A DECADE OF RURAL PROGRESS

A Decade of Rural Progress

1948-1958

Tenth Anniversary Review
of the Major Accomplishments of
the Joint Commission on Rural Reconstruction

Taipei, Taiwan

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INTRODUCTION

The Joint Commission on Rural Reconstruction set out ten years ago to establish a pattern of methods and philosophy for rebuilding the agriculture of China. Now, on the occasion of its tenth anniversary, it is fitting to look back and see if, indeed, the methods and philosophy the Commission has advocated have worked.

Many changes, political, economic, social and agricultural, have taken place in the past ten turbulent years in China. JCRR came into the picture at a time when the Chinese Communists had already thriven on the disease, hunger, and illiteracy inherent in Chinese rural society. In about a year's time following its organization in Nanking on October 1, 1948, JCRR was forced to move its headquarters twice with the Reds at its heels. What little work JCRR was able to do during this brief period gained for it only experience and the regretful realization that the program had begun too late.

JCRR headquarters came to Taiwan in August, 1949. During the past nine years, JCRR has carried out a total of 2,742 work projects representing an integrated program for the improvement of the island's agriculture. All these projects have been designed, implemented and appraised in strict accordance with the basic objectives, and their effects on the island people show how successful the program has been. JCRR projects are estimated to have had a helpful effect upon at least 95 percent of all rural people of Taiwan in ways which they themselves recognize and appreciate.

What has JCRR done on Taiwan? To answer this question it is necessary first to list the handicaps and challenges Taiwan's agriculture faces. The island is short of arable land. Only 875,000 hectares (2,161,250 acres) constituting about 24 percent of the total land area is under cultivation. On the other hand, there is a population of nearly 10 million to feed and a large military force to support. Every year about 350,000 babies are born on the island and the mortality rate has been on the decline due to rapid advances in health work.

Despite the rapid industrial growth on Taiwan, the island is still predominantly agricultural. Half of the population is rural and nearly one-third of the gross income of the island comes from agriculture. Agriculture provides the greater part of the working population employment, and farm exports garner for the island 90 percent of its total foreign exchange earnings.

Against this background, JCRR has cooperated with the Government in adapting an agricultural policy to the needs of the people. The issue was met by making a determined effort to increase production of such farm crops as rice, sugar cane, sweet potato, peanut, wheat, tobacco, soybean and jute. As a result, the island has not only produced enough to feed the people, but also has been exporting an annual average of 150,000 metric tons of rice, the staple food item, in recent years.

Achievement along this line is due to two main factors: expansion of rice acreage and increase of per-hectare production.

In 1945, Taiwan's rice fields totalled 502,018 hectares (1,239,984 acres). The total reached an all-time high of 789,075 hectares (1,949,015 acres) as early as 1951, about 100,000 hectares (247,000 acres) over the pre-war record. This expanded planting partly accounts for the fact that brown rice production on the island increased from 638,828 metric tons in 1945 to 1,839,000 metric tons in 1957. Efforts have also been made to survey the use of marginal land in foothill areas, investigate tidal land along the western coast and plan the construction of dikes and drainage facilitites to make more land available.

In addition, concentrated efforts at making the limited area of cultivated land produce more have resulted in a sharp increase in the per-hectare yield of farm crops. The per-hectare production of rice, for example, began to rise rapidly after 1949. By 1956, it had surpassed the pre-war record. By 1957, the average brown rice yield was 2,348 kilograms per hectare as compared with 1,273 kilograms in 1945.

The Joint Commission meets to discuss policy and projects.

Behind these cut-and-dried figures lie multiple projects all aimed at increasing production. Irrigation facilities have been improved to supply water to 22,800 hectares (56,316 acres) of dry land and help irrigate and drain 270,255 hectares (667,529 acres). Dikes have been built and repaired to protect vast areas of farm land. Successful introduction of a rotational irrigation system has saved water and fertilizer. The farmers have been taught to use chemical fertilizers and compost manure to increase their crops. Crop pests and diseases which deprived the farmers of the fruits of their labor have been brought under control. An island-wide field rat control campaign has wiped out 25,000,000 rats, saving the island 135,000 metric tons of food every year. Moreover, farmers were taught to adopt a revolutionary cropping system which enables them to grow, in addition to their two crops of rice, a winter crop of wheat, tobacco, or vegetables and a summer crop of pickling melon. Taiwan now has the highest per-hectare yield in the world.

Increased food production, however, would merely have boosted the individual gains of a small number of big landlords if efforts had not been made to achieve equitable distribution. Hence, JCRR has helped the Gov-

ernment carry out Taiwan's land reform—a bloodless social revolution aimed at providing land to the tiller. The island's farmers labor long and hard and, as a result of the reform, it is they who now stand to enjoy the gains from the fields they work so diligently. What is more, it was considered necessary that the farmers should organize themselves to protect their own interests and promote their own welfare. Hence, JCRR has assisted in streamlining the organization of the farmers' associations to make them truly representative of the farmers.

In attacking these rural problems, as well as those related to other fields of activity such as animal industry, forestry, rural health, rural economics, agricultural extension and information and work on off-shore islands, certain guiding principles have been followed with meticulous care. First, a project is considered only when a "felt need" for assistance exists on the part of rural people. Secondly, there must be fair distribution of accrued benefits. Thirdly, some sponsoring agency must qualify for effective use of the assistance. Fourthly, projects must be practical and adaptable to rapid and broad expansion. Fifthly, projects must be frequently inspected by experts.

