Foreign Aid and Agricultural Science

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For some reason, certain Filipino leaders have recently taken a critical view of the American aid program in the Philippines. So far as I can gather, the principal bases for the criticism are: (i) the total amount spent in dollars is disproportionately small in relation to the counterpart peso funds (two pesos equal one dollar); (ii) much of the peso expenditure is used for the benefit of American experts; (iii) in not a few cases, these so-called experts are not really experts at all, but people with relatively little training and experience; and (iv) the program apparently aims to shackle the Philippines to an agricultural economy, as is shown by its overemphasis on agriculture, at the expense of industry.

It should be pointed out that the United States Congress on its part has also been showing uneasiness toward the foreign aid program because of the adverse criticisms voiced by, and the heavy burden the program imposes on, the American taxpayer.

Without attempting to refute the arguments advanced, I wish to relate our experience in the operation of what is presently known as the ICA–NEC (International Cooperation Administration–National Economic Council) program in the College of Agriculture of the University of the Philippines at Los Baños. The International Cooperation Administration is the United States agency which carries out programs of economic development and technical cooperation in many of the less-developed nations of the world. The National Economic Council is the national economic planning and coordinating center for the Philippine Government.

War Destroys College

World War II left the College of Agriculture and its Central Experiment Station in shambles. Most of the buildings were in ruins and nearly all the animals, seeds, tools, equipment, laboratory apparatus, and library were either destroyed or looted. Although brave attempts were made to reopen the college to students in June 1945, while the rest of the university was still closed, almost no facilities were extant, and emergency shelter for faculty and students had to be found temporarily in old poultry laying houses. Indeed, about the only asset of the college that was left was the experienced faculty that, happily, escaped general massacre on the campus by the retreating enemy.

Prospects for ever rebuilding the college looked bleak. We had but a dim hope of restoring it to the status it had attained at the outbreak of the war, when, in 32 years, it had grown in prestige to be one of the world's leading tropical agricultural institutions. The war damage awards to the University of the Philippines, which came a couple of years later, at first gave us some reassurance. However, this new source of relief was to prove quite elusive, for out of the 10 million pesos granted to the university, we were given only P.400,000.

When what is now the ICA–NEC program began to operate in 1952, things began to happen in the College of Agriculture. We became the happy recipient of generous grants, thanks largely to the previous flattering recommendations of the American Agricultural Mission and of the Bell Mission. These two missions were sent by the United States Government to the Philippines after World War II to study the needs of the country and to make recommendations to meet those needs. An important feature of the program was the contract for technical assistance signed between the University of the Philippines College of Agriculture at Los Baños and Cornell University.

Technical Assistance Teams

As a result of this contract, which will continue until 1960, a succession of teams of not more than ten American professors (later increased to 14) have been assigned to the college, each to be in residence here for not less than one year. In practice, some visiting professors found the work so interesting and challenging that they stayed about two years. Thus, during the past five years, we had the privilege of having on our faculty, in succession, 34 American professors. Many of them were top-ranking in their lines of specialization. Of the 13 in residence during the past year, three were department heads and one, an associate dean. Three professors are mainly supported by grants from the Council on Economic and Cultural Affairs, which has its headquarters in New York City.

Dean W. I. Myers and his colleagues at Cornell University have been so justifiably proud of their part in the Los Baños program that they have always taken great care to select only high-grade men for assignment here. They have drawn heavily on the Cornell faculty, even at some sacrifice to that institution. Some of these visiting professors were borrowed from other American universities. As an added precaution, the record of each candidate for assignment is first sent to Los Baños for scrutiny and approval.

The salaries of the visiting professors are paid, in dollars, from the International Cooperation Administration headquarters in Washington. Because these are ranking men on their respective faculties, the annual bill settled by Washington in salaries alone is considerable. The International Cooperation Administration, Washington, also pays the transportation and living and other allowances for our College of Agriculture faculty members who are sent abroad for advanced training. Every year about ten Filipino faculty members could avail themselves of this privilege, and to date 54 have been sent. Most obtained advanced degrees and have become valuable permanent assets to the college faculty.

