

Utah State University Department of Agriculture Engineering  
Logan, Utah 84321

The rationale for a model for optimizing agricultural systems through knowledge transfer is developed and presented. The model attempts to disaggregate the environment into significant components which are also measurable. It uses crop production as the overall integrator of the agricultural system response to the husbandry program imposed at a specific site. The model should aid in organizing available crop data and investigations. It should form a useful outline to guide and provide a framework for a data retrieval system.

PN-AAA-336 \$1.95

### **IMPROVING IRRIGATION IN INDIA: THE NEGLECTED OPPORTUNITY**

K. William Easter  
Dec. 1973, 21 p. (N-333.913-E13)

University of Minnesota Institute of Agriculture  
St. Paul, Minnesota 55101

Over the centuries sizable investments have been made in India to develop the irrigation potential and these investments have continued during the first quarter century of independence. In this present article two different programs are considered which attempt to improve the water use and management in Eastern India. One is located in the HiraRud project which irrigates 282,000 acres in Sambalpur district of Orissa; the other is in Raipur district just west of Sambalpur in the state of Madhya Pradesh. Both projects attempt to improve the water use and management of existing irrigation by installing field channels to give farmers better control over water on each field. These projects represent the two ends of the cost spectrum. The Raipur project is capital intensive and costly relative to the Sambalpur projects, which consist of a simple system of village field chan-

## AGRICULTURE

nels installed at minimum cost. This article reports on the internal rates of return from these projects and highlights the importance of technically trained people and alternative project designs in making project viable.

PN-AAA-337

\$1.95

## LEGUME CROPS

### DEVELOPMENT AND FOOD UTILIZATION OF SOYBEANS

Earl R. Leng

April 1973, 152 p. (633.34-L566)

University of Illinois

Department of Agronomy, Urbana, Illinois 61801

Nutritionally and agronomically, there are good reasons to look to soybeans to alleviate critical world food shortages and to improve the diets of under- and malnourished people in many nations. Whole soybeans are an excellent source of protein—both in quantity and in quality. Research activities reported here had three broad objectives: (1.) To develop and demonstrate the University of Illinois process for making whole soybeans usable in human diets and a variety of food products that can be prepared from the basic processed whole soybean. (2.) To test the adaptability of improved soybean strains in tropical and subtropical locations, to identify highly productive, high-protein strains that can be grown in developing countries and to determine recommended cultural and management practices. (3.) To establish and maintain a computerized collection of biosystematic and ecological information on soybean insects available to researchers worldwide as a basis for developing effective pest-management programs to control insects that could limit soybean productivity.

PN-AAA-338

\$11.25

### DISEASES OF FOOD LEGUMES CAUSED BY PEA LEAF ROLL VIRUS IN IRAN.

Walter J. Kaiser

December 1972, 7 p. (IR-635.65-K13a)

Federal Experiment Station

P.O. Box 70, Mayaguez, Puerto Rico 00708

Various food legumes (pulse crops) are grown in Iran for human consumption and provide an important source of protein in the local diet. Virus diseases are a very important factor contributing to the low and erratic yields often obtained from these crops grown in Iran. One of the viruses affecting most food legumes in all major pulse grown regions of Iran is pea leaf roll (PLRV). This virus infects many leguminous crops grown in the country, including all pulse crops, except mungbean. At times PLRV has been a limiting factor in the cultivation of some food legumes in different areas of Iran. PLRV belongs to the group of plant viruses that are transmitted in a circulative (persistent) manner by their aphid vectors. Most aphids which colonize pulse crops in Iran are vectors of PLRV. Aphis vectors require longer feeding periods on an infected host to acquire PLRV, but retain the virus for extended periods, even through the various molts which occur in the development of an aphid. The virus is not transmitted mechanically and is apparently not seed-borne in the leguminous crops which are affected.

PN-AAA-339

\$1.95

### FACTORS AFFECTING GROWTH, SPORULATION, PATHOGENICITY, AND SURVIVAL OF ASCOCHYTA RABIEI.

Walter J. Kaiser

March 1973, 14 p. (635.65-K13)

Federal Experiment Station

P.O. Box 70, Mayaguez, Puerto Rico 00708

Isolates of *Ascochyta rabiei* from diseased chickpea (*Cicer arietinum*) from India, Iran, Turkey, and West Pakistan varied greatly in growth rate, sporulation, and colony appearance. In inoculation studies, *A. rabiei* infected chickpea, *Phaseolus vulgaris*, and *Vigna sinensis*, but was highly pathogenic only to chickpea. Of numerous chickpea lines tested, only one black-seeded type was highly resistant to most isolates of the pathogen. Pycnidia containing viable spores formed on dried chickpea stem pieces at temperatures of 10-30 C, but developed most quickly at 20 C. Mature pycnidia formed at 20 C in 46 hr. in continuous light, 50 hr. in alternating light and dark, and 68 hr. in continuous dark. The fungus survived over 2 yr. in naturally-infected chickpea tissue at temperatures of 10-35 C, relative humidities of 0-30% and on the soil surface. *Ascochyta* lost its viability rapidly at 65-100% relative humidity and at soil depths of 10-40 cm.

PN-AAA-340

\$1.95

## SOILS AND FERTILIZERS

### HUMID TROPIC SOIL MINERALOGY

Robert M. Weaver

1973, 2 p. (631.47-W363)

Cornell University

Department of Agronomy, Ithaca, New York 14850

This is a review article on the clay mineralogical composition of highly weathered and leached soils of the humid tropics. Attention is directed to recently reported results on the mineralogy of Ultisols and Oxisols from Africa and Latin America indicating appreciable quantities of amorphous aluminosilicates associated with the clay fractions. This amorphous material is different in many characteristics from the amorphous aluminosilicates called allophanes. Another mineral which has a high frequency of occurrence in the Ultisols and Oxisols is aluminum chlorite. The characteristics and formation of this mineral are discussed. The effect of the clay mineralogical composition of Ultisols and Oxisols on their ion exchange properties is elaborated.

PN-AAA-341

\$1.95

### ROOT RESPONSES OF THREE GRAMINEAE SPECIES TO SOIL ACIDITY IN AN OXISOL AND AN ULTISOL

Eduardo Brenes and R.W. Pearson

1973, 9 p. (631.41-B837)

Cornell University

Department of Agronomy, Ithaca, New York 14850

Sorghum roots were highly sensitive, corn roots moderately sensitive, and stargrass roots tolerant to soil solution aluminum in acid Ultisols and Oxisols. Stargrass was not affected by soil acidity even at pH 4.0. Corn root development was reduced only above 50 percent saturation of the cation exchange capacity with aluminum, although root growth decreased sharply with the first increment in chemical activity of soil solution aluminum. Sorghum roots were highly sensitive to aluminum, with essentially zero growth at 0.113 mM aluminum activity in the soil solution. Representative acid soils from the humid region of Puerto Rico contained less soil solution aluminum than did several selected from the southeastern United States at the same pH level. This confirms the observation that the critical soil pH range tends to be lower in soils of Puerto Rico than in those of southeastern United States. Soil solution aluminum concentration could not be predicted satisfactorily from pH alone, even for the same soil when free electrolyte content was varied. However, by including electrical conductivity as a measure of free electrolyte content, the aluminum level was calculated with acceptable accuracy using an equation developed from the data presented.

PN-AAA-342

\$1.95

**SOIL MICRONUTRIENTS**

M. Drosdoff  
1972, 7 p. (631.8-D787)

Cornell University  
Department of Soils, Ithaca, N.Y. 14850

Only with the advent of modern technology and intensification of crop production in the humid tropics has there been an awareness of the need for supplying one or more of the micronutrients along with other fertilizers. The increased productivity of commercial export crops in the tropics with the use of high-yielding varieties and the greater use of nitrogen, phosphorus, and potassium fertilizers has brought into sharper focus the need for greater attention to the micronutrient supply. Reports on deficiencies of zinc, molybdenum, boron, and other micronutrients in commercial plantings of coffee, cacao, rubber, oil palm, sugarcane, pineapple, citrus, and other crops grown extensively in the humid tropics are becoming more common. Reports on micronutrient deficiencies of annual food crops are less common, but undoubtedly the increased use of nitrogen, phosphorus, and potassium fertilizers on high-yielding varieties will stimulate a need for the application of micronutrients.

PN-AAA-343 \$1.95

**SOILS OF THE CENTRAL PLATEAU OF BRAZIL AND  
EXTENSION OF RESULTS OF FIELD RESEARCH  
CONDUCTED NEAR PLANALTIMA, FEDERAL DISTRICT,  
TO THEM**

M.G. Cline and S. W. Buol  
September 1973, 44 p. (BR-631.47-C641)

Cornell University  
Department of Agronomy, Ithaca, N.Y. 14850

The conclusions of the study are: (1) The results of the cooperative soils research at the site should apply to an immense area on the Central Plateau of Brazil; (2) Applications of the results may vary in detail on different kinds of soil of the plateau but the evidence indicates that the experimental results may be transferred directly to (a) dystrophic clayey Dark Red Latosols (Typic Haplustox or Acrustox, fine, isohyperthermic, kaolinitic) and (b) most areas of dystrophic, clayey, Red-Yellow Latosols (Typic Haplustox or Acrustox, fine isohyperthermic, kaolinitic); (3) Principles established by the research should apply to medium textured Dark Red and Red-Yellow Latosols and to the eutrophic varieties of both Dark Red and Red-Yellow Latosols; (4) The capacity of the Dark Red and Red-Yellow Latosols to supply water for crops during relatively short dry periods in the rainy season appears to be one of the very critical factors in crop production. It is suggested that the feasibility be investigated of constructing small ponds or reservoirs in suitable land forms of these soils for supplemental irrigation during the rainy season.

PN-AAA-344 \$3.30

**GENERAL ECONOMICS**

**PRODUCTIVITY GROWTH IN GERMAN AGRICULTURE:  
1850-1970\***

Adolf Weber  
August 1973, 86 p. (GE-338.1-W373)

University of Minnesota  
Institute of Agriculture, St. Paul, Minn. 55101

The process of agricultural development can be usefully interpreted as a dynamic process of induced technical and institutional innovation and factor substitution in response to growth in demand, changes in resource endowments, and changes in relative factor and product prices. The purpose of this paper is to describe the long-term trends in German agricultural develop-

ment for the period since 1850 and to test the "induced innovation" hypothesis against the German experience. Much of the contemporary literature in agricultural development has been preoccupied with crop agriculture and has ignored the potential contribution of livestock production, particularly small scale livestock production, in the agricultural development process. The German case is of significance since it provides an opportunity to explore the role of a small scale livestock sector in the development process.