How has the agricultural program paid off? On Taiwan, JCRR has spent about US$ 4,000,000 of American aid funds and NT$ 1,032,823,438 of Counterpart Fund for all of its operations. But the annual return from increased rice production alone is conservatively estimated to be greater than all project expenditures during the first four years of operations on the island. Yet JCRR's assistance in increasing rice production represents only a fraction of its total activities.

During the past decade, the original agricultural objectives set down have been largely fulfilled. These objectives were: (1) to increase crop and livestock production, (2) to improve rural living conditions, (3) to develop the potentiality of rural people for rehabilitation of their own communities, (4) to cooperate with government agencies in rendering services to agriculture, and (5) to encourage and develop rural leadership.

Emphasis in Taiwan's agricultural build-up is being shifted to a program to conserve and perpetuate what has already been achieved and to explore new fields for future developments. The new tendency is to step up the work in such activities as agricultural research and education, technical personnel training, the survey of potential resources, and development of pasture lands.

The evolution of Taiwan's agricultural program during the past ten years is highlighted in these pages by glimpses of key accomplishments only. To the reader who seeks a more complete picture of rural progress in the Republic of China, there are available the Annual Reports of the Joint Commission on Rural Reconstruction, as well as numerous specialized studies.

Farmers harvest Taiwan's high-yield rice crop twice a year.

What It Takes to Produce a Hectare of Rice

Here is capsule picture presentation of what to put into the land to produce a hectare of rice in central Taiwan. Per-hectare yield of one rice crop averages 62 bags at 60 kilograms per bag. The fertilizers needed include 12 bags of ammonium sulphate, 7 bags of calcium superphosphate, 1 bag of calcium cyanamide, and 1 bag of potassium chloride. Each person or each water buffalo represents 10 days of labor.

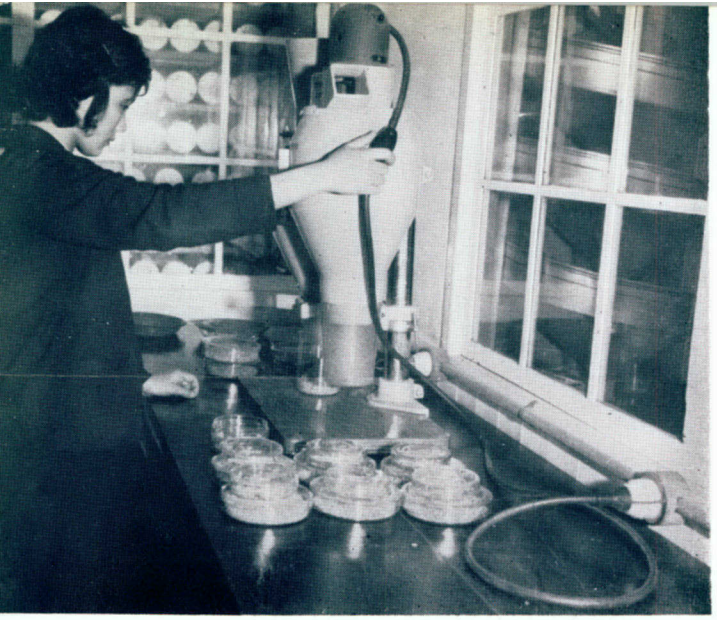
PLANT INDUSTRY

VARIETAL IMPROVEMENT AND SEED MULTIPLICATION OF CROPS

A key factor in Taiwan's expanding farm production during the past ten years has been the successful program for improvement of crop varieties and seed multiplication. That such a program is needed is evident. Farmers must engage in the most intensive cultivation of their land to meet the demands of an increasing population. Their cropping schedule is crowded. A revolutionary cropping system is enabling them to grow, in addition to two crops of rice, winter and summer rotation crops.

Efforts aimed at developing crop varieties that grow faster and mature early have been carried out with JCRR assistance. More than 500 crop varieties of foreign origin have been introduced into Taiwan and distributed to experiment stations for test cultivation. Some choice varieties have already been extended throughout the island. They include grain sorghum, soybean, onion and other vegetables.

Still other food crop varieties, such as corn, peanut and sugar beet, show great promise. Superior strains of pineapple, citrus and jute have been selected for long-range breeding. Agricultural experiment stations on Taiwan have set up committees to review the result of breeding rice and