Against these Washington expenditures, which total about a million pesos a year, our counterpart in the college for the support of the Cornell contract is only about P.200,000 a year, to meet transportation costs, living expenses,

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Fig. 1. Through these gates of the University of the Philippines College of Agriculture, at Los Baños, pass 3000 students who are unbelievably eager for a college education. In addition, the college serves as a training center for students from other Southeast Asian countries.

utility allowance, cost-of-living expenses, and per diems of the visiting professors and their families. The per diems for members of the family are paid only in connection with actual travel between the college and their respective residences in the United States. Of course, much larger peso allocations than this have been made to the college under the ICA–NEC program, but not a centavo of these additional sums has been spent for the visiting American professors. They have been used for improving the facilities; for hiring additional Filipino faculty members, research assistants, and technicians; for constructing more laboratory and classroom buildings and residences; for acquiring laboratory and farm equipment, and for purchasing livestock, increasing library facilities, and introducing numerous other improvements.

Close Working Relationships

As a result of this aid, in physical and faculty assets the college is at present very much better off in many respects than ever before in its 48 years of life.

The American faculty members do not function separately as an American group; they are members of the college departments to which they are assigned. The working relationship has certainly never been that of the American scientist and his native assistant, as was unfortunately the humiliating experience in this country even after World War I, which had allegedly been waged to "save the world for Democracy." American and Filipino have now happily worked as colleagues in Los Baños, where one is not the teacher and the other the perennial pupil; they have collaborated closely, studied together, and learned from each other. Even the members of their families have considered themselves a part of the local community, and their children have studied and genuinely enjoyed their experience in the same schools with the Filipino children, with whom they have developed lasting friendship and mutual respect.

Large Student Enrollment

Mainly as a result of the partnership between Cornell and Los Baños, the past five years have seen phenomenal growth in the College of Agriculture. From an average of 500 students, enrollment rose rapidly until it spiralled to over 4000 in 1955. Subsequently, limitations on new admissions had to be imposed by the faculty in an effort to safeguard standards. At present, the student body is held down to about 3000 (Fig. 1). Even this is somewhat too many for the capacity of the faculty, of only about 200, and of the facilities, but this number is deemed necessary to produce an estimated 300 graduates a year and to meet the growing requirements of the country in agricultural services.

The college is again steadily attracting students from neighboring countries, as it did before the war, and Washington and private American foundations have come to regard the college as a training center in agriculture for Southeast Asia. At present, we have 53 students from four foreign countries.

Likewise, various important government units and private concerns that deal with agricultural development and promotion have sent their men to the college for in-service training. The principal training center of the Community Development Program, under the Office

Fig. 2. The author (right) discusses the building of a new International House on the College of Agriculture campus with John D. Rockefeller III. The Rockefeller Foundation has made a grant of $250,000 (P.500,000) for this purpose.

of the President of the Philippines, is located on the college campus, where the faculty is actively cooperating.

Generous allocations by the Council on Economic and Cultural Affairs and the Rockefeller Foundation have been earmarked for the support of East Asian students in the college and for the following additional purposes: to engage certain highly qualified American professors; to upgrade library, classroom, and laboratory facilities; to help some deserving young faculty members to take up graduate studies in the United States; and to enable a limited number to make study tours abroad or attend international conferences. Recently, the Rockefeller Foundation likewise made a sizable grant of half a million pesos to establish and maintain an International House on the campus (Fig. 2). Local government and private entities have also made grants, largely for research and graduate scholarships.

Research Program Fostered

Research has always been given due emphasis by the faculty of the college, from the beginning of its life, because of the strong feeling that no one can be an effective teacher who is not at the same time an active researcher. Otherwise, the subject matter he imparts could grow stale and flat as he merely parrots borrowed ideas which are not constantly freshened and enlivened by first-hand contact with natural processes. Also, the faculty has been conscious of the fact that the Philippines is not a rich country because agriculture, on which its economy is based, has remained quite weak.

