

TECHNICAL COOPERATION IN AGRICULTURE



INTERNATIONAL COOPERATION ADMINISTRATION

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COVER: "I never saw maize like that before," exclaimed the Punjab farmer (right), when shown this hybrid corn developed through a technical cooperation project in India.



A Korean farmer harvested the bags of barley shown at the left from a field treated with fertilizer furnished under the ICA program. Another field, not fertilized, produced only one-half as much—the amount shown at the right.

TECHNICAL COOPERATION IN AGRICULTURE

Increased agricultural production is a critical need in all of the newly independent countries of the free world. The need is especially acute in countries with large populations relative to productive land.

Leaders in these underdeveloped areas are urgently concerned with answering the basic problem of how to provide enough for their people to eat and enough to wear. They also realize that industrial development must be preceded by increased agricultural output to help provide investment capital and a market for the goods of industry.

Technical cooperation in agriculture is one of the International Cooperation Administration's broadest fields of effort, accounting for a major portion of ICA's funds and personnel available for technical cooperation programs.

Because the technical cooperation program is comparatively young, dating from 1949, discussion of it in the past has been limited primarily to its aims and the techniques it intended to employ. Now, however, after the brief period of a decade, results are evident and it is possible to balance the challenge of technical cooperation in agriculture, the objectives set and the action taken, against achievements.

The evidences of agricultural improvements are not always spectacular. More often the result is a little extra food grain for the farm family, a few more eggs, and livestock spared from disease and loss through vaccination. The ancient grip of poverty is being broken for millions of people in less developed areas of the world with advice and assistance from the International Cooperation Administration and other outside agencies.

Challenge

In most of the newly independent nations malnutrition is widespread. Diets of the people frequently average half the calories consumed by the average American and less than the daily minimum required to maintain health. Diets are deficient in protein and certain other food elements essential to health.

People who eat less than enough to preserve their health cannot work efficiently, and the goal of economic development cannot be attained where people cannot work.

In the Near East and South Asia, where the majority of people live at a bare subsistence level, poverty is the common condition of the rural people.

In Africa a large percentage of the population depends upon subsistence farming with primitive techniques that have not been altered for centuries. The wheel is still rare in some areas south of the Sahara.

In Latin America agricultural productivity per worker is estimated at about one-fifth that of the United States.

At the same time the world population is growing and in many underdeveloped countries the population rate is increasing more rapidly than food supplies. Agricultural production is related to a number of factors. It may be affected by political instability. On the other



Varieties of rice are bred and tested at the Rice Institute at Bogor, Indonesia. Increased production is a vital goal since rice is the main staple of the diet and the crop is not at present sufficient for the needs of the country.

hand shortages of food and fiber may contribute to political unrest. Thus it can readily be seen that technical cooperation in agriculture is a vital component of the mutual security program.

A general problem in most of the new nations is a lack of trained personnel with the variety of skills needed. But a vicious circle is created by the limits imposed by low agricultural production on resources available for both training of personnel and the acquisition of equipment and facilities for training. Institutions serving agriculture usually are inadequate and government administration of agricultural programs is often poor.

Basically the challenge facing technical cooperation in agriculture is to increase agricultural production to a level which will sustain the health and working efficiency of the peoples of underdeveloped countries by teaching agricultural agents in each country how to teach their people improved farming practices. Many of the practices that need to be adopted are simple and inexpensive.

Objectives

The long-range task of technical cooperation in agriculture is essentially one of education at all levels:

- (1) Education of government officials in agricultural policies and in better management of government services to agriculture;
- (2) Development of better agricultural schools and colleges to produce field workers who can teach the farmers;
- (3) Instruction of the farm population in more productive agricultural techniques and better homemaking.

The most important aspect of these objectives is the need for the thorough inculcation of the philosophy that knowledge is useful only when it is put to work and that knowledge is most useful when it is working for most of the people.

These objectives require the development of new institutional arrangements and the alteration of traditional attitudes and customs. They are, therefore, long-range goals. In order to demonstrate the validity of new techniques and to inspire hope and confidence in the people, impact projects yielding comparatively quick results are coupled with the longer term programs.