PN-AAA-345 \$6.40

**A COMPETITIVE MARKET MODEL FOR "FUTURES"  
PRICE DETERMINATION**

Peter K. Clark  
August 1972, 21 p. (330-C594)

Center for Economic Research, Department of Economics,  
University of Minnesota, Minneapolis, Minn. 55455

A model of sequential competitive markets for "futures", is constructed and its properties examined. A "Slutsky equation" for the demand for futures is derived. The issue of short-term speculation is discussed by comparing a model in which costless recontracting is allowed with a model in which no recontracting takes place. The proposed model of speculative price determination is compared with the models of Radner and Keynes.

PN-AAA-346 \$1.95

**FACTOR INTENSITY OF CONSUMPTION PATTERNS,  
INCOME DISTRIBUTION AND EMPLOYMENT GROWTH  
IN PAKISTAN**

Ronald Soligo  
1973, 37 p. (PK-338.072-5686a)

Rice University Program of Development Studies  
Houston, Texas 77001

This paper examines the implications of different income distribution patterns on the rate of growth of income and employment. Income distribution can affect the demand for capital and labor if different income classes consume baskets of goods and services which differ in terms of their average factor intensity. The capital and labor intensity of consumption patterns was computed for both the average consumption patterns as well as consumption patterns out of increments to income. In both cases, urban households consume a more capital intensive and less labor intensive basket of goods and services than rural households in the same income class. Further the author concluded that within each sector, persons in high income classes have a higher capital intensive expenditure pattern than those in lower income groups. In the case of labor intensity, the author found that the consumption patterns of the lower income groups had a higher direct and indirect labor input per unit of expenditure than the higher income groups. In the second part of the paper the author computed the effects on income growth and employment of alternative distributional schemes.

PN-AAA-347 \$2.75

**INCOME DISTRIBUTION CONSEQUENCES OF  
AGRICULTURAL PRICE SUPPORTS IN COLUMBIA**

Wayne R. Thirsk  
1973, 35 p. (CO-338.13-T447)

Rice University Program of Development Studies  
Houston, Texas 77001

This paper examines the effect on income distribution and resource allocation of agricultural price supports in Colombia. The basic unit of analysis is an income class, of which there are five in total. Data are extracted from an input-output table for Colombia to indicate, for each income class, the amount of income

## ECONOMICS

earned in the production of any crop receiving support and the amount of income spent on the consumption of that crop. This data is used to calculate the zero-sum redistribution of real income which would occur in the following hypothetical situations: (a) a decline in support prices to world price levels; (b) a decline in support prices to world price levels adjusted for the extent of overvaluation of the Colombian peso. The latter comparison is made in order to consider how income distribution would change if an economically efficient set of support prices were established. The resource cost deviating from this particular set of support prices is also calculated. Two major conclusions emerge from this analysis. First, price supports in operation in Colombia appear to transfer real income from the lowest to the highest income groups. Second, the same supports impose an efficiency cost on the entire economy.

PN-AAA-348

\$2.60

### THE INCIDENCE OF COLOMBIAN TAXES, 1970

Charles E. McLure Jr.  
1973, 69 p. (CO-336.2-M166b)

Rice University Program of Development Studies  
Houston, Texas 77001

This paper reports the estimated distribution of income and incidence of taxation that prevailed in Colombia in 1970. Estimates are presented for the urban and rural sectors separately, though primary attention should focus on national totals. The estimates are based on data on the distribution of income and consumption patterns collected in several recent household budget surveys by the national statistical office (DANE) and on a variety of information on special topics (coffee, income taxes, transportation, special foreign exchange account, etc.). The bottom two-thirds of the income distribution (among households) receives only about one-fourth of household income and the top one-eighth accounts for roughly half of all income. In both the urban and rural sectors income is distributed quite unequally, but in both cases the inequality is less than for the nation as a whole. The Colombian tax system appears to exhibit a degree of progressivity ranging from rather mild to fairly strong, depending upon the assumed incidence of the corporation income tax and whether or not the coffee export duties are included in the analysis.

PN-AAA-349

\$5.15

### ORGANIZATION OF TRADE IN ONE TROPICAL MUNICIPALITY OF VERA CRUZ, MEXICO

Hugh L. Cook and Theodore Cook  
September 1972, 73 p. (MX-380.141-C771)

Land Tenure Center  
University of Wisconsin, Madison, Wisconsin 53706

The organization of agricultural trade in a small Mexican city is studied by making the market organization in that city a focal point for inquiry. Much of the produce consumed in San Andres Tuxtla originates in the state of Vera Cruz or nearby states. Surpluses are shipped elsewhere in Mexico by rail or by a hard surface road connected to the national highway system. Since most of the basic food items are produced nearby, their cost should be less and availability greater than in most of Mexico. Several government agencies are involved in marketing through price fixing, extension of credit, wage-fixing, etc. CONASUPO regulates supplies of basic foods by maintaining minimum and/or ceiling prices by buying from the farmers or importing items in short supply. However, few of the smaller farmers were selling directly to CONASUPO. The FONDO sponsors a rural credit program funded by AID. This program apparently is working quite well. The complexities of marketing agricultural products are summed up in 2 tables covering farm size, market and technical restrictions for output, and labor and capital requirements.

To draw the small farmer into the mainstream of economic growth and development, there should be greater government activity and more development of cooperatives.

PN-AAA-350

\$5.45

## AGRICULTURAL CREDIT

### CB: IBRD FARM MECHANIZATION CREDIT PROGRAM: PHILIPPINES

Ida Estioko  
December 1972, 25 p. (RP-631.3-E81)

The International Rice Research Institute  
Los Banos, Laguna, Philippines

Unlike many modern factors employed in agriculture, such as fertilizer and improved seeds, mechanization in its many forms represents a highly indivisible input. It is this lumpiness in investments for modern agricultural equipment which has given rise to much of the controversy pertaining to the effects of mechanization on the distribution of income and employment. These arguments contend that scale economies embodied in mechanical technologies result in ownership and use patterns heavily biased in favor of larger farms endowed with preferential access to productive resources, including financing for the acquisition of machinery. Tariffs, exchange controls, labor legislation and credit policies all have a direct impact on relative factor prices and the resulting resource allocation. While many of these factors are examined briefly, the focus of this paper is the role of credit in promoting the use of mechanization in Philippine agriculture. Specifically the author is concerned with the impact that credit programs funded by the International Bank for Reconstruction and Development and administered by the Central Bank of the Philippines have had on the rate and pattern of growth in mechanization over the past several years.

PN-AAA-351

\$1.95

### THE ROLE OF CO-OPERATIVE CREDIT IN SMALL FARMER ADOPTION OF NEW CEREAL VARIETIES IN INDIA

Michael G.G. Schluter  
May 1973, 42 p. (IN-332.71-5346)

Cornell University, Department of  
Agriculture Economics, Ithaca, New York 14850

A large number of micro studies have shown that small farmers have lagged in adoption of the new seed varieties, and that there is a close relationship between adoption by small farmers and use of co-operative credit in many areas. Co-operatives are also becoming the most important source of agricultural credit. However, the importance of co-operative credit in adoption is not universal and many aspects of this relationship are ill-defined. This paper examines four main questions to bring the issues more sharply into focus. (1) How important is co-operative credit relative to other factors in the adoption process? (2) Under what conditions, or at what stage of the adoption process, does credit become a critical factor in adoption? (3) Why are small farmers dependent on co-operative credit for adoption rather than on credit from moneylenders or other traditional sources? (4) Are demand or supply constraints critical in expansion of co-operative credit to small farmers for adoption of new varieties?

PN-AAA-352

\$3.15

## AGRICULTURAL ECONOMICS

### A GLOBAL REVIEW OF GREENHOUSE FOOD PRODUCTION

Dana G. Dalrymple  
October 1973, 161 p. (631.544-D151)

United States Department of Agriculture  
Economic Research Service, Washington, D.C. 20250

Controlled environment crop production is most nearly approached, on a commercial scale, in greenhouses. Greenhouses have been used for food production for over a century, mainly in developed regions. The introduction of plastic film during the 1950s lowered construction costs and made it possible for less affluent nations to use greenhouses. Among the newer techniques of environmental control used commercially are artificial cooling, carbon dioxide enrichment, use of artificial soil, and automated irrigation with liquid fertilizers. Desalted water is even used for irrigation in some oil-rich desert nations. Complete environmental control is possible but is seldom economically justified. Green house labor and capital requirements per unit of land exceed those for outdoor food crop production. Much of the work must be done by hand; there are usually few economies of scale beyond family sized operations. Capital investments for glasshouses in developed nations commonly exceed \$100,000 per acre. The most important crops produced worldwide are tomatoes, cucumbers, and lettuce. Fuel shortages or higher fuel prices could hinder expansion in northern regions, and transportation improvements could increase competition from open-field crops from southern regions. But on a global basis, environmental control via greenhouses will be increasingly important in agriculture.

PN-AAA-353

\$11.95

#### **THE ECONOMIC FEASIBILITY OF THE WEST AFRICAN REGIONAL POULTRY PROJECT**

Leo R. Gray and Norman G. Paulhus  
November 1973, 37 p. (AFR-338.1765-G779)

U.S. Department of Agriculture  
Economic Research Service, Washington, D.C. 20250

Since 1970, the U.S. Agency for International Development (USAID) has been assisting a West Africa Regional Poultry Project associated with the Organization pour la Mise en Valeur du Fleuve Senegal (OMVS). OMVS countries include Mali, Senegal, and Mauritania; Guinea was also a member, but withdrew from the project shortly after its inception. The regional project has been plagued with numerous problems, especially problems relating to management and a recurring feed grain supply crisis. Consequently, the USAID/U.S. Department of Agriculture team preparing this report, after evaluating these problems in an economic feasibility study of the project, concludes that USAID should terminate its involvement in this project soon, by December 31, 1973, if possible.