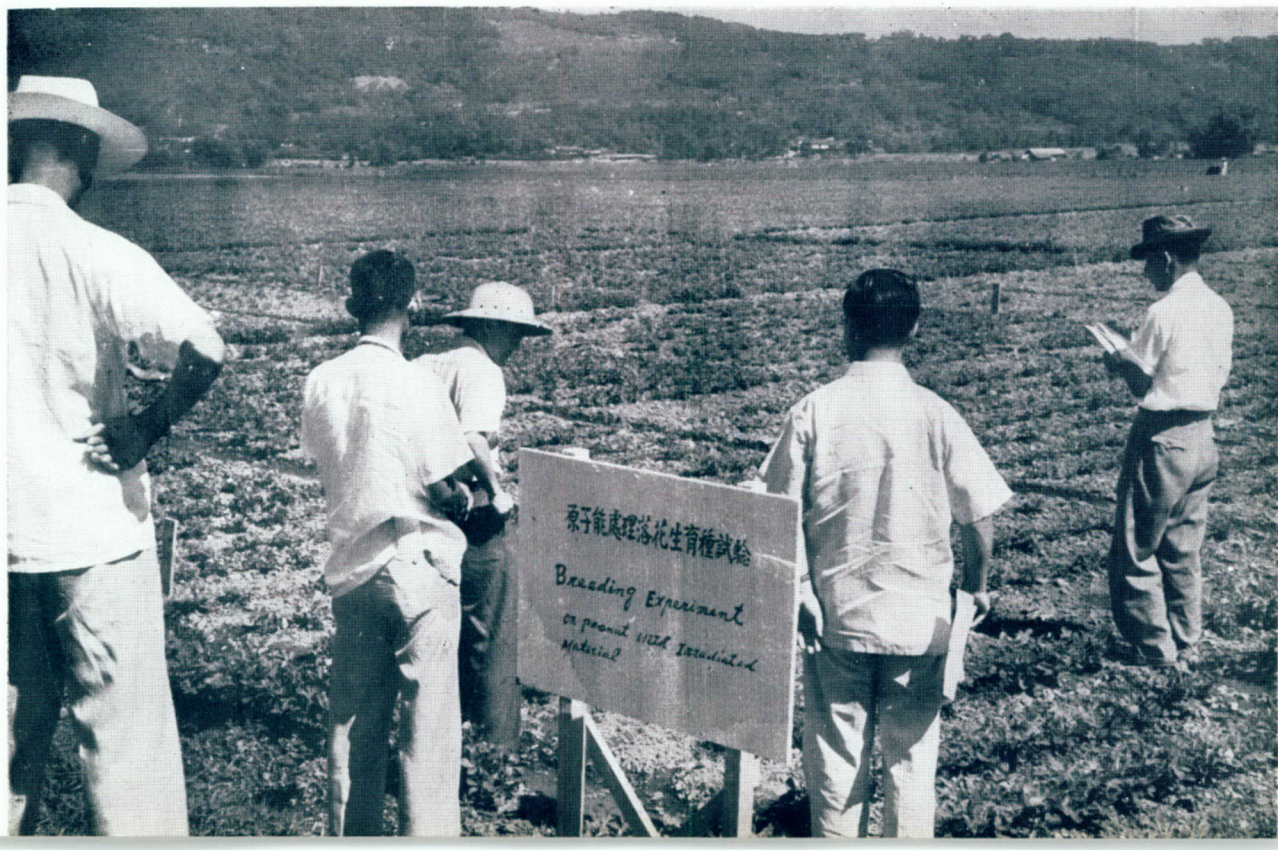


In a seed laboratory, the aspirator removes lighter materials of the seed.

other food crops every six months, and to decide on varieties for multiplication and extension. Varieties of all major food crops so selected have been subjected to island-wide tests to determine their regional adaptability.

JCRR has assisted in building up the facilities of seed farms and improving the island's seed multiplication system. Rice seed farms have been consolidated and their operations placed on a firmer footing. A new system for checking the dispersal of rice seeds by the seed farms has been established in 60 *chen* where the crop is grown mainly for export. The seed multiplication systems of sweet potato and peanut have also been

Local peanut varieties, treated with irradiated material in U. S., are tested for selection of disease resistant strains.



overhauled to afford more efficient control of distribution and assure that only the newly improved strains of these plants are multiplied on the seed farms.

One of the major steps to improve seeds on Taiwan was the establishment of the seed certification system following the meeting of the ICA-sponsored Far East Seed Improvement Conference in 1956. Since then, procedures and standards have been worked out for seed inspection in field, storage and laboratory for rice, sweet potato, peanut, soybean, wheat and sorghum. Classes for training extension workers in seed inspection have been conducted. Two laboratories, one for doing research and training workers in seed technology and the other for the actual carrying out of seed certification, are being built.

Rice breeder examines improved rice seeds.

Extension of choice varieties of crops to new areas has paid off well. One ready example is soybean. Originally a winter crop grown in southern Taiwan only, soybean is now raised in the northern and eastern parts of the island as well. The reason is the introduction of the Sankuo variety from Japan. Increased production as a result promises to cut down soybean import which is costing Taiwan from US$ 13,000,000 to US$ 15,000,000 a year.

MANURES AND CHEMICAL FERTILIZERS

Widespread use of chemical fertilizers and organic manures largely accounts for the high yield of crops on Taiwan. Both climatic conditions of the island and the multi-cropping system adopted by most of the farmers call for regular application of soil nutriments.

JCRR has given continuous support over the past ten years to a program of island-wide education in the proper use of chemical fertilizers. Field demonstration plots, numbering from 600 to 1,200, have been laid out across the island for each rice crop to show farmers in every region the techniques and value of fertilizer application. Classes have been conducted in each *chen* to train the farmers. At the time the fertilizers are distributed, village leaders are informed as to the characteristics of the different chemical compounds, application methods and procedures of local distribution. Audio-visual aids such as radio and posters are used to further spread pertinent information among the farmers.

The educational program has been responsible for acceptance of new chemical fertilizers by the island's farmers. The merits of calcium cyanamide, for example, came to be known and believed in generally only after a special educational project was carried out. Similar familiarization measures have had to be taken in the cases of urea and nitrophosphate, both of which are to be produced in large quantities domestically.

Rural education in the scientific use of fertilizers had its beginnings in an earlier experiment in which JCRR participated to find indicated rates

Time for using chemical fertilizers on rice crop.

***Lupine** is grown on tea fields as green manure.*

of application for various crops grown on Taiwan. Control tests were made regionally with rice, sugarcane, sweet potato, peanuts, wheat, tea and pineapple, and the effects of the different fertilizers on yields established. Results of the study have proved useful not only in the allocation of chemical fertilizers to the farmers, but in planning the capacity of domestic fertilizer plants and determining cost-benefit relationships of the industry's operation.