As has been the experience in other lands, it has been found that high agricultural productivity cannot be attained unless a sustained research program is fostered to solve numerous problems which serve to depress farm income. Of paramount importance is the fact that research enthusiasm is contagious, and the teacher-researcher quickly imbues his students with the desire to find out things for themselves and to develop the creative spirit of a scholarly mind.

Unfortunately, research funds, in the past, were perennially short. In 1918, the Legislature voted and made available the sum of P.125,000 for establishment of the Central Experiment Station in the College of Agriculture. The funds went into the purchase of additional lands, which enlarged the college area from the originally very inadequate 70 hectares to a much more capacious 400 hectares. A more adequate stock of farm animals was acquired, and farm implements were purchased.

Sad to relate, the Experiment Station was to be quickly forgotten, and no continuing support was to be forthcoming. Hence, whatever research could be done was carried out through the meager sums that had been squeezed out of the slim funds intended primarily for educational purposes. Creative scholarship was maintained largely on the spare time or overtime of the faculty and of the more advanced students.

These conditions should have disheartened any but the most determined; they are related here not to offer an excuse for limited accomplishment. When one looks back, the wonder indeed is that the faculty and students could make any contribution at all. Despite tremendous odds, the annual research output of the college rose progressively, and much of the basic foundation for modern agriculture in the Philippines was laid down through these earlier efforts.

The operation of the ICA–NEC program and the contract between Cornell and Los Baños brought two tremendous forces into play to accelerate research in the college: (i) the sustained availability of ample funds for research, which permitted acquisition of needed facilities and adequate technical manpower, and (ii) the healthy intellectual cross-fertilization between two groups of people, American and Filipino. We certainly congratulate ourselves on the fact that Cornell could take over the contract with Los Baños, because it has afforded us close association with a great American agricultural institution, with its over-a-century head start over the Philippines in experiment-station work and with its American organizational know-how.

Research Benefits Farmers

As a result of these first years of collaboration, great strides have been made in agricultural research. The Filipino farmer is already beginning to reap the benefit of superior, higher-yielding varieties of rice of good eating quality, the foundation stock of which has been the result of the patient and persistent work of our plant breeders (Fig. 3). Five strains of double-hybrid corn, the first of their kind in the eastern tropics, have been outyielding the ordinary kinds, and in not a few cases the harvest reaches as much as 90 cavans per hectare (1 cavan equals 2.2 bushels).

Experiments have indicated that we overwater lowland rice fields, because it was found that 2.5 centimeters, or half or even a fourth as much as is now commonly used, accomplished the same re-

Fig. 3. New rice varieties are "born." Plant-breeding specialists at the college continually work to develop high-yielding varieties that do not fall over and become lodged or twisted together—a major problem in the Philippines. Such characteristics reduce yields and make harvesting difficult. D. L. Umali, head of the Division of Plant Breeding (left) and H. L. Everett, visiting professor from Cornell, inspect some of these new varieties.

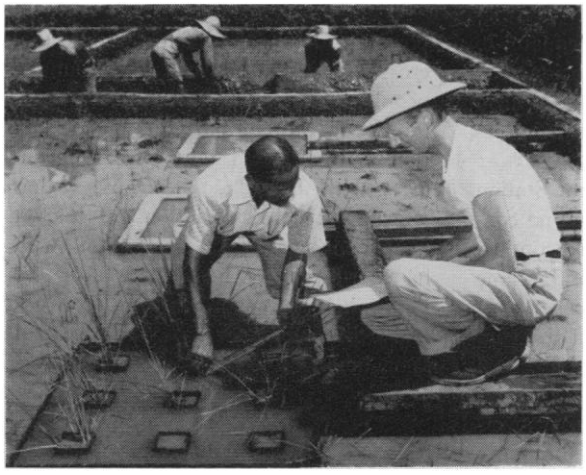

Fig. 4. Sets of tanks are used in experiments at the college's Experiment Station to find out how much water is needed by growing rice plants. The findings being recorded here by A. B. Catambay, head of the Department of Agricultural Engineering (left), and Harold E. Gray, visiting professor from Cornell, have been used to plot the most profitable and economical use of water on farms.

sults (Fig. 4). Hence, a more rational management could make possible the expansion of irrigated areas two- to four-fold.