PN-AAA-354

\$2.75

#### **COSTS OF PRODUCING HIGH YIELDING RICE VARIETIES AND TRADITIONAL RICE VARIETIES IN SUPHAN BURI WET SEASON 1970, AND DRY SEASON 1971**

Tongruay Chungtes and William R. Burton  
May 1972, 10 p. (TH-633.18-C559)

Cornell University Department of  
Agricultural Economics, Ithaca, N.Y. 14850

During this past year the authors have been conducting field research in Changwat Suphan Buri on the economics of producing high yielding varieties (HYV) of rice. The senior author's interest has focused on the costs of producing HYV, while the junior author has investigated the productivity and distributive effects of growing HYV in the Suphan Area. The information presented in this paper is based upon a series of interviews with approximately one hundred and thirty farmers in six villages. Forty farmers were randomly selected from two villages in a

deep water, broadcasted rice area of Amphoe Bang Pla Ma where floating rice is grown. Ninety farmers were randomly selected from four villages in a transplanted rice area of Amphoe Sri Prachan where both traditional and HYV are grown.  
PN-AAA-355

\$1.95

#### **THE DIFFERENTIAL IMPACT OF GROWTH POLICY ON THE SMALL FARMER OF SOUTHERN BRAZIL**

Norman Rask  
February 1973, 20 p. (BR-338.1-R225a)

Ohio State University Department of Agricultural  
Economics and Rural Sociology, Columbus, Ohio 43210

This paper focuses on the impact of growth policies on the small farmer in the generally bimodal farm structure of Southern Brazil. The paper has three general objectives: (1) to test the appropriateness of the above small farmer classification systems in understanding the impact of growth policies on small farmers. (2) to describe the intra and inter sub-regional growth patterns on farms in a small farm unimodal and in a bimodal system. (3) to suggest policy changes that will lead to more satisfactory results. The discussion begins with a description of policies, technology and farming and institutional situations in the two sub-regions. This is followed by an analysis and comparison of farm level data from each sub-region. A final section examines the policy implications.

PN-AAA-356

\$1.95

#### **CAPITAL FORMATION AND THE FIRM-HOUSEHOLD DECISION MAKING PROCESS**

D.W. Adams and I.J. Singh  
October 1972, 19 p. (338-13-A211)

Ohio State University Department of  
Agriculture Economics, Columbus, Ohio 43210

Despite the difficulty of assembling appropriate data, detailed knowledge regarding the capital formation processes at the rural firm-household level is necessary if the development process is to be understood. No satisfactory explanation of rural growth can be formulated until we understand how the primary capital producing unit, the firm-household, makes decisions. The major focus of this research project, therefore, is on how the firm-household decision making process is related to capital formation. The following discussion is divided into three parts: (1) an outline of a firm-household decision making model which is being used to study the capital formation process, (2) a brief discussion of the major research issues on which the project is focusing in Brazil and Taiwan, and (3) an outline of how firm-household analysis can be aggregated into sub-regional or regional models for more comprehensive policy use.

PN-AAA-357

\$1.95

#### **THE EFFECTS OF TAXES AND SUBSIDIES ON LAND AND LABOUR UTILIZATION IN NIGERIAN AGRICULTURE**

Francis Sulemanu Idachaba  
April 1973, 33 p. (NI-338.1-I18)

Michigan State University Department of  
Agriculture Economics, East Lansing, Michigan 48823

The major objective of Idachaba's paper is to provide a theoretical framework for examining the effects of government and marketing board taxes on land and labor utilization in Nigerian agriculture. The author develops a multicrop production function model along the lines of G.L. Johnson's investment-disinvestment theory to analyze the effects of taxes on resource allocation. The model is extended to consider ways in which the allocative distortions from taxation might be minimized, in particular through subsidies on agricultural inputs. Empirical results

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on the effects of marketing board groundnut and cotton taxes on the relative prices of land and labor employed in these crops in the northern states of Nigeria are presented for the period 1950-1966. Idachaba concludes that taxes on these crops have resulted in: a) a reduction in the rate of entry of new and young farmers and additional land into Nigerian agriculture and b) an increase in the rate of exit of resources, both land and labor, from the Nigerian farm sector.

PN-AAA-358

\$2.45

### RESEARCH ON EMPLOYMENT IN THE RURAL NONFARM SECTOR IN AFRICA

Carl Liedholm

April 1973, 42 p. (AFR-338.1-L718)

Michigan State University Department of  
Agricultural Economics, East Lansing, Mich. 48823

Liedholm's paper is an outgrowth of the increasing emphasis being given by scholars to rural nonfarm activities as a source of income and employment generation in rural areas. The author first gives a descriptive profile of the rural nonfarm sector on the basis of existing information, primarily from Nigeria. He then develops and explores the implications of a theoretical model of the rural nonfarm sector based upon Hymer-Resnick model but modified to consider: a) the demand for rural nonfarm activity generated by urban and foreign consumers and b) the effects of backward and forward agricultural linkages on the rural nonfarm sector, e.g., the potential demand for rurally produced farm inputs and for indigenous processing of agricultural outputs, respectively. The paper concludes with a proposed approach to research destined for use in generating detailed micro-data on rural nonfarm activities in Sierra Leone.

PN-AAA-359

\$3.15

### METHODOLOGY AND PROBLEMS OF FARM MANAGEMENT INVESTIGATIONS: EXPERIENCES FROM NORTHERN NIGERIA

D. W. Norman

April 1973, 52 p. (NI-338.1-N842a)

Michigan State University Department of  
Agriculture Economics, East Lansing, Michigan 48823

Norman describes in this paper the basic objectives, methodology, and problems encountered with the series of farm management studies conducted by the rural Economy Research Unit (REU) at Ahmadu Bello University in Zaria, Nigeria since 1965. The RERU surveys have been designed to provide quantitative micro-data on rural areas in northern Nigeria for government planners and policy-makers. Norman describes extensively the methodology used to select areas, villages, and farms for investigation. He summarizes his "frequent interviewing approach" and the types of data which RERU has thereby collected. He considers the organizational problems of a) village representativeness, b) securing village cooperation, and c) selecting and training enumerators. He explores the RERU experience with data collection and describes the way RERU has resolved problems of choice of survey period, effects of seasonal variation, collection of data by field and plot, estimation of time, distance, area, quantities of inputs and crop yield, and problems associated with missing data, sensitive data, and data accuracy.

PN-AAA-360

\$3.85

### A FRAMEWORK FOR RESEARCH ON THE ECONOMICS OF FARM MECHANIZATION IN DEVELOPING COUNTRIES

Gordon Gemmill and Carl K. Eicher

April 1973, 71 p. (338.1-G323)

Michigan State University Department of  
Agricultural Economics, East Lansing, Mich. 48823

Gemmill and Eicher's paper provides a comprehensive review of research conducted on the economics of farm mechanization in developing countries. The paper first explores conceptually how mechanization and other technological changes in agriculture affect social and economic conditions in both the village and the developing country as a whole. Secondly, the authors consider the short, medium, and long-term decisions which governments must make concerning farm mechanization and examine the types of economic research which may be relevant to each class of decisions. The third major part of the paper reviews the existing body of economic studies on farm mechanization within the earlier presented conceptual framework and with particular attention to the question of how fully such studies have met the needs of policymakers. Detailed treatment is given to questions concerning the collection of data, the nature of the economic analysis, and the warranted policy implications from existing studies. Finally, the authors make a number of suggestions for the redirection of economic research on mechanization.

PN-AAA-361

\$5.30

### INDIRECT EMPLOYMENT AND INCOME DISTRIBUTION EFFECTS OF AGRICULTURAL DEVELOPMENT STRATEGIES: A SIMULATION APPROACH APPLIED TO NIGERIA

Derek Byerlee

1973, 83 p. (NI-630.9669-B993)

Michigan State University Department of  
Agricultural Economics, East Lansing, Mich. 48823

The paper proposes a simulation approach to exploring agricultural-nonagricultural interactions in general, and evaluating the indirect effects of agricultural development strategies on output, employment and income distribution in the nonagricultural sector, in particular. The interrelationships between the agricultural and nonagricultural sectors are first reviewed within the conventional two-sector framework with attention to employment and income distribution variables. It is concluded that a generalized analysis of these interactions requires a model that explicitly considers the several types of interactions in product and factor markets, that analyses the labor market in more detail, that assumes an open economy and that disaggregates the nonagricultural sector into at least a labor intensive sector and a capital intensive sector. Simulation is proposed as a versatile approach to theoretical and applied analysis of this type of economic system. A simulation model is developed to analyse the indirect effects of alternative food and export promotion strategies in the Nigerian economy.

PN-AAA-362

\$6.15

### TECHNOLOGY AND THE AGRICULTURAL OUTPUT MIX

Martin E. Abel and Delane E. Welsch

October 1973, 26 p. (338.1-A141)

University of Minnesota  
Institute of Agriculture, St. Paul, Minnesota 55101

There is widespread agreement on the importance of technology as a source of growth for agriculture. Furthermore, there is increasing evidence that factor endowments and relative factor prices play an important role in inducing technical change in directions which augment the supply of scarce factors. The purpose of this paper is to show how the allocation of research resources among commodities and the effects of such allocations on the output mix depend upon (a) the initial production conditions, (b) the nature of the research production functions, and (c) the nature of the demand relations for the commodity outputs. The basic model used is a two-factor, two-product model in which certain types of technical change are introduced. This model is presented and discussed in the next section. The third

section of the paper deals with the implications of technical change and demands for the outputs on the product mix. The policy implications of the analysis are discussed in the fourth part of the paper.

PN-AAA-363

\$1.95

### **THE MEASUREMENT OF TECHNICAL CHANGE BIASES WITH MANY FACTORS OF PRODUCTION**

Hans P. Binswanger

October 1973, 30 p. (338-1-B614)

University of Minnesota  
Institute of Agriculture, St. Paul, Minnesota 55101

Technical change biases have generally been measured in two factor models, using value-added functions. Two models of measurements of biases are considered, both using the Translog cost function. Model A assumes variable rates of biases and is used to derive long-term series of biases. Model B assumes the biases to occur at constant rates and can be used with regression models. Since a cost function is used, very few constraints have to be imposed on the production process in both models (e.g., it does not have to be homogenous of degree one). Both models are applied to U.S. agricultural data. For the period when data were available for both methods, the resulting estimates of bias were essentially the same, which gives support to the methodologies used.

PN-AAA-364

\$2.25

### **ECONOMICS OF TECHNICAL CHANGE IN WHEAT PRODUCTION IN PUNJAB (INDIA)**

Surjit S. Sidhu

January, 1973, 40 p. (IN-633.11-5568)

University of Minnesota  
Institute of Agriculture, St. Paul, Minnesota 55101

Northwestern India and Pakistan have achieved significant increases in yields and output of wheat. In this paper an attempt is made to determine empirically the parameters of this change in the Indian Punjab. Also, the author seeks to explain the process of absorption of new wheat technology over the four year period 1967/68-1970/71, that is, the process of technical change. The author has attempted to give empirical content to the change in production technology of wheat resulting from the introduction of Mexican wheat varieties in Indian Punjab. The models are simple and represent applications of the standard neoclassical theory of cost and production. Empirical evidence is based on farm-level primary data—for the years 1967/68 to 1970/71—the scope of which covers almost the entire state of Punjab and which have been generated by careful record keeping. The results indicate that the technical change has been approximately neutral—it has not been strongly biased in either a labor-saving or a capital-saving direction. It has been cost saving. Technical efficiency has increased by almost one-fourth and unit costs of production have declined by about 16 percent. The demand per acre for labor, fertilizer and capital inputs have increased by about 25 percent.