Taiwan's farmers have shown a growing interest in using chemical fertilizers during the past ten years. In 1957, they consumed 659,017 metric tons of chemical fertilizers as compared with only 128,770 metric tons in 1948. Of the total used in 1957, 492,291 metric tons, or 74.7 percent, were for paddy rice; 101,743 metric tons, or 15.44 percent, for sugarcane; and 64,983 metric tons, or 9.86 percent, for all other crops. It is estimated that a total of 1,000,000 metric tons of chemical fertilizers is needed for sufficient application on all crops.

In the field of manures, JCRR has cooperated with the government in helping the farmers build 110,027 compost shelters in the past decade. From these compost shelters, a total of more than 2,700,000 metric tons of high-quality compost is estimated to be produced each year. This quantity of compost contains about 13,500 metric tons of nitrogen, 6,750 metric tons of phosphoric acid and 13,500 metric tons of potash, with a total estimated value of more than US$ 6,000,000. Use of compost on rice and many other crops has become a regular farm practice on Taiwan.

Support has also been provided to establish green manure crops in northern Taiwan. New green manure crops such as yellow lupine, astragalus, and mucuna capitata have been introduced and established. Forty kinds of leguminous crops either collected locally or imported are now under test.

USE OF ORGANO-PHOSPHORUS PESTICIDES

The highly effective organo-phosphorus group of pesticides, including parathion, malathion and PM, have been successfully introduced on Taiwan and are finding an ever wider acceptance among Free China's progressive farmers. JCRR helped conduct the first local experiments to ascertain the lethal power of these extremely poisonous chemicals against certain voracious crop destroyers that had long been sapping the rural economy.

Two sample liters of the as yet locally unknown compound, parathion (Folidol), were brought in from Hong Kong by JCRR in 1952.

One liter was used in field tests for the control of rice borer; the other was tested in the control of pineapple mealy bug. In both cases, the chemical proved to be highly effective. The related poison, malathion, was first used locally in fighting citrus insects in 1954. Other organo-phosphorous pesticides were tested subsequently.

Following the successful experiments, field demonstrations in the correct application of the new pesticides were conducted. Farmers also were taught what precautionary measures were necessary in using such poisonous chemicals. Acceptance of the pesticides was readier than expected. Farmers now are buying all of them, as needed, with their own money.

More than 100,000 hectares of rice fields, constituting about one-eighth of the total rice-growing area on the island, had been treated with

Farmers spraying citrus orchard with insecticides. Both the sprayers and insecticides are made locally.

parathion, PM, or diazinon by 1957. Spraying of malathion became common practice in Taiwan's citrus orchards. In areas where mealy bugs cause wilt disease on pineapple plantations, growers have come to use parathion for dipping seedlings and for field application.

Three factories have been set up on Taiwan to formulate and bottle the deadly compounds with imported technical material. Sprayers are also being made locally.

As a result of this broad program, Taiwan has established an effective agricultural regulatory and educational system through which pesticides can be speedily distributed to the hands of millions of farmers for safe application.

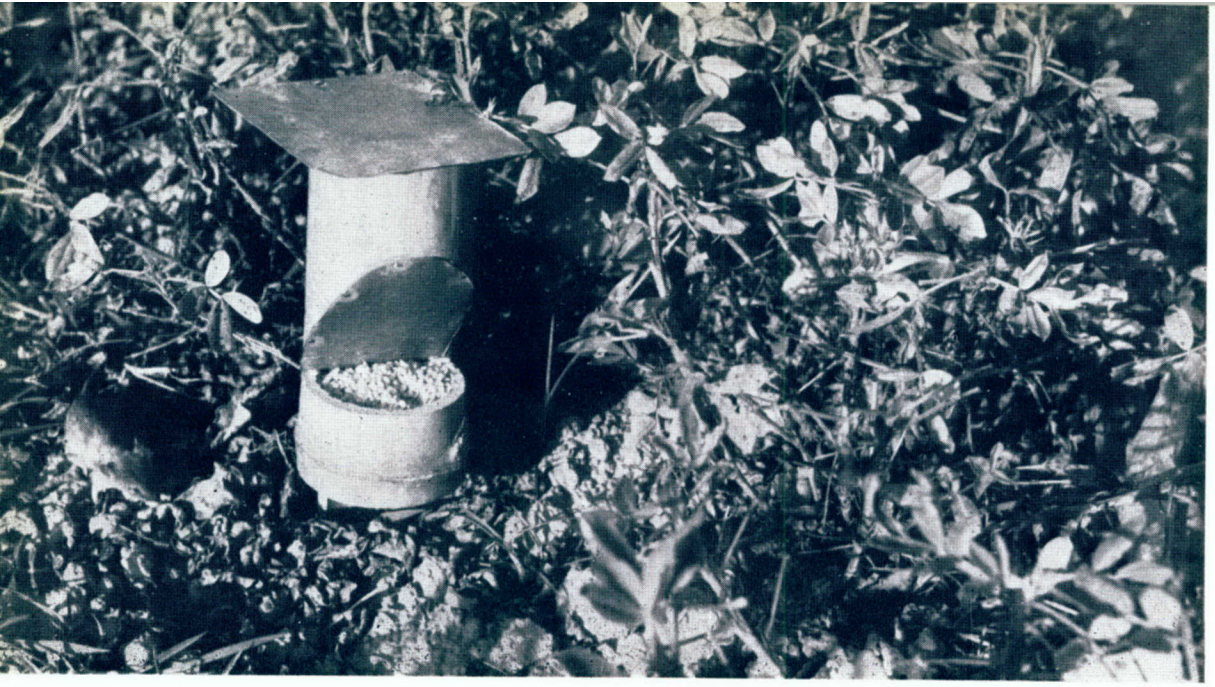
ISLAND-WIDE RAT CONTROL

Taiwan's field rats, which nibble away an estimated total of 135,000 metric tons of crops a year, have now been brought under control, thanks to a campaign successfully carried out by the Government of Free China with JCRR assistance.