Effective insecticide treatment against the destructive rice borer and the rice bug has been found.

Eleven arabica coffee plants have been isolated as rust-resistant strains; these may well prove to be the beginning of the rehabilitation of this important money crop, which had been wiped out in Batangas in the 19th century by the rust. To accelerate distribution of rust-resistant arabica stock to farmers, further large-scale importation of these proven rust-resistant seeds was again made from India. With the cooperation of the Bureau of Plant Industry, these seeds are being planted in different stations in various parts of the country. The seedlings are sprayed with rust suspension to eliminate the small percentage of rust-susceptible plants. The survivors will then be distributed.

Artificial insemination to improve local livestock more effectively, speedily, and economically has been proved to be practical in this country. At present a central bull stud is being built on the campus, with the cooperation of the Bureau of Animal Industry, to serve livestock farmers in every province.

Research on soil and fertilizer needs of crops (Fig. 5), study of sociological and economic problems of the farm, utilization of agricultural products and by-products, and very many other projects have been undertaken. Attention to these different items is aimed at increasing production and putting more pesos in the farmers' pockets.

Fig. 5. One way to take research results to the farm is to conduct tests on a local farm for all to see. Here a college soil technician (left) is working with a farmer to find why leaves of the coconut tree turn yellow and why the tree stops bearing. With the use of different fertilizers, researchers could see improvements in the trees within three months, but the answers were still incomplete. Within three to five years they hope to have definite results, so that they can make recommendations to farmers.

Agencies and College Cooperate

One important aspect of our research program is that, for the first time in this country, there has come about a close and active cooperation between the college and the Department of Agriculture and Natural Resources, which is concerned with all phases of the agricultural programs of the Philippines. The result has been the further strengthening of the agricultural research program in this country, where, rather than being competitive, these entities now pool their resources.

Under this arrangement, the main responsibility of the college is basic research, while the corresponding bureaus of the Department of Agriculture and Natural Resources attend largely to development and extension. Because of varied conditions in different sections of the country, field stations of the department's bureaus have become available to college researchers for cooperative regional tests. For that matter, certain agricultural schools also participate as cooperators, to make it possible to cover many of the different climatic and soil conditions in the country. Hence, if a superior variety of rice or hybrid corn is recommended for any particular locality, the recommendation carries the assurance that it will be backed by a reasonably adequate study right in that vicinity.

Hand in hand with cooperation in research, cooperation with the Bureau of Agricultural Extension has been considered paramount. Taking useful information to rural people is the principal responsibility of this bureau in the Department of Agriculture and Natural Resources. Research is not of much value if it ends in the laboratory or experimental field. The results should reach farmers as quickly as possible so they can be put to use. In this difficult task, we have been leaning heavily on extension personnel.

Strengthen Agriculture First

Has too much emphasis been placed in this country on agricultural development at the expense of the industrial? The fact is obvious that a healthy economy demands that our agricultural pro-

gram be balanced with a certain degree of industrialization. Industrial research must, therefore, be properly attended to. Unfortunately, the tendency in too many countries, including those in our part of Asia, such as Thailand, Pakistan, India, Formosa, and even our Philippines, has been to launch a disproportionately ambitious program of industrialization and shove agriculture into the back seat. A swing to this extreme may well spell disaster, as was unfortunately the sad experience in Argentina, in Peron's time, when the economy of the country was nearly ruined through overindustrialization.

Before we can industrialize to any considerable extent, agriculture, which is the basis of our economy, must first be strengthened. Vigorous, sustained, and adequately supported research is necessary to solve the many important problems that still remain to be studied to make our farms give more bountiful yield. For a good many crops, superior seeds that could produce fourfold or more still await development. Better farm management has to be worked out to make operation more economical and more efficient; needs for fertilizer have to be more precisely determined; numerous pests, diseases, and weeds that exact a heavy toll on the harvest cry for more effective control.