The solution of the problem of increasing agricultural production does not lie simply in importing new gadgetry or in adding new physical resources. Rather the solution lies in teaching the masses of farmers better utilization and management of existing resources.



Honduran homemakers examine a handmade, hand-operated washing machine developed in ICA, which can be easily constructed at a cost of a few dollars. The machine has been introduced to home demonstration clubs around the world.

Action

The individual farmer holds the ultimate key to increased agricultural production. Furthermore, small farm ownership has proved a stubborn bulwark against communism.

The increasing emphasis which ICA is giving to projects which will reach and benefit the small, individual farmer is reflected in the allocation of funds. In fiscal year 1956 (1955-56), 18 percent of ICA's total funds for agriculture was programed for agricultural education, extension work, and research. In fiscal 1959, 32 percent was programed for such projects, and about the same percentage is proposed for fiscal 1960.

The total budget for technical cooperation in agriculture in fiscal 1959 was about \$30 million. In every country which participates in this program the host government also contributes from its own budg-

etary funds large sums of money, which are generally many times the U.S. contribution.

Most of the U.S. funds for technical cooperation in agriculture are expended for U.S. advisers in the cooperating countries, for the training of country technicians in the United States, and for equipment and supplies purchased in the United States.

At the beginning of 1959 ICA had technical cooperation programs in agriculture, including forestry and fisheries, in 54 countries. U.S. technicians hired directly by ICA were assigned to 49 countries. Technicians working under ICA contracts were assigned to 3 others. Two countries, Iceland and the Federation of Rhodesia and Nyasa-



At a farm tractor school in New Delhi, India, ICA technicians help train Indians to operate and maintain tomorrow's more complicated farm machinery.

land, had programs limited to training their technicians in the United States.

Of the 54 countries, 18 were in Latin America, 11 in the Near East and Southeast Asia, 12 in Africa, 9 in the Far East, and 4—Spain, Greece, Yugoslavia, and Iceland—in Europe.

In addition to individual country programs there are a number of important agricultural activities assisted by ICA on a regional basis. For example, the regional insect control project has had several years of success in South Asia, the Middle East, and Africa in developing cooperative control of locusts and other pests.

More than 1,100 U.S. agriculturists are currently providing advice and guidance in the countries participating in technical cooperation. Of these, some 800 are personnel directly employed by ICA, obtained primarily from land-grant colleges and agencies of the U.S. Department of Agriculture. Another 200 such technicians are engaged from teaching staffs of the 27 land-grant colleges with which ICA has con-



In the last 10 years technical cooperation on Taiwan has doubled the yield of rice per hectare. The seed, fertilizers, sprays, and implements pictured here, plus 10 days of labor for each person and water buffalo, produced the 62 bags of rice stacked in the center.

tracts for assistance to agriculture in the participating countries. Another 100 technicians are under other contracts for assistance to the cooperating countries.

The direct-hire technicians work individually through the grass-roots approach in the provinces, coordinating their efforts with those of other technicians. The contract teams provide the institutional approach through establishing and improving agricultural colleges and experiment stations.

Each year approximately 1,400 agricultural participants from underdeveloped countries receive training in the United States through the cooperation of the U.S. Department of Agriculture and the U.S. land-grant colleges. During their period of study in this country all participants observe the land-grant college system and the methods of disseminating information to farmers through the extension service.

An additional 500 participants each year receive training in other countries under the technical cooperation program. Most of these lack English language facility sufficient for training in the United States.

These agriculture participants are effectively utilized by their respective ministries of agriculture upon their return home. Many are assigned to highly responsible posts and exert increasing influence.