The weapon used is warfarin mixed with brown rice seasoned with a small amount of peanut oil. Preliminary steps in the control, taken in 1956, included an extensive study of the natural behavior of rats under various field conditions and the tabulation of their burrowing habits, reproductive capabilities and migratory tendencies. On the basis of these findings, a baiting scheme was worked out.

The next step was to demonstrate to the farmers and local agricultural workers how to launch the area-wide baiting operation. In the winter of 1956, 14 *chen* in 13 *hsien* took part in the demonstration. The result was so successful that when the program started in the next winter it covered all *chen* in the farming areas.

The island-wide rat eradication campaign placed under control a total of 817,835 hectares (2,020,052 acres) of land. With the exception of mountain areas and towns with a population of over 10,000, the drive covered all crop fields, waste land, dykes, graveyards, and farm houses in



The bait station that lures millions of rats on Taiwan to their death. Bait is made of brown rice, peanut oil and warfarin.

villages. Bait stations were set up over 411,618 hectares (1,016,696 acres). A total of 817,540 farm families participated in the campaign.

The campaign owed its success to a detailed preliminary survey to ascertain the winter crop area of each farm, the area of public land and number of rural households in each village, *chen* and *hsien*. Findings proved to be highly useful in determining the amount of bait and the number of stations needed for its distribution.

Every farm family was acquainted with the operation of bait stations with the help of audio-visual materials and training classes. Close observation of the baiting schedule on the part of farmers was a key factor in the success of the program.

The result of the campaign was clearly indicated in the number of tails collected—a total of 6,902,729. It was estimated that for each dead rat found there were at least three more that had died in holes or in the field. The campaign is estimated to have wiped out 27,610,000 field rats.

The campaign cost Taiwan NT$ 19,321,767, toward which JCRR contributed NT$ 4,172,488. The balance was shared at different levels of government, among farmers' associations, and by the farmers themselves.

To ensure lasting effect of the campaign, JCRR has also helped to carry out a supplementary project to maintain permanent bait stations in strategic spots to check rats from uncontrolled areas.

MECHANIZED FARMING

A principal JCRR effort to help Taiwan meet the twin problems of increasing population and shortage of arable land centers upon the introduction of mechanized farming. The need for this program is reflected in the fact that there are not enough draft cattle to carry out intensive, multi-crop farming of the 870,000 hectares (2,148,900 acres) of cultivated land on the island. It is estimated that Taiwan is at present short of about 100,000 head of buffaloes for adequate farming operations.

JCRR has assisted in attacking the problem from several angles under a well-coordinated program. Different models of small-sized power tillers made in Japan were imported for trial use on the island as early as 1954. The tractive and rotary type power tillers, light in weight, compactly built, easily maneuverable and low-priced, were chosen as the most suitable models for use on Taiwan.

JCRR since has supported project tests to compare the performance and operating cost of the power tillers with those of the water buffalo. The tests were made on many different crops at numerous experiment stations on the island. Experiments were conducted also on selected farms to study the kinds of chores performed and number of working days involved when the farmer uses a power tiller instead of a water buffalo.

Also supported were experiments conducted by universities and agricultural stations to re-design a variety of farm implements so as to

Small power tiller is challenging the traditional position of the water buffalo on Taiwan farms.

make them attachable to the tilling machines for motive or stationary operation. Yet another effort to make Taiwan's farmers tiller-minded involved staging demonstrations throughout the island in the use of the versatile new machines. Agricultural technicians, farm extension workers and vocational school teachers were given class training in the operation and maintenance of the tillers.

The problem of petroleum supply was solved when the government, upon JCRR recommendation, promulgated special regulations governing the sale of gasoline, diesel and fuel oil to users of power tillers.

Five factories on Taiwan already have gone into the manufacture of small power tillers, and a growing number of farmers are purchasing the modern machines from savings or with loans extended by local banks and farmers' associations.

WATER USE AND CONTROL

ROTATIONAL IRRIGATION

Taiwan farmers grow two crops of rice and sometimes a third or even a fourth cash crop on the same land each year where sufficient irrigation water is available. Supply of irrigation water was never considered a problem until the rapid increase of population in recent years made it necessary to save water.

A study of this problem by JCRR revealed that a new system, called "rotational irrigation," could save as much as 20 to 50 percent of water without affecting crop yields. Tests and demonstrations conducted on a number of farms in 1954 and 1955 convinced JCRR engineers that the new method was not only beneficial to the farmers but necessary for the development of the island's agriculture. A drought during this period further strengthened their belief.

Differing from the customary island-wide practice of continuous flooding of fields, the new method provides water in a given area on a field-by-field rotating basis in which the farmer receives enough but not too much water on a definite schedule. This also saves fertilizer and prevents many water disputes.

As a result of JCRR's investigations, the Government in February,

The water distribution system holds the key to equitable sharing of water in rotational irrigation.