PN-AAA-365

\$3.00

### **RELATIVE EFFICIENCY IN WHEAT PRODUCTION IN THE INDIAN PUNJAB**

Sirjit S. Sidhu

January 1973, 36 p. (IN-633.11-S658a)

University of Minnesota  
Institute of Agriculture, St. Paul, Minnesota 55101

In summary there are two substantive conclusions that follow from the analysis of the data. First, there seem to be limited possibilities for growth by improving allocative efficiency in

moving toward production frontiers. This is the inference from tests indicating rational producer response to disturbances in the labor market generated by shifts in the labor demand function. On the other hand technical changes such as the shift in the wheat production function on the order of about 45 percent, popularly known as 'green revolution' constitute the more important source for potential increases of output. Second, the author finds that tractor-operated wheat farms are no better in terms of their economic performance than nontractor-operated ones and that large farms are no better than small farms—there are no differences in the technical and price efficiency parameters of these classes of farms. Policy for curtailing farm size may be based only on social and political considerations. Finally, the analyses of the data have yielded a number of elasticity estimates which are important for applications of economic theory for developmental policy. These estimates are the coefficients of the wheat production function and the elasticities of labor demand and output supply with respect to wage rate of labor, price of wheat and the quantities of land and capital.

PN-AAA-366

\$2.70

### **AGRICULTURAL MARKETING**

#### **EXPORT OPPORTUNITIES FOR VIETNAM AGRICULTURAL PRODUCTS IN JAPAN**

Robert E. Frye et al.

October 1973, 85 p. (VS-382.6-F948)

U.S. Department of Agriculture  
Economic Research Service, Washington, D.C. 20523

Japan has a large and expanding demand for agricultural products. Inputs for agricultural production or ingredients for further processing account for a major portion of Japan's current agricultural imports. Despite trade and agricultural policies that encourage self-sufficiency in domestic production of crops and animals, changing Japanese economic conditions are likely to result in increased imports of basic commodities as well as partially-processed and consumer-ready products. Vietnam has the capability of producing a large number of agricultural products currently imported by Japan. Japanese traders express strong interest in Vietnam as a source of imports. Immediate prospects for Vietnamese farm exports to Japan appear to be best for spices, onions, and garlic. A full assessment of the potential for exporting Vietnamese farm products to Japan must consider production and marketing costs, marketing and storage facilities, ability to deliver the quality and product characteristics required, and the vigorous competition among nations currently exporting agricultural products to Japan.

PN-AAA-367

\$6.30

#### **EXPORT OPPORTUNITIES FOR VIETNAM AGRICULTURAL PRODUCTS IN THE UNITED STATES**

Harold R. Linstrom et al.

October 1973, 78 p. (VS-382.6-L759)

United States Department of Agriculture  
Economic Research Service, Washington, D.C. 20250

Export potentials for Vietnamese fish, forestry, and agricultural products are being measured in a series of U.S. Department of Agriculture/U.S. Agency for International Development studies. This report discusses potential markets in the United States for spices, canned tropical fruit and vegetables, tea, coffee, pork, and sugar. Vietnam products having the greatest opportunity in the U.S. processed food market are cassia (cinnamon), black tea, and canned oriental specialty foods (e.g., bamboo shoots and water chestnuts). All opportunities are predicated on three main requirements: the Vietnamese product must be top quality, offered at a competitive price, and regularly available to the U.S. Buyer. The U.S. Sugar Act and its quota

## ECONOMICS

system pose a barrier to Vietnam's exporting sugar to the United States. Likewise, U.S. Government sanitation regulations all but eliminate the export potential for Vietnam's canned, or otherwise processed, pork.

PN-AAA-368 \$5.80

### WORLD DEMAND PROSPECTS FOR COFFEE IN 1980

Daniel W. Timms  
March 1973, 118 p. (382.41373-H568)

U.S. Department of Agriculture  
Economic Research Service, Washington, D.C. 20250

Coffee exports account for about 13 percent of total foreign exchange earnings of the coffee producing less developed countries. Multiple linear regression analyses of coffee consumption in the importing countries during 1952-65 indicate that declines in retail price and increases in real consumer incomes at the lower and medium income levels positively influence per capita consumption. In importing countries with relatively high per capita income levels, saturation levels for coffee consumption are increasingly evident; however, shifts in tastes away from alternative beverages and the lowering of domestic consumer tax levels have increased coffee consumption in some countries. World coffee consumption is projected to increase 2.2 percent yearly. At this rate, projected consumption would increase about 1.1 million metric tons, increasing export earning for the less developed countries by over \$860 million at 1964-66 prices. If a concentrated effort were made to expand export volume beyond the assumed equilibrium level—for example, by 12 percent—world coffee prices could be expected to fall 30 percent and coffee export earnings by 22 percent.

PN-AAA-369 \$8.75

### DEMAND FOR SELECTED VIETNAM FISH PRODUCTS IN SINGAPORE

Howard L. Steele  
May 1973, 133 p. (SN-382.43709597-S814)

International Development Center Economic Research Service  
U.S. Department of Agriculture, Washington, D.C. 20250

Singapore's economy is growing at a real rate of 9 percent yearly. A combination of factors makes it an attractive export market; population is growing at 1.7 percent per year from the 1971 base of 2.1 million, the domestic market is quite active, and it is one of the world's largest transshipment ports. Singapore imported 100,000 metric tons of fish products worth more than \$26 million in 1971. The business climate is excellent, well organized, and anxious to reestablish contacts with Vietnam. Vietnam can best earn foreign exchange from fish exports by supplying well-processed products to Singapore—shrimp, prawn, lobsters, and crayfish, for example, if these enterprises are profitable and fish resources are properly managed for the long run. Mackerel, red snapper, and threadfin are also in strong demand. Nearly 20,000 M.T. of these seven species were imported into Singapore in 1971. Prices vary by species, quality, pack, and month of delivery. Freezer sea freight from Vietnam costs less than \$100 per M.T.

PN-AAA-370 \$9.85

### NEEDS AND OPPORTUNITIES FOR IMPROVED GRAIN MARKETING IN PANAMA

Richard Phillips  
March 1973, 58 p. (PN-338.1731-P562a)

Kansas State University Food and Feed  
Grain Institute, Manhattan, Kansas 66506

The study of grain marketing represents an integral part of overall analysis for agricultural sector planning and development in

Panama. The general objective of the study is to identify major long-term needs and opportunities for improved grain marketing in Panama within the setting of balanced development for the total agricultural sector of the country. Specific objectives include the following: -Identify patterns of projected demand for grain and grain products; -Develop projections of grain production on potentials by province; -Develop projections of market volumes and distribution patterns; -Identify needed improvements in existing marketing and processing facilities; -Evaluate grain price policies and price support programs as they affect producers, handlers and consumers; -Identify major needs for supporting marketing services.

PN-AAA-371 \$4.30

### PRIORITIES FOR IMPROVING GRAIN MARKETING IN INDONESIA

Richard Phillips and Do Sup Chung  
June 1973, 25 p. (ID-658.809631-P562)

Kansas State University Food and Feed  
Grain Institute, Manhattan, Kansas 66506

The priority needs for improved grain marketing in Indonesia do not require consideration of a major capital loan at this time. A capital loan may be needed to finance such grain handling and storage facilities at the ports as may prove feasible, but cannot be recommended until a careful study of the economic potentials has been made. Other priority needs can be financed through program loans and through ongoing technical assistance programs in Indonesia. The priority needs observed by the Kansas State University team include the following: (1.) Careful study of the economic potential for possible port grain handling and storage facilities; (2.) Equipment and technical assistance for improved grain handling; (3.) Assistance in developing and administering an effective National rice policy; (4.) Assistance in conducting effective research and demonstration programs; (5.) Participant training programs in grain marketing.

PN-AAA-372 \$1.95

### DEVELOPMENT, UNEMPLOYMENT, AND MARKETING IN LATIN AMERICA

Kelly Harrison  
April 1972, 31 p. (LAT-380.141-H319)

Michigan State University Department of  
Agriculture Economics, East Lansing, Mich. 48823

In this paper the author contends that because of unequal income distribution and high unemployment and underemployment levels in Latin America, development planners should begin to examine issues of economic organization and exchange (marketing) in search of opportunities for stimulating development with broader participation by the masses. First, the author examines current concerns about underemployment of human resources and the related problem of unequal income distribution. Next, an alternative approach to development is outlined. Then, more specifically the role of micro and macro marketing reforms in such a development approach—offering some examples of the relationship between marketing development and employment is examined. In the last section, an attempt is made to summarize the argument and offer some conclusions.