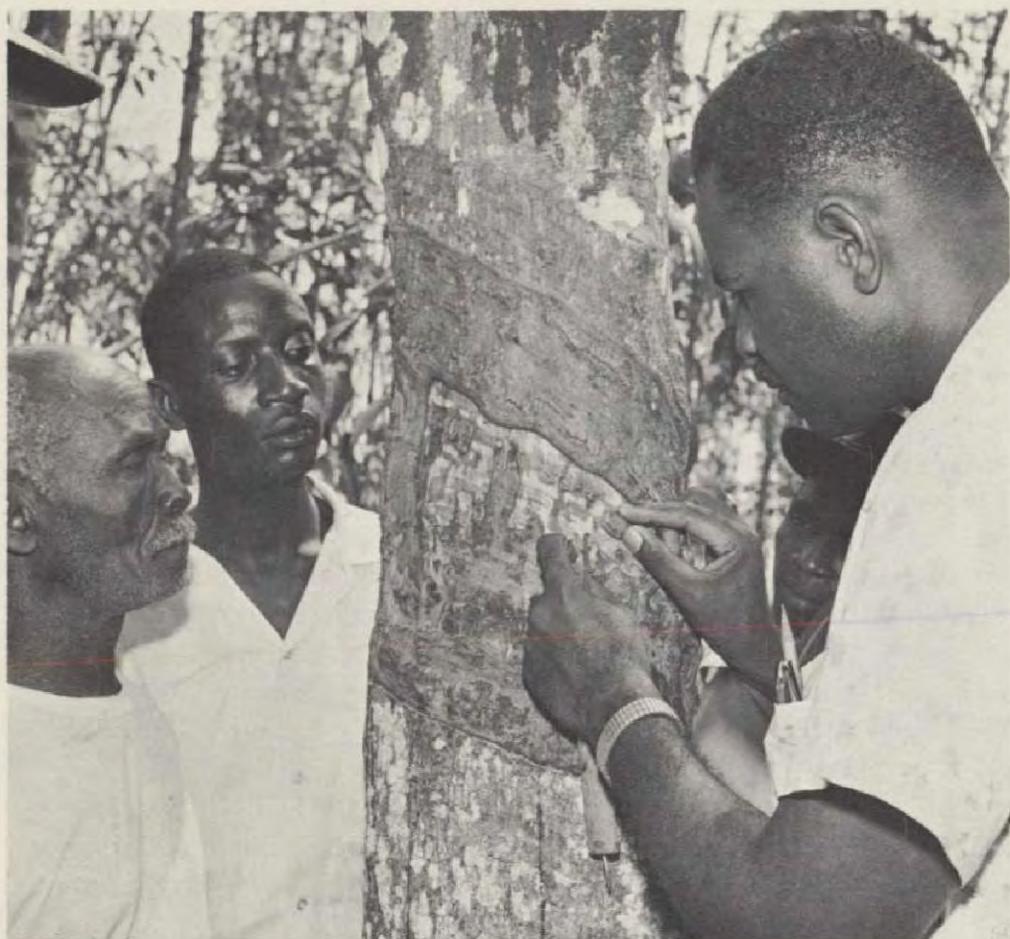
Achievement

The end benefits of technical cooperation in agriculture in most of the participating countries began to reach people on the farm only within the last few years.

Technical assistance from the U.S. Government to other countries goes back to World War II when Americans advised certain Latin American nations on the production of strategic materials such as hemp and rubber.

The present concept of technical assistance for mutual security was set forth in the point 4 program of 1949.

Since time was required to establish both U.S. and cooperating country organizations and to reach bilateral agreements, only 15 of the 54 countries received their first U.S. technical advisers before 1951. Between 1951 and 1954, technical cooperation programs were established in 23 additional countries, and in 16 others between 1955 and 1958.



An ICA agricultural extension adviser demonstrates to African farmers the damage to a rubber tree caused by improper tapping.

Even the bare statistical story of ICA technical cooperation in agriculture is exciting.

- Agricultural extension services introduced in 32 countries for the first time . . . 625,000 boys and girls enrolled in farm youth clubs overseas . . . 1,750,000 pounds of improved cropseeds distributed . . . 18,200,000 cattle, hogs, and chickens inoculated against disease . . . water brought to an additional 1,738,000 acres of cropland . . . 4,597 new water wells dug or storage reservoirs built.

Whole communities and major segments of a nation's entire population have felt the impact of technical cooperation in agriculture.