1957 promulgated a set of regulations governing the use of rotational irrigation on Taiwan. At the same time, the Government also formulated a four-year plan to put rotational irrigation on a total of 112,808 hectares (278,750 acres) of paddy fields. Implementation of this plan will result in providing sufficient water supply to 10,850 hectares (26,810 acres) which have been insufficiently irrigated, and adding 9,075 hectares (22,420 acres) of new irrigated land. The change in irrigation methods is expected to increase the annual yield of paddy rice by 61,010 metric tons. For 1957, JCRR appropriated NT$ 9,070,000 (approximately US$ 366,000) for assisting in starting this project. In 1958, JCRR provided NT$ 7,725,000 (approximately US$ 312,000) for expanding the program, besides NT$400,000 for personnel training.

Brick revetment protects earth dike along an alluvial river.

FLOOD PREVENTION

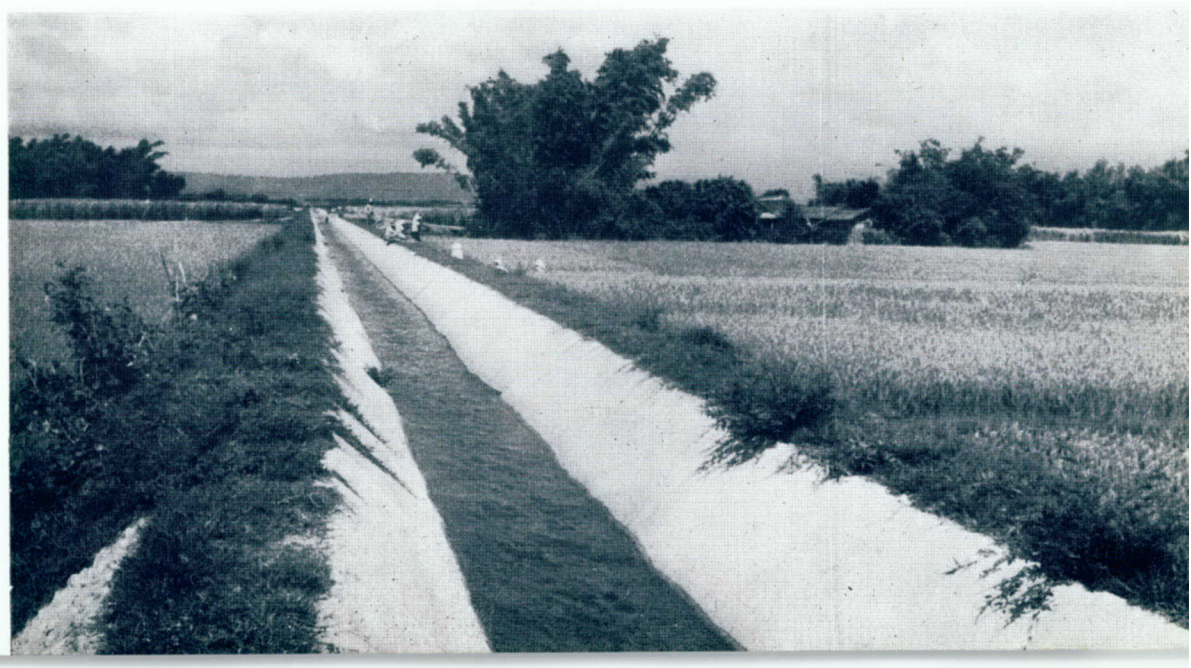
JCRR reviews the entire flood control program prepared by the Taiwan Provincial Water Conservancy Bureau, studies the design and estimates of each project, offers technical advice during work progress and provides financial assistance for projects not covered by government budgets. JCRR began to participate in flood control work on Taiwan in 1952.

JCRR has helped provincial and local authorities build 75,420 meters (47 miles) of new levees and 987 units of new spur dikes, and rehabilitate 145,450 meters (90 miles) of old levees; build 5,763 meters (19,000 feet) of sea walls, and build and repair 20,300 meters (12½ miles) of revetments as two units of silt control check dams. One river channel has been straightened.

Total expenditures were NT$304,000,000 of which NT$165,000,000 was paid from the counterpart fund and the balance from the provincial treasury. JCRR also helped by importing 11,637 metric tons of cement.

As a result, almost all river works built during the Japanese occupation have been rehabilitated. Some outstanding projects are yielding immediate results. The five-kilometer rock-filled levee built on the right bank of the lower Ta-an river protects thousands of hectares of paddy land formerly exposed to floods. On the right side of the Tansui River