PN-AAA-373 \$2.30

### IMPROVING INTERNAL MARKETING SYSTEMS AS PART OF NATIONAL DEVELOPMENT SYSTEMS

Harold M. Riley  
May 1972, 27 p. (380.141-R573)

Michigan State University Department of  
Agriculture Economics, East Lansing, Mich. 48823

The information base and the views expressed in this paper have been derived from a marketing research and development project (Latin American Market Planning [LAMP] Center) through which a Michigan State University group has carried out studies in Puerto Rico, Northeast Brazil, Bolivia, and Colombia in collaboration with local governments and their related agencies. The material being presented in this paper represents an accumulation of experience over a period of approximately seven years by the Michigan State University group. The primary purpose of this effort has been to conduct diagnostic studies in internal marketing systems linking large urban centers with their rural supply area and to formulate recommendations for marketing improvements. This activity has centered upon agricultural marketing broadly defined to include not only agricultural product marketing but also the distribution of farm inputs and consumer goods.  
 PN-AAA-374 \$2.00

**COMMODITY MODELING ALTERNATIVES FOR POLICY SIMULATION ANALYSIS: A CASE STUDY OF THE LAURIC OILS MARKET**

Walter C. Labys  
 August 1972, 46 p. (338.17461-L127)

University of Rhode Island  
 Department of Economics, Kingston, Rhode Island 02881

Commodity simulation models based on national and international markets increasingly are receiving attention as a means for analyzing policy decisions and for making market forecasts. This paper attempts to analyze the utilization of these models from several different points of view. First, an examination follows of the alternative forms of commodity models which can provide a basis for policy simulation analysis. Second, an important commodity market, that of the lauric oils, is selected to demonstrate the formulation of one type of commodity model. Third, the appropriateness of the model for policy simulation analysis is considered with respect to its analytical solution as well as several computer solutions. Although the unifying aspect of the paper is to reveal the nature of utilization of commodity simulation models, some attention is given to analytical and computer solutions as a means of validating this particular class of models. Empirical information also is included regarding market characteristics and simulation results.  
 PN-AAA-375 \$3.45

**PROJECTIONS AND PROSPECTS FOR THE LAURIC OILS: 1972-1987**

Walter C. Labys  
 June 1972, 7 p. (338.17461-L127a)

University of Rhode Island  
 Department of Economics, Kingston, R. I. 02881

A set of economic forecasts based on both quantitative and qualitative analysis of market prospects is presented. The forecasts have been more general than particular, but this has been the result of the difficulties of analyzing market prospects for a large number of specialized end-uses. Several basic uncertainties which limit the fulfillment of these forecasts are reviewed. The demand forecasts presented hopefully will be more meaningful as the surrounding uncertainties are lessened, especially with regard to supply. At present it appears that the Philippine coconut situation is improving with potential export availabilities in the near future closer to the high assumption than the medium assumption. Should no typhoons or droughts set back the anticipated increases for the Philippines, we should be entering a period of greater lauric oil export availabilities. No antici-

pated increases are foreseen immediately for Ceylon or Indonesia. Given the existence of adequate supplies of lauric oils on a world basis, the demand for these oils is likely to be steady, although increasing only slowly. This conclusion, of course, assumes that a period of adequate supplies will foster a price level which is both reasonably low and reasonably stable.  
 PN-AAA-376 \$1.95

**EDUCATION**

**INSTRUCTIONAL TELEVISION IN THE EDUCATIONAL REFORM OF EL SALVADOR**

Wilbur Schramm  
 March 1973, 95 p. (ES-371-3358-S377)

Information Center on Instructional Technology  
 Academy for Educational Development  
 1424 Sixteenth Street, N.W.  
 Washington, D.C. 20036

El Salvador faces difficult problems in the expansion and improvement of its education system. While most children in El Salvador do start school many drop out after a short time greatly reducing enrollment in secondary grades. An attempt is made to alleviate this problem by focussing upon the junior high schools for a systematic reform of the entire education system. The reform program encompasses developing new curriculums, teacher retraining, new study materials, and modernization of teacher supervision methods. However, the key element of the program is the introduction of instructional television (ITV). The reform program has clearly helped to introduce modern pedagogy into El Salvador's classrooms. In addition, there is tentative evidence that the ITV reform program contributes to greater equalization of learning gains and has a salutary effect on dropout and promotion rates. It is concluded that not all the benefits of ITV are costable, and that substantial savings can be achieved by applying ITV's capability to tasks other than teaching in classrooms.  
 PN-AAA-377 \$7.05

**DEPENDENCY AND EDUCATION IN COLOMBIAN UNDERDEVELOPMENT**

Rodrigo Parra Sandoval  
 June 1973, 80 p. (CO-370.09861-5218)

University of Wisconsin Land Tenure Center  
 Madison, Wisconsin 73706

Specifically, this paper addresses itself to the issue of education and dependency in Colombia, arguing *against* the notion that education is a prime factor in social mobility and development. Chapter I defines dependency in terms of its relationship to underdevelopment and the processes of industrialization and urbanization in Colombia. Chapter II addresses itself specifically to the relationship between the Colombian educational structure and dependency, stressing ties class. In Chapter III, a detailed statistical breakdown of university student distribution among Colombia's five regions is used to demonstrate further the ties between educational resources and development patterns fostered by extranational interests through investment. Chapter IV points out how the educational structure created by dependency as outlined in the first three chapters has contributed to internal contradictions, contradictions which have led to certain clashes in class interests and the attendant growth of political, economic, and social tensions.  
 PN-AAA-378 \$5.95

## PUBLIC HEALTH

### PUBLIC HEALTH

#### HEALTH AND DEVELOPMENT AN ANNOTATED, INDEXED BIBLIOGRAPHY

Kathleen N. Williams  
1972, 169 p. (016.61-W724)

Johns Hopkins University School of Hygiene  
and Public Health, Baltimore, Maryland 21218

This bibliography began as part of a pilot project to study health and development or, more specifically, the relationship between improved health, however measured, and economic development. The literature searches which provided most of the references were undertaken with the goal of improved health resources allocation in mind. Tangential subject areas were given less attention or deferred. The literature review was initially done in four main areas: health, population and demography, operations research and economics. The major categories were as follows: (1.) Economics or Cost and Cost Analysis, (2.) Economics—Medical or Economics—Hospitals, (3.) Group of health terms: Family Planning; Population Control; Community Health Services; Public Health; Social Medicine; Preventive Medicine; Preventive Health Services; Public Health Administration, (4.) Group of named diseases: Amebiasis; Cholera; Dysentery, Bacillary; Filariasis; Leprosy; Leptospirosis; Malaria; Onchocerciasis; Poliomyelitis; Schistosomiasis; Smallpox; Trachoma; Tuberculosis, Pulmonary; Typhoid; Typhus; Yaws; Yellow Fever; Malaria Control, (5.) Expenditures, Health, (6.) Social Change.

PN-AAA-379 \$12.50

#### STUDIES ON THE DIURNAL RESTING HABITS OF ANOPHELES ALBIMANUS AND A. PSEUDOPUNCTIPENNIS IN EL SALVADOR

Samuel G. Breeland  
March 1972, 8 p. (E-614.4323-B832d)

U.S. Public Health Service  
Center for Disease Control, Atlanta, Georgia 30333

Research objectives of the Central America Malaria Research Station (CAMRS) in El Salvador requires means of measuring anophelism apart from commonly used domicile methods. *Anopheles albimanus* and *A. pseudopunctipennis* are present in large numbers in natural diurnal resting sites, and are less abundant in artificial sites. Favored natural sites are "rock-oriented" and include crevices of large and small rocks, rock walls, and lava deposits in shaded areas. Tree trunks, cavities, and roots also offer favorable sites. From natural sites, 181 collections yielded 7,670 *A. albimanus* and 2,344 *A. pseudopunctipennis* for an average of 42.4 and 12.9, respectively. Of these, the sex ratio of *A. albimanus* was 24.5 percent males and 75.5 percent females, while that of *A. pseudopunctipennis* was 34.0 percent males and 66.0 percent females. *A. pseudopunctipennis* seemed to prefer darker, more protected niches than *A. albimanus*. *A. albimanus* females moved into resting turned between midnight and 3 am, whereas *A. pseudopunctipennis* females were absent from resting sites throughout the period of darkness. The results emphasize the usefulness of diurnal resting sites for density measurements associated with control projects and biological studies, and as a source of specimens for experimental use.

PN-AAA-380 \$19.95

#### STUDIES ON THE ECOLOGY OF ANOPHELES ALBIMANUS

Samuel G. Breeland  
1972, (LAT-614.4323-B832)

U.S. Public Health Service  
Center for Disease Control, Atlanta, Georgia 30333

Research objectives of the Central America Malaria Research Station\* (CAMRS) require broader studies on vector ecology than have resulted from the wall-spraying regimen of malaria eradication programs in the region. While CAMRS has conducted a number of studies related to dwelling-oriented activities of *Anopheles albimanus* in the evaluation of alternative residual insecticides and techniques of application, the major effort has been directed toward the development and evaluation of methodology not in common use in the region, including such diversified measures as area-wide and selective adulticiding and larviciding, engineering techniques, and biological control. In general, it seems that *A. albimanus* might be more zoophilic than anthropophilic, more exophagic than endophagic, more exophilic than endophilic, not particularly long-lived, and infrequently found harboring malaria parasites. Yet, this species is considered to have been responsible for the annual transmission of malaria to thousands of people in El Salvador. This might be due to overwhelming numbers, to the existence of extremely effective "strains" or to a combination of reasons not easily understood.

PN-AAA-381

\$19.95

#### EVALUATION OF THE INDIRECT HEMAGGLUTINATION TEST AS AN EPIDEMIOLOGIC TECHNIQUE FOR MALARIA

Irvin G. Kagan  
September 1972, 8 p. (614.532-K11a)

U.S. Dept. of Health, Education and Welfare  
Public Health Service, Atlanta, Georgia 30333

The indirect hemagglutination test is being evaluated as a seroepidemiologic technique for malaria. Employing serology as an epidemiologic method will be especially useful: (1) to measure the level of malaria endemicity; (2) to determine whether malaria transmission has been interrupted or reduced; (3) to delineate malarious areas; (4) to detect seasonal changes of malaria transmission; (5) for an independent termination of the intensity and distribution of malaria since it is not necessary to depend on the recorded malariometric surveillance information; (6) for identification of population groups with especially high rates of malaria infection; (7) to assess the coverage of the standard surveillance methods which are used to measure the occurrence of malaria; (8) to determine the role of migrants in the introduction of malaria from malaria endemic areas to receptive areas with little or no malaria; (9) for evaluating sera of malaria infected blood donors; and (10) for surveillance in areas of low endemicity.