- The new agricultural extension service in Peru, assisted by ICA, helped farmers to expand the planting of castor beans from 1,000 to

20,000 acres in 3 years, besides distributing a million pounds of improved seed, 45,000 nursery plants, 14,000 chicks and small animals, and 450,000 pounds of fertilizer. Extension agents have reached approximately 250,000 farm families in Peru and crop yields have tripled in several communities over the last 10 years.

- Through peaceful and democratic processes and with ICA advice the Philippines has instituted several basic programs designed to alleviate old land distribution and utilization problems. Laws for improved conditions of tenancy have been enacted and enforced. Public lands have been surveyed, cleared of malaria, and opened for settlement. Greater opportunities have been opened for tenants to purchase land. Since 1955 a total of 7,200 land disputes affecting 110,000 tenants have been settled; 22,000 families have been resettled on public lands; some 200,000 landownership titles have been issued; and 130,000 acres have been purchased from large estates for resale to tenant farmers.

- A Bedouin tribe near Jubeika, Jordan, has borrowed from the agricultural bank to build houses for 1,500 persons in two new villages.

- In Ecuador the combination of a favorable government policy, a roadbuilding program, and a good world market resulted in a phenomenal expansion of banana production from 3.9 million stems in 1948 to almost 24 million stems in 1955. During this period Ecuador became the world's largest producer of bananas, and bananas became that country's chief source of export income. Then sigatoka, a serious leaf disease, spread through the banana crop and threatened to devastate the industry. A research program started in 1954 by Ecuadoran technicians and their ICA advisers developed new techniques for sigatoka control. After an initial field test on 4,000 acres in 1956, the new methods were used commercially on 79,000 acres in 1957, and their use has continued to spread. As a direct result Ecuador's banana exports rose to 32 million stems in 1957 and exports of 38 million stems were predicted for 1959.

Countless individual small farmers have begun to see the results of technical cooperation in agriculture.

- Haif Haddad, an ex-soldier in the Arab army, farms near Amman, Jordan. The agricultural credit program in Jordan enabled him to borrow enough money to buy five cows and two calves and to build a concrete dairy barn. He now makes a profit selling milk in Amman.

- Ali ben Mohamed, a poor Libyan farmer, invited ICA technicians to inspect his farm. He wanted to plant olive and fruit trees but realized they would need irrigation, and he thought he should



Day old chicks were flown from the United States to Israel, through ICA's technical assistance program, to help improve Israel's production. As a result of the success of this project, Israel herself now sends chicks to other countries. It is estimated that 2½ million will be exported in 1959.

build a cistern to provide a handy source of water. Ali borrowed tools from the Government and, with the help of his two brothers, dug a new cistern. ICA furnished cement for the lining. Eager to get started, Ali purchased a dozen olive trees at a nominal cost under an ICA-assisted project and is carrying water a mile and a half for these few trees until his cistern, which will provide water for several dozen trees, is filled.

The Extension Service

Agricultural services—extension, research, education, farm credit—which reach the families on the land provide the most effective means for improving the living standards of rural people and increasing agricultural production.

The most common symbol of such service in rural areas of the United States is the county agent. He is the catalyst whose advice

during the last 40 years has been a major factor in making American farmers the most productive and prosperous in history.

ICA is offering this highly successful and unique system to other countries, and 44 countries have accepted the offer. Two hundred former county agents and their associates serve as agricultural extension and home economics advisers in cooperating countries. They comprise the largest single bloc of ICA technicians.

Illustrative of the results of agricultural extension around the world are the following examples.

- One of the "oldest" new extension services is that established by Greece in 1949. Today the mayors of 27 Greek villages are former members of 4-H clubs sponsored by that service. The system in Greece has advanced to the point where its extension officials now serve as short-term consultants to other countries.

- The extension service established in Spain in 1956 now has 134 agents in 36 of Spain's 50 provinces. Introduction of hybrid corn is a main extension activity.

- The Bureau of Agricultural Extension in the Philippines maintains 5,000 plots throughout the islands as demonstrations of improved practices for production of corn, rice, and other food crops. The 285 home agents in the islands have helped farm women install 72,600 "blind" drainage systems to eliminate stagnant water pools beneath their kitchens.

- In November 1958, after several years of encouragement from the ICA mission, Yugoslavia established a Federal Center for Extension Service. Korea also enacted legislation in 1958 for a permanent extension service.