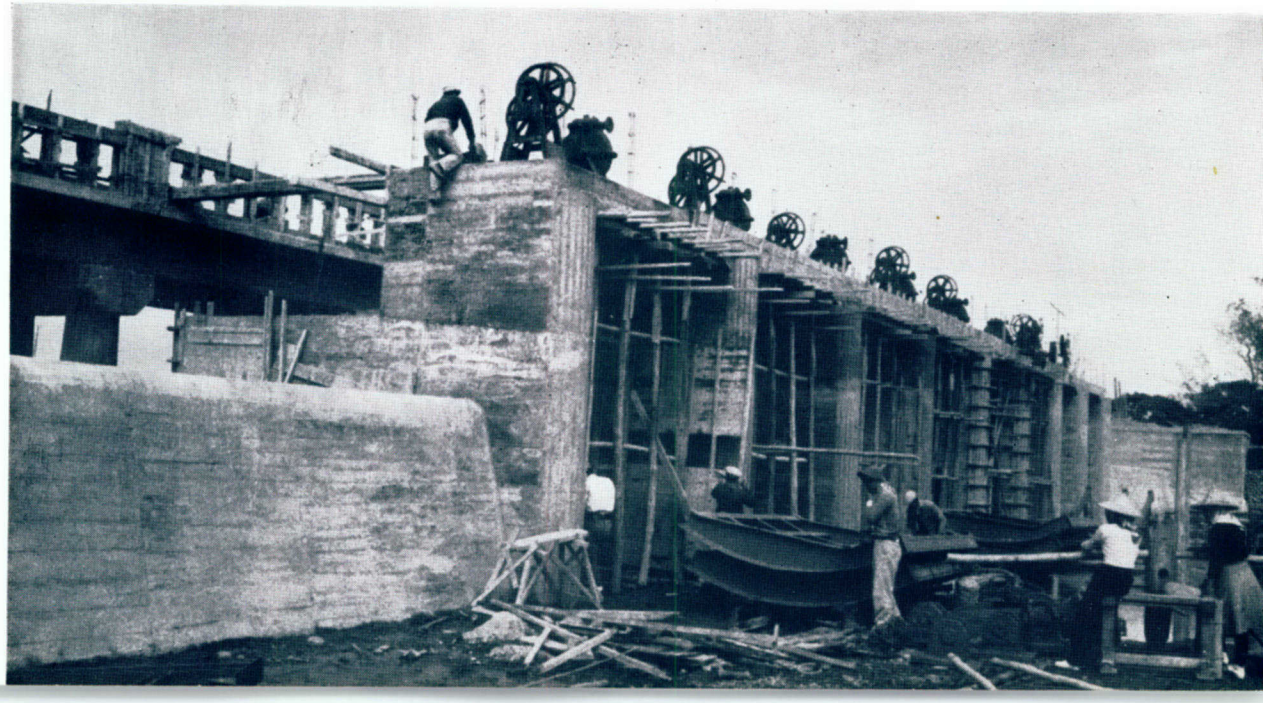
A section of concrete-lined canal on Taiwan. More than 100 miles of such canals have been built in the past ten years.



View of Tapu reservoir construction project in northern Taiwan. Diversion dam is under construction.

near Peitou, the 4.6-kilometer earth dike provided with automatic tide gates has freed 700 hectares of paddy from inundation by salt water. The six-kilometer levee newly built on the left bank of Laonung Creek in Pingtung Hsien now permits reclamation and settlement of 1,918 evacuees from the Tachen Islands. The sheet-piled sea walls at Koh-tze-liao and Hung-mao-kang afford protection to both the fishing industry and the homes of thousands of fishermen living there.

A diversion gate structure goes up on a drainage channel in central Taiwan. Drained water will be used for irrigation purposes.



TIDAL LAND DEVELOPMENT

Taiwan urgently needs more arable land.

JCRR is helping in the preparatory work for developing tidal land for agriculture. This is also one of the important projects in the Republic of China's Second Four-Year Plan, now underway.

The preliminary survey conducted in October 1955 revealed that the most promising area for the development program is the 550 square kilometers (212 square miles) of tidal land between the mouth of the Ta Chia River and the mouth of the Tseng Wen River in the southwestern part of the island. The development work may take 15 years while the cost is estimated at NT$3,000,000,000, of which NT$342,500,000 must be in U. S. dollars (approximately US$13,690,000) for purchase of equipment and machinery.

The tidal land totals 55,000 hectares (136,000 acres) of which 44,000 hectares will be developed into good farm land. It is estimated this land will support at least 100,000 people. The development program also will provide job opportunities for about 10,000 retired servicemen who can settle down in the area after the reclamation is completed. The land will be reclaimed by leaching of salt and use of dikes and gates to keep out sea water.

To date, JCRR has appropriated a total of US$14,000 and NT$ 2,855,372 for this program. The U. S. dollars have been used for the purchase of equipment and machinery while the local money covers planning, surveying and starting actual reclamation work.

GROUND WATER INVESTIGATION

An attempt to increase water supply on Taiwan is being made through JCRR investigations and surveys of ground water under the alluvial plains. In certain localities, ground water is often reached by wells.

Extensive well digging, however, can be carried out only after hydrological or geological investigations are made to determine the ground water reserve and exact locations.

In March, 1954, JCRR financed the purchase of well drilling equipment, an electric logmaster and a refractive-type seismograph for the study of geological formations. With JCRR assistance, a geological survey was conducted in the first three months of 1955 on the ground water in the Ta Cho Shui Chi Fan. The findings were highly encouraging.

Another test aimed at determining the quantity of ground water reserve in this area was made between October 1955 and November 1957, also with JCRR assistance. The development program which is still underway is based on the results of the test.

JCRR has also assisted in probing the untapped water wealth under the area between Peikang Chi, Chiayi Hsien and Hsia-tan-shui Chi in Kaohsiung Hsien. The survey for determining the quantity of ground water in this area was started at the end of 1957 and is scheduled to be completed in two years.

For carrying out the entire program, JCRR's financial contribution totals NT$2,500,000 for the surveys and about US$30,000 for equipment.

Farmer smiles at harvest of rice crop benefited by a pumping project.

TYPHOON DAMAGE REPAIR

JCRR extended technical and financial assistance to government agencies in repairing flood control works and irrigation and drainage systems damaged by four major typhoons which struck Taiwan in 1956.

A total of NT$75,000,000 originally provided for irrigation and flood control for fiscal 1957 was immediately appropriated to help in the emergency. In addition, JCRR provided NT$70,000,000, including NT$ 53,000,000 as grant and NT$17,000,000 as loan, for the repair of damaged irrigation and drainage facilities and dikes.