PN-AAA-382

\$19.95

#### MOSQUITO LARVICIDE STUDIES WITH MON 585, A JUVENILE HORMONE MIMIC

W. L. Jakob and H. F. Schoof  
March 1972, 6 p. (614.4323-J25e)

U.S. Public Health Service  
Center for Disease Control, Savannah, Ga. 31402

Results obtained at the Technical Development Laboratories with MON 585, a synthetic hormonomimetic compound with unique activity for larvae of six mosquito species are presented. Technical MON 585 contains only carbon, hydrogen and oxygen, and has the chemical structure of 2,6-di-*t*-butyl-4-(*a,a*-dimethylbenzyl) phenol. Data from the manufacturer show that the compound has an acute oral LD-50 of 1,890 mg./kg. to female rats. Technical MON 585 was dissolved in 95 percent ethanol and serially diluted so that the addition of 1 ml. of solution to 250 ml. H<sub>2</sub>O effected the desired test concentration. A 3 lb. MON 585/gal. emulifiable concentrate (e.c.), used in certain tests, was diluted with H<sub>2</sub>O and pipetted into the medium. Laboratory and simulated field studies show that Mon 585, a

synthetic juvenile hormone mimic, was effective against larvae of *Ae. aegypti*, *C. p. quinquefasciatus*, *C. tarsalis*, *Ae. taenirohynchus*, *A. albimanus* and *A. stephensi*. Activity of the compound is expressed in death of newly formed pupae. Exposure of third instars to relatively high concentrations for intervals of 6 hours or less similarly resulted in mortality at the larval-pupal moult. The compound did not cause any larval mortality. PN-AAA-383 \$1.95

#### QUANTITATIVE DETERMINATION OF FEEDING RATES OF ANOPHELES ALBIMANUS LARVAE

D. P. Wilton et al.  
March 1972, 6 p. (614.4323-W755a)

U.S. Public Health Service  
Center for Disease Control, Savannah, Ga. 31402

Much of the food of mosquito larvae consists of particulate matter which they extract from the water by a filter-feeding mechanism. Dissections of a number of species have revealed a wide variety of microorganisms and high proportions of both organic and inorganic detritus in the gut with little evidence of selectivity. Mosquito larvae apparently ingest all available particulate materials which can be swallowed without regard for their food value. The feeding mechanism does not function with equal efficiency on all kinds of particulates, however. Factors such as size, concentration, and chemical make-up of particulates may be expected to influence the feeding process. A colorimetric technique using dyed food particles floated on the water has been developed for investigating the relation of particle size to food consumption by anopheline larvae. Simultaneous study of large numbers of larvae is possible with results expressed as pg. of food/larva/unit time. Tested with larvae of *A. albimanus* the method has demonstrated the relation of food particle size to feeding efficiency. PN-AAA-384 \$1.95

#### MOSQUITO BLOOD MEALS: IDENTIFICATION BY A FLUORESCENT ANTIBODY METHOD

Roger M. McKinney et al.  
March 1972, 7 p. (614.4323-M158)

U.S. Public Health Service  
Center for Disease Control, Savannah, Ga. 31402

A procedure was developed for specific fluorescent antibody staining of erythrocytes from various mammalian species for the purpose of identifying the source of mosquito blood meals. Antibodies were prepared in rabbits against the erythrocyte membranes of humans, cows, horses, pigs, and sheep. The serum globulin fractions were labeled either with fluorescein isothiocyanate or tetramethylrhodamine isothiocyanate, each of which produced brilliant fluorescent antibody staining of homologous erythrocytes. Although initially crossreactive, the conjugates were rendered specifically reactive, among the species tested, by adsorption with stroma preparations of erythrocytes from the heterologous species. A blood meal extracted from a single mosquito, when diluted with saline, was sufficient to make eight microscope slide preparations. By pairing and mixing fluorescein labeled antibody to erythrocytes of one species with rhodamine labeled antibody to erythrocytes of another species, it was possible to test for two species with a single microscope slide preparation, thus allowing one to screen for 16 animal species with a blood meal extracted from a single mosquito. Blood meals were identified by this technique up to 44 hours after ingestion by the mosquito. PN-AAA-385 \$1.95

## NUTRITION

#### POST-PRANDIAL PLASMA FREE METHIONINE AS AN INDICATOR OF DIETARY METHIONINE ADEQUACY IN THE HUMAN INFANT.

Dr. George G. Graham  
March 1973, 15 p. (612.398-G739p.)

Instituto de Investigacion Nutricional  
Apartado 55, Mira flores, Peru

Fasting plasma free methionine (met) levels were not different in infants consuming met-deficient and met-adequate diets. We have now measured plasma free amino acids (aa) just before and one, two, three and four hours after consumption of a single meal which was either limiting in met, limiting in another aa (lysine or threonine), or probably not limiting in any aa. In the first group postprandial plasma met was almost invariably below fasting, particularly at three and four hours. In the second group postprandial met was almost invariably above fasting, while in the third group (balanced diets) it was generally close to the fasting level, but with wider variation. When plasma met is expressed as its molar fraction of total essential and semi-essential aa, it discriminates more sharply between the different diets, notably at four hours.

PN-AAA-386

\$1.95

#### LACTOSE INTOLERANCE IN PERUVIAN CHILDREN: EFFECT OF AGE AND EARLY NUTRITION

George G. Graham et al.  
March 1972, 5 p. (PE-613.28-G739)

Johns Hopkins University  
Baltimore, Maryland 21218

The authors 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 breast feeding and continued milk consumption. Age appeared to be the most pertinent variable in identifying a subject's ability to hydrolyze and absorb lactose. Comparisons of several variables, such as length of breast feeding, continued milk consumption, or previous malnutrition were not significant contributors to the subject's ability to tolerate lactose. The Report's data on an impoverished Peruvian population suggest that, irrespective of the youngster's very early nutritional experience, be it nutritional reinforcement with milk as in our well-nourished siblings, or the deficiencies experienced by our malnourished children, the expression of this problem appears to be independent of these early nutritional events.

PN-AAA-387

\$1.95

#### NUTRITIONAL IMPROVEMENT OF WHEAT: NUTRITIONAL EVALUATION

Constance Kies  
June 1972, 11 p. (633.11-K47)

University of Nebraska  
Dept. of Food & Nutrition, Lincoln, Nb. 68503

At the University of Nebraska, the Department of Agronomy and the Department of Food and Nutrition recently entered into an agreement to cooperatively investigate the protein value of various wheat materials. Although both departments have other independent projects concerned with nutritional evaluation of cereal materials, the objectives of this project are as follows: (1) To set up a mass testing operation for biological evaluation of various wheat materials as sources of protein; (2) To attempt to

## SCIENCE AND TECHNOLOGY

isolate and define causes of variability among different wheat samples in relation to protein value; (3) To lay a foundation for establishment of general guidelines for predicting the value of wheat materials as sources of protein. This paper attempts to do two things: (1) Review our philosophy for what we are doing and why we have selected the procedures we have; (2) Review our progress. This project really is only fairly beyond the limitation stage.

PN-AAA-388

\$1.95

## SCIENCE AND TECHNOLOGY

### RESEARCH MANAGEMENT AND TECHNICAL ENTREPRENEURSHIP

National Academy of Sciences (Panel)  
September 1973, 49 p. (001.4-N277g)

National Academy of Sciences  
Washington, D.C. 20418

As the role of science and technology in the development process is better understood, a point of weakness looms: the limited capacity of developing countries to organize research and apply it productively. This report reflects an initial effort by concerned U.S. specialists to devise a U.S. technical assistance program aimed at remedying the problem. The main theme of the report is that U.S. knowledge and experience in research and technical management can be marshaled and adapted to provide training opportunities suited to the needs of the developing countries. U.S. practice in this context is not extensive, however, and we are not as aware as we should be of the cultural and other constraints that impede the assimilation of technology by developing countries. The report argues for an experimental approach to try out and perfect avenues of training, in concert with other countries similarly engaged, and to the fullest extent possible within the developing countries themselves.

PN-AAA-389

\$3.65

### MEETING THE CHALLENGE OF INDUSTRIALIZATION: A FEASIBILITY STUDY FOR AN INTERNATIONAL INDUSTRIALIZATION INSTITUTE

National Academy of Sciences (Panel)  
August 1973, 148 p. (338-N277)

National Academy of Sciences  
Washington, D.C. 20418

In 1972 the U.S. Agency for International Development requested the National Academy of Sciences and the National Academy of Engineering to examine the need, feasibility and demand for an international institute to perform research on new approaches to international industrialization that would benefit developing countries. In response, the Academies convened an international panel of distinguished and knowledgeable persons from both developed and developing countries. These experts included engineers, scientists, economists, bankers, lawyers, and industrialists. The report conveys the panel's deliberations as well as discussions that were held over the course of a year with more than 300 leaders concerned with those interviewed was that an institute as envisioned by the panel could contribute invaluable to the more orderly and harmonious industrial development of both worlds. Thus, it is the unanimous recommendation of the Academies panel that an International Industrialization Institute be established.

PN-AAA-390

\$10.95

### DEVELOPING SCIENCE AND TECHNOLOGY SYSTEMS: EXPERIENCE AND LESSONS FROM AGRICULTURE

John W. Mellor  
May 1973, 15 p. (630.72-M527a)

Cornell University  
Department of Agriculture Economics, Ithaca, New York 14850

The purpose of this paper is to describe the science and technology conditions of the agricultural sector and the means by which those conditions have been serviced, as a basis for drawing lessons for the development of similar systems for the industrial and other sectors. The underlying emphasis of the paper is on the special role research may play in a more employment oriented strategy of growth and the similarity of the industrial research needs in such a strategy to the needs of agricultural research. A high employment strategy requires good rapid growth in agricultural production through technological change, a structuring of the industrial sector towards relatively labor intensive modern industry and expanded trade, with export of efficiently produced labor intensive commodities in exchange for capital intensive intermediate products and capital goods. Each of these three elements of a high employment growth strategy requires science and technology support to facilitate increased incomes in accompaniment with rising employment.

PN-AAA-391

\$1.95

### TECHNOLOGY TRANSFER AND AGRICULTURAL DEVELOPMENT

V. W. Ruttan and Yujiro Hayami  
April 1973, 34 p. (338.1-R982a)

University of Minnesota Department of Agriculture  
and Applied Economics, St. Paul, Minnesota 55101

The "technology factor", in either its embodied or disembodied form, is increasingly recognized as a major source of differences in productivity and welfare over time and among nations. Yet technical change is one of the more difficult products for a country in the early stages of economic development to produce. In agriculture the initial success of the "green revolution" has resulted in renewed interest in the economic and institutional considerations involved in international technology transfer. In this paper, from earlier research on the diffusion of culture and technology we draw insights that can contribute to a more adequate understanding to the processes involved in the international transfer of agricultural technology and the impact of such transfer on the location of agricultural production and international trade in agricultural commodities. This analysis leads us to place major emphasis on the emergence of national experimentation capacity for adaptive research and development as a critical element in the international transfer or "naturalization" of agricultural technology.

PN-AAA-392

\$2.55

### TRANSPORTATION AND VIETNAM'S AGRICULTURE

Clarence A. Moore  
October 1973, 61 p. (VS-380.509597-M821)

United States Department of Agriculture  
Economic Research Service, Washington, D.C. 20250

Vietnam's water, rail, and road transportation industry has enough moving stock to transport an estimated 70 million M.T. of freight annually. The country's postwar agricultural freight transport requirements are estimated at 6.5 million M.T. Thus, the industry appears capable of handling the postwar agricultural transport task. However, repair of railroad and highway roadbeds, some dredging of waterways, and security of routes will be

necessary to attain the moving stock capability. Construction of farm-to-market roads in new agricultural areas and improvement in basic water and land routes and in transport moving stock could substantially lower costs and increase efficiency of transport. Recommendations for transportation improvements are given.