- In the Iranian state of Azerbaijan, bordering Russia, 23 agents of the new agricultural extension service are teaching farmers improved techniques including use of moldboard plows; control of pests and diseases of wheat, fruit, and vegetables; and artificial insemination of their dairy cows. Two farm machinery cooperatives have been organized and a special project to encourage the production of white wool from sheep has been adopted by 30 farmers.

- The extension service established in Viet-Nam in 1955 had expanded into 21 provinces by 1958. It had carried out 728 farm crop demonstrations, had enrolled 2,200 young women in home improvement clubs, and in 1958 alone had visited 30,500 farms and homes.

- Extension work is well organized in Jordan. In the 5 years since it was established, the Jordan service has helped 22,000 farm families improve their production and living levels. A corps of 110 trained workers, including 15 women, are in contact with families in

800 villages. About 600 of the villages have extension committees of 3 to 15 elected members who plan and direct improvements with the guidance of the trained agents. One measure of the strength of extension work in Jordan was the bypassing of a local extension office during a village riot when the mob leaders shouted: "This is ours. Don't wreck it."

A partial tabulation shows 37,983 extension agents, including 1,274 women home economists, on national extension rolls in countries receiving ICA assistance.

Farm Youth Clubs

Like their 4-H Club prototypes in America, some 625,000 boys and girls in 33 countries are organized into 19,774 clubs to engage in improvement projects.

"Four" is the universal common denominator for these youth clubs. Adaptation of the American 4-H (Head, Heart, Hands, and Health) takes many forms: 4-Leaf in Nepal; 4-K in Turkey; 4-S in Bolivia, Panama, and Colombia; 4-C in El Salvador and Paraguay; 4-D in Iran; and 4-F in Ecuador.

Improvement techniques developed by the American 4-H clubs are found in a number of countries. A cockerel exchange plan enables club members to receive purebred roosters in exchange for low-grade native fowls. Club members in "pig chains" receive high-grade boars



A young Ecuadoran shows a champion ram which he raised under the Club 4-F program.

Vietnamese farmers sign for loans under a new agricultural credit project.



and agree to give one of the offspring from each litter to another club member. The same two plans are also used by adult farmers on a wide scale—often after introduction by the youth—for the upgrading of livestock generally.

The youth clubs frequently lead their parents toward improvements. Through their 4-S clubs in Bolivia, the organized farm youth have stimulated their elders to build 20 new school buildings and have cooperated in the construction.

Agricultural Credit Services

Many simple but significant improvements in farming, such as cleaner cultivation, can be installed by the poorest farmers without money outlay. Many other desirable practices, such as the use of improved seeds or plant pesticides, require a cash expenditure—perhaps only \$10 or \$20 a season but still beyond the present incomes of most farmers in underdeveloped areas.

Hence a system of agricultural credit for small borrowers is a must for substantial expansion of farm output in Africa, Asia, and Latin America. At present these small farmers must depend almost entirely upon private money lenders who often charge interest rates as high as 100 percent and sometimes more. One reason for the excessive interest charges is the unproductive use of credit by the farmers. This makes technical supervision of the use a necessary part of a sound credit program. Thus the establishment of an extension service goes hand in hand with credit as does cooperative marketing in many countries.

Thirty-one countries in Africa, Asia, and Latin America now have ICA-sponsored U.S. technicians to advise on the establishment

of credit services. These are often linked with farmer cooperative associations, which handle both credit and marketing.

Eighteen countries already have established agricultural credit systems operating with ICA advice. Incomplete reports from 11 countries tabulate a total of 782,000 farmer-borrowers benefiting from these credit opportunities which were nonexistent a few years ago.

The figures show in a graphic manner that this component of technical cooperation in agriculture yields benefits directly to the people on the land.

- Peru's agricultural credit system made 7,000 loans to assist 30,000 rural families in 1957-58. In the Montaro Valley 12 farms in Pucara used credit to triple their production of potatoes, barley, and quinoa (a plant that produces seeds used as a cereal). The valley showed a record of 82 percent repayment of loans before due dates.