As it is now, the average Philippine farmer, it is estimated, can raise only enough for himself and three other persons. Compare him, for instance, with the American farmer, who, after feeding himself, has enough left over for 20 other persons. As we raise the efficiency of our agricultural worker, more manpower could then be released to industries without harmfully affecting the farm, and the average per capita income would have sufficiently improved to take care of the market for the industrial products. These goals can hardly be attained if we slacken, rather than accelerate, the pace and intensity of agricultural research.

News of Science

IGY Oceanography

The deep currents in the South Atlantic Ocean, the ocean bottom, and the influence of a large river system on ocean bottom deposits will be investigated during the next 8 months by the research vessel *Atlantis*, which left the Woods Hole Oceanographic Institution last month on a cruise in the South Atlantic and Indian Oceans for the International Geophysical Year. Under the leadership of oceanographer Arthur R. Miller, the seven-man scientific party will make observations in the Brazil Current to fill in data obtained last year.

From a distance of about 1000 miles offshore from Buenos Aires, the *Atlantis* then will sail in the direction of the Rio de la Plata, obtaining long and short cores of ocean-bottom sediments for chemical analyses to determine the influence of a large estuary on ocean-bottom deposits. Bottom photographs will also be made. Upon arrival in Buenos Aires, Richard G. Leahy will leave the ship and transfer to an Argentine vessel to obtain sediment samples in the Rio de la Plata. He will travel upstream until sea water is no longer encountered.

The major task in the South Atlantic will be the making of observations of temperature, salinity, and dissolved oxygen from the surface down to the ocean bottom along latitude 32° S. Such observations will be made by stopping the ship every 80 miles, each "station" taking from four to five hours. In between stations the sea temperature will be measured hourly to a depth of 900 feet while the ship is underway with the aid of a bathythermograph.

The section between Buenos Aires and Cape Town will be the southernmost one to be finished in the British–U.S. IGY Atlantic Ocean program. Eight of the eleven east-west crossings have been made during the past year by the small (125-foot) research vessel *Crawford* of the Woods Hole Oceanographic Institution and the *R. R. S. Discovery II* of the (British) National Institute of Oceanography. By the end of 1958 the Atlantic Ocean water masses from Nova Scotia to Argentina on the west, and from Ireland to the Cape of Good Hope on the east, will have been examined. For the first time in history it will then be possible to provide a complete description of the three-dimensional distribution of the physical and chemical properties of the whole Atlantic Ocean. In the past satisfactory data existed only in rather limited areas, with the exception of the South Atlantic, where the German vessel *Meteor* made a survey in 1926–27.

During this IGY it has become possible for the first time to note whether any changes have taken place in the ocean during a 30-year period. Preliminary examination of the data acquired last year by the *Crawford* has shown but little change in temperatures and salinities but a significant loss in dissolved oxygen in deep water. A similar loss in oxygen has been found in the North Atlantic, compared with observations made nearly 30 years ago by the *Atlantis*. It is believed that neither in arctic nor in antarctic water has it been cold enough in recent years to form water of sufficient density to replace the very cold water now present in the deep ocean. In other words, the deep ocean water is getting "older" and is not being replaced by oxygen-rich waters from the surface.

Plankton tows and other observations. Biological observations will be made by Langley Wood and Robert Risebrough. These will include the making of plankton tows and chemical determinations of nutrients in the sea. Such observations will be especially important in the Indian Ocean, which rarely has been visited by oceanographic vessels.

Lamont-Woods Hole Indian Ocean Expedition. After arrival in Cape Town, South Africa, in the latter part of April, most of the members of the scientific party will fly back to Woods Hole and be replaced by a group of geophysicists under John W. Graham. The latter group will take the ship through the Indian Ocean and Red Sea, working together with the research vessel *Vema* of the Lamont Geological Observatory of Columbia University. The two ships will make echo-sounding profiles of the ocean bottom and, with the aid of explosives, determine the thickness of the sediment on the ocean bottom and the character of the bedrock below the ocean floor.