PN-AAA-393 \$4.55

**GENERAL SOCIAL SCIENCE**

**THE CITY WARD MOVEMENT:  
SOME POLITICAL IMPLICATIONS**

Wayne A. Cornelius  
August 1972, 16 p. (301.32072-C814)

Harvard University  
Department of Political Science, Cambridge, Mass. 02138

The massive population shift from rural to urban areas has been one of the most important social- and demographic-change processes in most Latin American countries during the past quarter-century. Increased rates of urbanization were general throughout the already much more urbanized than Africa or Asia and somewhat more so than southern Europe, surpassed all other regions in the rate of growth of its urban population. This paper focuses on the political attitudes and behavior of migrants residing in squatter settlements as well as other types of predominantly low-income residential zones in Latin American cities. The discussion is limited necessarily to low-income migrants, since data on the more economically advantaged sectors of the newly urbanized population are virtually nonexistent.

PN-AAA-394 \$1.95

**QUALITY OF LIFE-FAMILY**

Cecile H. Edwards  
September 1973, 224 p. (301.3-E26)

Department of Home Economics  
Howard University, Washington, D.C. 20001

To assess the feasibility of a major research and development effort in non-formal educational techniques to improve the quality of life in rural and urban family units in less developed countries (LDCs), the Howard University team obtained information by personal interview and from publications on families, non-formal learning, roles of women and men, paraprofessionals, research conducted and in progress, and change processes and agents. The study was confined to West Africa and the Caribbean and included Sierra Leone, Ghana, Nigeria, The Bahamas and Trinidad. Great interest was shown by village and urban people in obtaining more knowledge as a vehicle to improve their quality of life. Family life subject matter was identified as that most desired by the people in non-formal education programs. Radio and family unit education appeared to be feasible channels for such programs. Seventeen quality of life indicators were developed from responses of the village and urban people interviewed. Measures for enabling people to move toward their perceptions of quality of life were classified for each indicator as a basis for action programs in these LDCs. (Two volumes)

PN-AAA-395 \$16.60

**A COMPARISON OF PEASANT SOCIAL SYSTEMS OF  
NORTHERN AND SOUTHERN VIET-NAM: A STUDY OF  
ECOLOGICAL ADAPTATION SOCIAL SUCCESSION  
CULTURAL EVOLUTION**

A. Terry Rambo  
Summer 1973, 485 p. (VS-301.3409597-R167)

Southern Illinois University  
Center For Vietnamese Studies, Carbondale, Illinois 62901

The Vietnamese peasants residing in the Lower Mekong Delta (the Hau-Giang Region) of South Viet-Nam have a different social system from that of the Vietnamese peasant of the Red River Delta in North Viet-Nam. Why did the pioneer settlers of the Hau-Giang Region abandon traditional Vietnamese patterns of social organization and adopt a radically different system with no precedent in Vietnamese historical experience, although still maintaining numerous other aspects of traditional Vietnamese culture? The bulk of this study is concerned with exploring the applicability of possible explanations. Chapter I provides a theoretical and methodological introduction to the way in which the author attempted to investigate the problem at hand. Chapter II offers a comparative description of the two social systems, while Chapter III (the Natural Environment), IV (the Human Community), V (the Demographic Environment), VI (the Conflict Environment), and VII (the Politico-administrative Environment) examine the multiple environmental pressures to which the social systems in the two regions had to adapt. Chapter VIII (the Cultural Environment) discusses the possible effects of differential acculturation in Northern and Southern Viet-Nam, while Chapter IX explores the utility of the successional explanation.

PN-AAA-396 \$35.90

**SOCIAL SYSTEMS MODELS OF INDICATORS OF SOCIAL  
DEVELOPMENT. A PRELIMINARY METHODOLOGICAL  
FRAMEWORK**

Leslie D. Wilcox, W. Alex McIntosh, Kerry J. Byrnes,  
James Malia  
December 1972, 110 p. (301.3-W667)

Department of Sociology and Anthropology  
Iowa State University of Science and Technology  
Ames, Iowa 50010

The development of social indicators to be utilized by developing countries to assess their social development progress is discussed. An adequate set of social indicators should show how effectively a society is meeting its goals, as well as whether particular desired societal goals continue to be relevant over time in relation to other goals of the society. Historical background of the social indicator concept is reviewed. An evaluation of past research experience and a critical examination of a sample of some of the theories of development was made. Since most theories of development are inherently laden with the values of the industrialized, Western nations, and not those of the LDC's, it was suggested that a more inductive approach be taken when constructing social development indicators for the LDC's. The inductive approach to model building is discussed. A plan of study is outlined, consisting of procedures and tasks perceived as necessary in order to generate societal and sectoral models of social development.

PN-AAA-397 \$8.15

**THE BREAKDOWN OF PROVINCIAL URBAN POWER  
STRUCTURE AND THE RISE OF PEASANT MOVEMENTS**

Giorgio Alberti  
September 1973, 20 p. (PE-301.444-A334)

University of Wisconsin  
Land Tenure Center, Madison, Wisconsin 53706

It has long been recognized that the study of peasant movements requires two basic methodological rules for its proper understanding: first, the focus of the study must be both on the interaction process which binds the peasantry to its overlord and the social forces that impinge upon both poles of interaction; second,

## SOCIAL SCIENCE

such study must necessarily deal with the historical contexts within which the interaction process between lord and peasant develops. The main purpose of this paper is to apply these two methodological rules to a case study of (a) the transformation of a regional power structure and (b) the origins and development of a peasant movement that swept an intermontane valley of Peruvian Central Sierra dominated by the hacienda system, transforming it into a region of Indian communities. A second purpose of the paper is to derive certain theoretical generalizations from the empirical case which can be relevant for the development of a theory of political peasant movements. Finally, a third objective of the paper is to discuss in the light of the empirical information at hand the role of successful peasant movements in the development process of dependent, unequally developed societies, like Peru.

PN-AAA-398

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## DEVELOPMENT PLANNING

### ASSISTING AGRICULTURAL DEVELOPMENT IN NEPAL

Howard W. Hjort  
June 1973, 75 p. (NP-630.95426-H677)

U.S. Department of Agriculture  
Economic Research Service, Washington, D.C. 20250

Nepal's development efforts over the past 17-18 years have generated an impressive list of results. A number of institutions have been created and a relatively large pool of manpower has been trained. Roads, ropeways, bridges, and trails have been developed. Air transport services to isolated areas are now provided. Power generating capacity has increased greatly and more people have access to electricity. Industrial enterprises have been established. A growing number are in school, and health facilities and services are more readily available. Nevertheless, much remains to be done. The economic and social development programs still cannot operate in many geographic areas because the necessary infrastructure is not in place. The primary agricultural development goal has been to increase agricultural production. Significant progress has been obtained. The cultivated area has increased. More land is irrigated. About 600 extension agents are helping the farmers. Four of the five research farms are nearly up to standard. The Agricultural Marketing Corporation and the Agricultural Development Bank have a growing capacity to provide the major farm inputs. Sales of farm inputs and credit extended have risen sharply since the mid-1960's, although still far below the optimum levels.

PN-AAA-399

\$5.55

### AGRICULTURE IN VIETNAM'S ECONOMY A SYSTEM FOR ECONOMIC ANALYSIS

Rex F. Daly et al.  
June 1973, 336 p. (VS-338.13-D153)

U.S. Department of Agriculture  
Economic Research Service, Washington, D.C. 20250

This USDA/AID work pulls a broad range of Vietnam economic and demographic data into an economic intelligence system. The analyses of these data lend valuable insights into inner workings of the Vietnamese economy to aid decisionmakers. Data inadequacies are apparent, but the USDA/AID team worked to develop as much economic information as possible into a logical system rather than dwelling on data shortcomings. Several analytical techniques are used to quantify economic relationships. Regression analysis, ranging from simple linear relationships to polynomial distributed lags, formed the basis of

most of the analysis. Supply and utilization tables were constructed for major commodities, supplemented by seasonal analyses, index number construction, and a detailed economic profile. Much of the analysis is then drawn into an illustrative multi-equation framework of the Vietnamese economy. This framework provides important guides to policymakers through simulated alternative assumption levels. It also demonstrates important interrelationships within the agricultural sector, as well as between agriculture and the national accounts.

PN-AAA-400

\$24.90

### A STUDY OF SMALL INDUSTRIES IN GUJARAT STATE, INDIA

Jan H. vander Veen  
May 1973, 78 p. (IN-338.64-V241)

Cornell University  
Department of Agriculture Economics, Ithaca, N.Y. 14850

This paper presents a descriptive analysis of small industrial units in Gujarat State. Chapter II explores, very briefly, the industrial terrain in India and fixes the position of small units in that terrain. Chapter III outlines the approach adopted by the author in conducting a field survey of small industrial units in Gujarat State. Chapter IV highlights some of the chief economic characteristics of the small industries subsector. Chapter V examines the "materials intensive" nature of small industrial units and discusses the commercial orientation of the owners of these units. Chapter VI deals with the economic interdependence of small industrial units in the form of a statewide input-output table. Chapter VII concludes the study with a discussion of some of the policy implications of the findings presented in Chapters IV, V and VI.

PN-AAA-401

\$5.80

### A CONCEPT OF HUMAN RESOURCES SUGGESTING ACTIONABLE AID PROGRAMS

John Badgley  
December 1972, 48 p. (309.2-B135)

Johns Hopkins University School of  
Advanced International Studies, Washington, D.C. 20036

The purpose of this paper is to explore past assumptions by scholars and program officials in the field of human resources, and to propose an approach offering practical benefit to a majority population in countries receiving AID support. Comprehensive planning based in spatial and demographic considerations with focus on new urban centers offering "complete" services is recommended. Family planning, nutrition, health, education, and other welfare programs should be integrated within each region to improve the outreach of centrally dominated development. Decentralization is emphasized to hasten velocity of programs and to build within traditional community institutions when feasible. Involvement of local leaders in decisions about budget and emphasis of programs is a prescriptive measure recommended to enhance their identification with change. The paper weighs the idiosyncratic quality of each culture heavily, and proposes inclusion of expert social scientists (country specialists) within AID programs to serve as bridges with indigenous experts involved in planning. Sensitivity to communal values is of such importance that the author believes most projects will create greater problems than they resolve without weighing this factor scientifically at the outset and throughout the development of each project.