- Viet-Nam now has 79 farmer cooperatives. Crop loans have aided 361,000 Vietnamese farmers.

- In Panama 22 credit cooperatives have been organized with 1,400 members.

- The Philippines has advanced from no rural cooperatives in 1952 to 478 cooperative credit and marketing associations in 1958, with 276,000 farm family members and loans totaling \$85 million. In addition 115 rural banks, lending to both small farmers and rural businessmen, have been organized with loans totaling \$14 million. The cooperative lending agencies have enabled 60,000 farmers to acquire water buffalo for work animals.

- The Agricultural Bank of Libya, founded in 1956, has loaned \$1,400,000 to 2,500 farmers.

Agricultural Education and Research

Sustained and efficient agricultural development in a country depends upon systematic education and research. In the United States this process is organized into the land-grant college system of state colleges of agriculture and mechanical arts established by Federal legislation in 1862.

Under ICA-financed contracts with 27 American colleges and universities, the concept of the U.S. land-grant college is being adapted and transplanted to 19 underdeveloped countries. In addition Viet-Nam is developing an agricultural college with advice from direct-hire ICA technicians. Several countries have started vocational agriculture schools and classes for the training of farmers and of agricultural agents for village work.

Reports from 10 cooperating countries showed more than 9,000 students enrolled in 1958 in agriculture and forestry classes.

- India has the largest project for higher agricultural education in the technical cooperation program. Five U.S. land-grant universities, under ICA-financed contracts, are cooperating with 42 Indian agricultural and veterinary colleges to develop leadership training and services for a land-grant college system. Enrollment in the 42 institutions had risen from 1,492 in 1952 to 3,027 in 1958. Research and teaching are being integrated. Extension methods are being taught. Agricultural information services have been started by some colleges.

- The first permanent agricultural training centers in Ethiopia were established in 1952 by Oklahoma State University under a contract financed by ICA. The Imperial Ethiopian College of Agricultural and Mechanical Arts, established at Alemaya in 1956, has graduated 18 students and trained 59 agents in extension teaching methods. The enrollment in 1958 was 163. At the Jimma Agricultural Technical School, administration is being transferred gradually to Ethiopian personnel.

- In the Philippines the College of Agriculture and the College of Forestry are receiving contract assistance from Cornell University.



Ethiopian students with an Oklahoma State University adviser examine pineapples grown for demonstration purposes at the Jimma Agricultural Technical School.

Enrollment in agriculture and home economics rose from a prewar peak of 881 to 3,149 in 1958, while the number of forestry students increased from 174 in 1952 to 386 in 1958. Sixteen major buildings have been rehabilitated and the Philippine professional staff at the College of Agriculture increased from 99 to 247 in 5 years.

- The first class to complete a 4-year course at the Karaj Agricultural College in Iran was graduated in 1959. During the 5 years from 1954 to 1959 enrollment increased from 150 to 400 students. Assisted by Utah State University, the college has conducted valuable research on the improvement of dairy breeds.

Land Tenure and Settlement

Ancient systems of land ownership and crop sharing hamper agricultural development in many countries. Thousands of tenant cultivators have no more freedom of operation than medieval serfs and do not receive a fair share of what they produce. Under these conditions the farmers on the land lack incentives and resources to adopt improved practices such as high-yielding seeds or better bred livestock.

Related problems include absence of registry of landownership titles, tribal ownership systems which impede productive land management, absentee ownership of large areas of land suited to farming but lying idle, fragmentation of farm tracts into many small uneconomical plots, and large areas of underdeveloped public lands.

Countries which have requested U.S. specialists to advise on improved land tenure systems, and which are currently receiving such assistance, include Guatemala, Iran, the Philippines, Spain, Taiwan, Thailand, and Viet-Nam.

- More than 350,000 acres of interior farmland have been opened for settlement in Guatemala.

- By the initiative of the Shah the land in 700 crown-land villages in Iran is being distributed to 400,000 tenants, with plans calling for an additional 200,000 farmers to receive title to public lands by 1963.

- With the assistance of U.S.-owned local currency Spain has undertaken a land consolidation program. By the end of 1958 about 21,111 fragments of land had been consolidated into 3,457 units totaling 37,900 acres. The program will ultimately involve 4 million acres and 126,000 owners. Under the old fragmentation pattern farmers had attempted to cultivate as many as 20 or more separated plots of land.

- In Taiwan land reforms begun in 1949 have resulted in land-ownership or part ownership for more than 80 percent of the country's farmers, as well as a reduction in land rental scales. An estimated half million farm families have benefited.



The model of a build-it-yourself overshot haystacker is demonstrated to county agents at a short extension course at the University of Ankara Agricultural College in Turkey.

• Viet-Nam, faced with the need to assimilate thousands of rural refugees from north Viet-Nam, has developed 20 villages on idle lands to accommodate 12,000 farm families. Each family has a house, a garden plot, hand tools, and a work animal. Also in Viet-Nam, some 704,000 tenure contracts have been registered under a new rent control and tenure security ordinance. Ownership of about 500,000 acres of land has been transferred to tenants.

Technical Agriculture

The development of agriculture requires a continuing process of coordinating research with application. Established knowledge and experience must be evaluated. Improved techniques must be developed and tested in practice. Information on proven methods must be disseminated and demonstrated.

ICA has provided approximately 500 specialists to advise on specific technical problems of individual countries. Their specialties include agronomy, entomology, horticulture, animal husbandry, poultry, veterinary medicine, soil conservation, irrigation, drainage, farm equipment, and crop storage.

Crops. Programs to enable farmers to plant improved seeds are underway in 43 countries and involve the selection, breeding, multiplication, and distribution of high-yielding varieties. U.S. horticultural

turists are assigned to 25 countries to advise on the control of plant diseases and on the improvement of planting stock and production practices.

- In Ceylon 5 percent of the total rice acreage is now planted with improved varieties of seed. The previous normal yield of 30 bushels per acre has been increased to 75 bushels through use of the new seed and improved practices.

- Chile has established a system for distributing registered and certified seed to farmers, while new corn varieties in El Salvador have boosted yields by as much as 40 percent.

- Crop diversification in Taiwan increased soybean production by 126 percent between 1952 and 1957, pineapple production by 57 percent, and peanut production by 56 percent.

- Two coffee nurseries have been established in Ethiopia, a native home of coffee, and more than 500,000 seedlings sold to growers. Farmers are beginning to cultivate coffee rather than rely on wild crops. A new system for processing the coffee berries, introduced by ICA, has raised the crop returns to farmers by 25 percent; exports of washed coffee have gone up from 300 tons in 1956 to 1,500 tons in 1957.

- Seven fruit packing stations have been constructed in Greece and grading systems standardized. One result is the increase in the export of perishable crops to other European countries from \$3.1 million in 1954 to \$12.1 million in 1957.

- In the past, yields on India's 326 million acres of cropland have been among the lowest in the world. In 1951 the United States initiated a major program for the importation of fertilizers into India, coupled with research and some 200,000 demonstrations to encourage farmers to use fertilizers. The Government of India also began importing with its own funds, and the U.S.-financed imports were reduced annually. Between 1951 and 1957 fertilizers imported by the Government of India totaled 1,727,000 tons, as compared with U.S.-financed imports of 312,000 tons. During the 1951-58 period India's use of fertilizers quadrupled, and the country now has constructed fertilizer factories with an ultimate combined capacity in excess of 600,000 tons.

Livestock. Livestock improvement programs with ICA advice are underway in 43 countries. Emphasis is placed on improved feeding, disease control, and upgrading of native breeds of cattle, hogs, and poultry.

- More than 5 million cattle were vaccinated in 1953-57 in Ethiopia's large-scale livestock disease control program. A newly

established vaccine laboratory produces 1.5 million doses of cattle vaccine annually and 300 Ethiopians have been trained in inoculation techniques.

- In Iran 2,000 trained vaccinators have treated 24 million animals with biologics produced in the new Razi Veterinary Institute which has an output capacity of 25 million doses annually.

- The availability of meats and eggs in Korea is now at record levels. The supply of chickens multiplied 11 times between 1950 and 1957, and the number of hogs was increased by seven times.