PN-AAA-402

\$3.60

**INCOME AND EMPLOYMENT GENERATION IN RURAL AREAS IN RELATION TO ALTERNATIVE FARM PROGRAMS WITH SPECIAL EMPHASIS ON THE NORTH CENTRAL REGION**

Earl O. Heady and Steven T. Sonka  
December 1973, 160 p. (US-301.35-H433)

Iowa State University  
Regional Center for Rural Development, Ames, Iowa 50010

The major objective of this study is to measure the economic impact of several types of farm programs on the income and employment generated in rural areas and agriculturally related industries. Since income and employment generation through farm programs is affected directly by the amount and distribution of crop production and the resulting levels of farm profits, an auxiliary but also major objective of the study is to analyze the impact of four alternative farm programs on the acreage and production of major field crops and on net farm income. The order of presentation is as follows: First, the methods and parameters employed in the study are summarized. Next, the secondary or multiplier effects of the farm programs in generating income and employment are presented and explained for the entire nation. This is followed by a discussion of the impact of these programs on income and employment in the North Central Region. Next, the effects of the four policies on the distribution of cropland acreages, the production of crops, net farm income and food costs are summarized.

PN-AAA-403 \$11.85

**BUILDING VIABLE FOOD CHAINS IN THE DEVELOPING COUNTRIES**

Richard Phillips and Samuel G. Unger  
August 1973, 134 p. (338.19-P562)

Kansas State University  
Food and Grain Institute, Manhattan, Kansas 66506

This Agribusiness Planning and Development Conference was the final segment of a three-part series of planning conferences and workshops sponsored by the Technical Assistance Bureau of the Agency for International Development. The over-all purpose of the series of conferences was to identify and explore key attributes of agribusiness planning and development to build more effective food systems in the developing countries. The consensus of the Conference was that the Agency for International Development can build more effective development assistance programs for food systems by establishing an Agribusiness focus which involves: (1) Utilization of the commodity system (food chain) approach; (2) Adoption of region-specific or area-oriented development programs; (3) Concentration of resources on commodities in space, time and form which have the greatest comparative strengths; (4) Assisting host countries develop a framework of National programs to support food chain development; (5) Development of formal cooperation and communications among the principal donor agencies providing assistance for food chain development.

PN-AAA-404 \$9.95

**WORLD FOOD DISTRIBUTION POLICIES**

Martin E. Abel  
December 1973, 19 p. (338.19-A141)

University of Minnesota  
Institute of Agriculture, St. Paul, Minnesota 55101

This paper is concerned with strategies for dealing with annual variations about the long-term trends in food production or demand, whether on a global or a country basis. The long-run trends in world food production and consumption are not dis-

cussed. However, long-run and short-run considerations are not independent of each other. To the extent to which the long-term trends imply an increased degree of specialization in food productions among countries and a growing volume of international trade in food, stability of food supplies and prices in an individual country are increasingly influenced by developments in other countries. Stabilization of food supplies and prices implies the existence of food reserves or reserve production capacity which can readily be brought into production. In this paper, both aspects of a food reserve are discussed in terms of grains. These are the commodities which form the basis of most of our food supplies, are most suitable for storage, and are large components of international agricultural trade.

PN-AAA-405 \$1.95

**CASE STUDIES IN AID CONTRIBUTIONS TO HUMAN RESOURCE DEVELOPMENT**

John H. Badgley  
October 1973, 58 p. (309.2-B135a)

John H. Badgley Institute of the Rockies  
Missoula, Montana 59801

This is a descriptive and evaluative report on ten country programs which illustrate AID approaches to human resource development. It is a sequel to a concept paper on human resources which suggested actionable AID programs to fulfil the goal of "creating new options for the populace". Based on interviews of two dozen AID officers, who were nominated by their peers as experts on one or more countries, this study searched for general principles revealed in specific country-settings where AID programs existed for at least a decade. The report on each country includes a brief summary of the size and scope of U.S. assistance, as well as a comment about its significance to the country's overall development scheme. For purposes of comparison the ten cases are divided into three categories: large program and moderate population, large program and large population, and moderate program. The study concludes that most programs lacked focus in trying to improve the human condition, both the material and mental well-being of the majority were considered beyond the reach of AID programs. This is evident in the lack of interest, until recently, in data on rural employment, income distribution, nutrition, and other measures of equity within the society.

PN-AAA-406 \$4.30

**ALTERNATIVE DEVELOPMENT STRATEGIES IN ZAMBIA**

Ann Seidman  
June 1973, 44 p. (ZA-338.96894-5458)

University of Wisconsin  
Land Tenure Center, Madison, Wisconsin 53706

This paper seeks to examine the development policies adopted by Zambia, not only because of their impact on the lives of the people of Zambia, but also because it is hoped that as a case study, it may illuminate the entire developmental process required to attain self-reliant economies in Africa. The paper is divided into three parts: first, an explanation of the problem of underdevelopment as it confronts Zambia; second, an analysis of the policies adopted by the newly independent Zambian government; and, third, the suggested outline of a development strategy which might more effectively achieve Zambia's goals, given the existing constraints.

PN-AAA-407 \$3.30

## SOCIAL SCIENCE

### **AGRICULTURAL DEVELOPMENT AND THE CENTRAL AMERICAN COMMON MARKET**

Rodolfo Quiros-Guardia  
January 1973, 63 p. (LAT-630.9728-Q8a)

Land Tenure Center  
University of Wisconsin, Madison, Wisconsin 53706

The Central American Common Market, including Honduras, Costa Rica, Guatemala, El Salvador, and Nicaragua, was established by treaties in 1959-60. The common market stage of economic integration has virtually been achieved; its immediate objective is formation of a customs union and achievement of free factor movements and its longer term objective is formation of an economic union among the 5 member nations. Economic integration is only a means to achieve economic development through acceleration of economic growth and the transformation of production and trade patterns. Regional integration is not a necessary condition for agricultural development, but it may expand the market for agricultural products, leading to stability, productivity gains, and economic growth in agriculture. Free trade should encourage greater regional specialization and production efficiency. Regional integration of research and training can lead to improved agricultural economy. A unified policy could enhance the bargaining power of the Central American nations as long as the major export crops remain competitive in international markets. Since agricultural exports provide 95 percent of total foreign earnings, agriculture plays a significant role in maintaining internal growth and balance of payments stability within the Common Market.

PN-AAA-408

\$4.70

### **METHODOLOGICAL ISSUES IN THE STUDY OF DEVELOPMENT**

A. Eugene Havens  
1972, 23 p. (309.22072-H386)

University of Wisconsin  
Land Tenure Center, Madison, Wisconsin 53706

It is appropriate, after concluding the Decade of Development, to take stock of where the study of development has taken us and where it has gone wrong. That it has gone wrong is painfully obvious given the meager results of efforts to improve the quality of life in most third world countries as well as the attempts on the part of advanced capitalistic countries to enhance the life chances of their less-advantaged sectors. A portion of these mistakes may be attributed to methodological errors in the part of those engaged in the study of development. The present paper attempts to review some recent approaches to the study of development and suggest what future steps are needed to develop a clearer understanding of the issues and approaches to developmental concerns.

PN-AAA-409

\$1.95

## **LAND TENURE**

### **A LONGITUDINAL ANALYSIS OF THREE SMALL FARM COMMUNITIES IN COLOMBIA: A COMPENDIUM OF DESCRIPTIVE STATISTICS**

Robert L. Whittenbarger and A. Eugene Havens  
June 1973, 50 p. (CO-301.35-W624)

University of Wisconsin  
Land Tenure Center, Madison, Wisconsin 53706

The present study describes changes in selected socio-economic characteristics in three areas of Colombia where one encounters small farm holdings. Each area is structurally distinct in terms of its relationship to the overall economic structure of Colombia. Nevertheless, the trends are basically similar. The small-farm sector has not received sufficient attention in Colombia to allow

it to either produce to its maximum potential or to absorb much of the labor force that it generates. Recently, both Colombian and foreign loan agencies have placed a higher priority on stimulating development of the small-farm sector. Thus, it is hoped that the data presented herein will be helpful in allocating new resources being made available to small farmers. First, data are presented on the general situation of the small-farm sector and then baseline and restudy data from changes that have occurred in a number of basic characteristics.

PN-AAA-410

\$3.70

### **CREATING OPPORTUNITIES FOR SMALL FARMERS: THE ROLE OF LAND TENURE AND SERVICE INSTITUTIONS**

Don Kanel  
August 1973, 20 p. (301.35-K16a)

University of Wisconsin  
The Land Tenure Center, Madison, Wisconsin 53706

This paper is concerned with the institutional organization of the agricultural sector. It deals with two types of institutions: (1) land tenure, including types of tenure and the size distribution of farms, and (2) service institutions performing marketing processing, credit, research, and extension functions. With respect to the latter, the major issue discussed is whether such services are widely available to all the farmers or whether they are primarily accessible only to the larger farmers. Under present circumstances of large rates of population growth in the less developed countries, it is important to prevent premature decrease of employment in agriculture, to minimize the stresses due to displacement of workers and increased insecurity of employment, and to achieve a wider distribution of the benefits of development. If larger farmers have a dominant role in adopting new technology, they may displace tenants and workers. A more egalitarian land tenure system is likely to decrease labor displacement, but if agricultural development is to be based on small farmers, then the creation of appropriate service institutions becomes crucial.

PN-AAA-411

\$1.95

### **HACIENDAS AND COOPERATIVES: A PRELIMINARY STUDY OF LATIFUNDIST AGRICULTURE AND AGRARIAN REFORM IN NORTHERN PERU**

Douglas E. Horton  
September 1973, 103 p. (PE-334.683-H823)

University of Wisconsin  
Land Tenure Center, Madison, Wisconsin 53706

The research upon which this draft paper is based was carried out in Peru from May 1970 until June 1972. Most of the time was spent on the north coast, interviewing people on, or familiar with, the haciendas of the Lambayeque Valley. The last six months of stay in Peru were spent in Lima, gathering secondary data, interviewing members of landowning families and agricultural technicians, and working with hacienda documents at the Centro de Documentacion Agraria. Part II summarizes very briefly the agrarian history of northern Peru, emphasizing changes in production patterns and hacienda organization in the last century, and the central role played by sugar in the agricultural growth of the region. Part III deals specifically with the haciendas of one of Peru's largest landowners, the Piedra family. Changes in production patterns and hacienda organization are described in detail and related to local natural condition, technological advance, market forces, and social and agrarian legislation. Part IV analyzes the effects of agrarian reform and cooperativization on these estates. Part V summarizes the above, relates the findings to the work of other students of agricultural organization and collectivization, and draws some conclusions of theoretical and practical importance.

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