- Viet-Nam is now hatching 4,000 chicks weekly and distributing them to farmers. Seven mobile teams have vaccinated 429,000 head of cattle in 2 years.

- Lebanon has developed poultry into the most prosperous segment of its agriculture. The value of poultry production rose from \$3.3 million in 1952 to \$10.8 million in 1957. "Point 4 eggs" is the name given premium grade eggs in the Lebanese market.

- Turkey has advanced its hatching-egg production from none in 1952 to 1 million chicks in 1959, and 40 poultry farms have been established.



In Libya camels are dipped in a large vat to kill body parasites. This process was introduced by ICA technicians to replace slower and less effective methods.

- Hog cholera has been practically eradicated in Taiwan where 6 million hogs have been vaccinated.
- Foot-and-mouth disease has been brought under control in Chile with 450,000 cattle inoculations.
- Nepal has founded its first veterinary clinic.

Water Resources. Bringing water to fertile lands, making better use of water already available, and reclamation of land by drainage are major objectives of water resources advisers assigned to 30 countries.

- Historically, Aklan, a Philippine province, had imported two-thirds of its rice from other provinces. Three pump irrigation systems were installed to serve 5,000 of Aklan's 50,000 acres of cultivated rice lands. Yields of the irrigated areas are now double that of pre-irrigation years, and the price of rice to the local consumer has been lowered. A total of 301 pumping units to irrigate 91,200 acres have been installed throughout the Philippines.

- Two deep wells drilled on an experimental farm near Shiraz, Iran, stimulated a "multiplier" reaction. Seeing how the wells converted the desert portion of the experimental farm into a productive tract, neighboring farmers drilled or dug 1,200 wells in the area at their own expense. Several thousand acres of desert were brought into production, and one result has been bumper harvests of sugar beets. The new farm prosperity has stimulated building activity in the city of Shiraz, including construction of a telephone exchange. The "multiplier" effect is a basic concept in ICA programing.

- In Somalia, a U.N. trust territory administered by Italy and due to become independent in 1960, ICA has assisted in drilling 164 water wells. Pumps have been installed on 96 wells. New irrigation works have brought an additional 100,000 acres of land into production for 12,000 farm families.

Forestry. Advisers in forestry have been assigned to 26 countries to assist in land classification, forest and watershed management, establishment of tree nurseries, reforestation, and logging projects.

- Forest Ranger Schools established in Guatemala and Iran offer 2-year training courses which teach surveying, timber inventory, elementary silviculture, and logging and reforestation practices.

- In the Philippines a forest products laboratory, established and equipped through ICA assistance, is working on 90 different research



A Liberian housewife smokes fish obtained from a conservation pond. The fish is high in protein, commonly lacking in the Liberian diet.

problems. Work already completed includes the successful fabrication of high quality paper from local woods never previously pulped. Approximately 100 Philippine species have been classified with respect to their industrial potential. Other results achieved include the control of rattan stain and the adaptation of local woods for tool handles, Venetian blinds, pencils, and shoe heels.

Fisheries. Lack of animal protein is a major dietary deficiency for the peoples of Africa, Asia, and Latin America. For many countries the development of fisheries—marine and inland—has equal or greater potential than livestock or poultry to increase the supply of animal protein. ICA has technical advisers in 12 countries to assist in fisheries projects concerned with inland fish ponds, rice paddy fish production, improved gear and methods for deep sea fishing, and the storage and marketing of marine products.

Summary

Admittedly American advice and assistance cannot claim credit for all or even a major part of the achievements in improving agricultural production in underdeveloped countries. Major credit must go to the cooperating countries and their people living on the land. Assistance from outside has also been given by international agencies, such as the Food and Agriculture Organization of the United Nations, and by private foundations and organizations.

Any analysis, however, will show the corps of U.S. technicians abroad acting as a catalytic force to stimulate agricultural development. The guiding concept of their services is to help rural families help themselves. More government services bring them new knowledge and incentives to increase production for their own better living and the economic welfare of their country. Finally, the most significant achievement of technical cooperation in agriculture is the new hope for betterment which it has stirred in farm peoples around the world.

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