Irrigation works benefited by this program included repair of the newly finished Touliu Main Canal, rehabilitation of eight diversion weirs in Taoyuan Hsien, repair of the banks of existing irrigation canals and reconstruction of damaged irrigation structures in the Chia Nan area. Damaged dikes repaired under the program included 52 projects on major rivers and 26 projects on secondary rivers, mostly located on the Cho-shui, Wu, Peikang and Hsia-tan-shui river banks. In addition, JCRR assistance also resulted in the construction of a 1,402-meter-long (4,600-foot) dike on the left bank of the lower Wu river as a key step to the rehabilitation of Hsinkang *hsiang* in Changhwa *hsien* which was greatly damaged by floods.

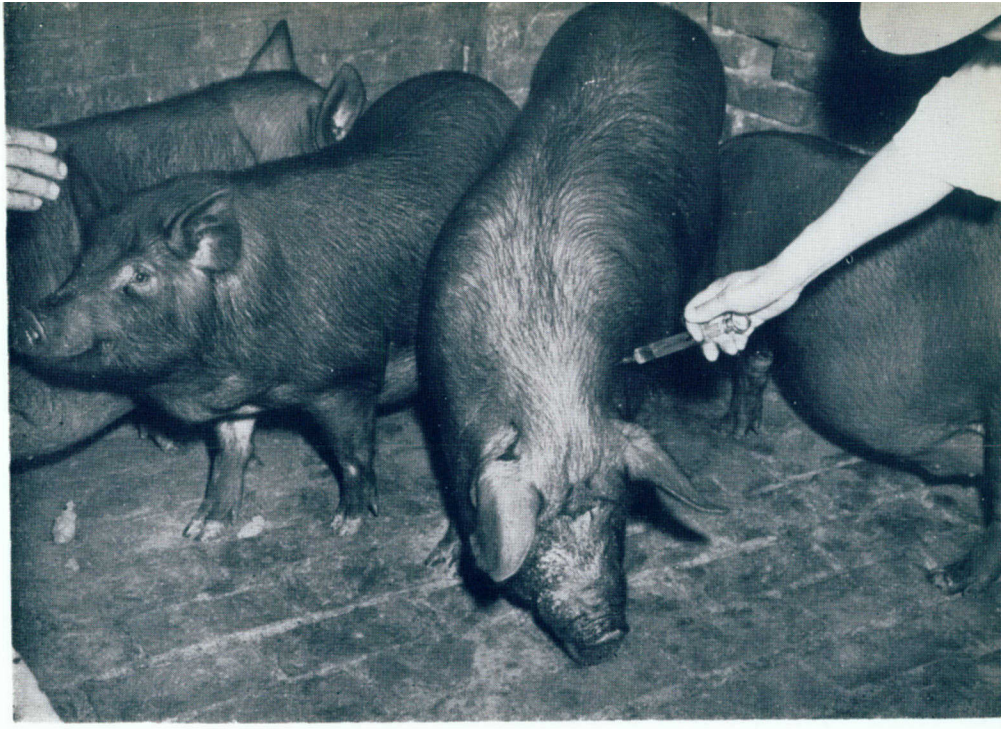
ANIMAL INDUSTRY

HOG CHOLERA CONTROL

JCRR's assistance in the control of hog cholera has raised hopes for virtually eliminating this dread disease from Taiwan within the next few years. Already the disease has been eradicated from the area south of the Chu-shui River. Vaccination is no longer necessary in Pingtung *hsien*. Stepped-up programs in other areas are beginning to bring the same measure of control.

The first measure taken to prevent outbreaks of hog cholera was to help the island produce crystal violet vaccine with which to start preventive inoculations. Production of the vaccine was started in 1950 and large-scale output followed shortly after. Yearly production soon reached about 800,000 five c.c. doses.

In December 1952, JCRR helped to introduce the lapinized hog cholera virus to Taiwan from the Philippines. After an intensive study of the nature of the virus, and 21 months of pilot field tests, extensive use of the wet preparation of lapinized hog cholera vaccine was begun in Pingtung *hsien* with excellent results. Mass vaccination with the vaccine was carried out in coordination with sanitary control measures such as inter-prefectural quarantine and inspection of slaughtered animals and destruction of infected hogs.



Hogs are given anti-cholera vaccinations in an island-wide program to control the disease.

A new anti-hog cholera inoculant called "Freeze-dry" vaccine is now being pioneered by JCRR and Provincial Department of Agriculture and Forestry technicians. The new vaccine promises to be an even greater contribution because it can be stored at room temperatures for as long as one year. Lapinized vaccine must be used within 10 hours after preparation. Local farmers' associations will thus be able in the future to keep all kinds of vaccines on their shelves for use in emergencies.

Control success in Pingtung inspired neighboring ***hsien*** and cities to adopt the same system, and it was gradually extended to the north. By 1958, lapinized hog cholera vaccine had been used on hogs throughout the island to replace the crystal violet vaccine. All told, 6,000,000 pigs had been vaccinated with lapinized vaccine within a period of five years with an average post-vaccinal mortality of less than 0.6 percent. The vaccine is now prepared locally.

Over these years, JCRR has effected closer cooperation with local governments and hog owners in hog control. The program started with JCRR subsidy only. Now, the expenses are equally shared among the government organizations, hog owners and JCRR. At the outset, the control expense for each hog under this program was about NT$ 7.50 per year per head. By 1958, the cost had been reduced to NT$ 4.42, which included the cost of vaccine, equipment and facilities, per diem of vaccination and survey personnel and salaries of control teams.

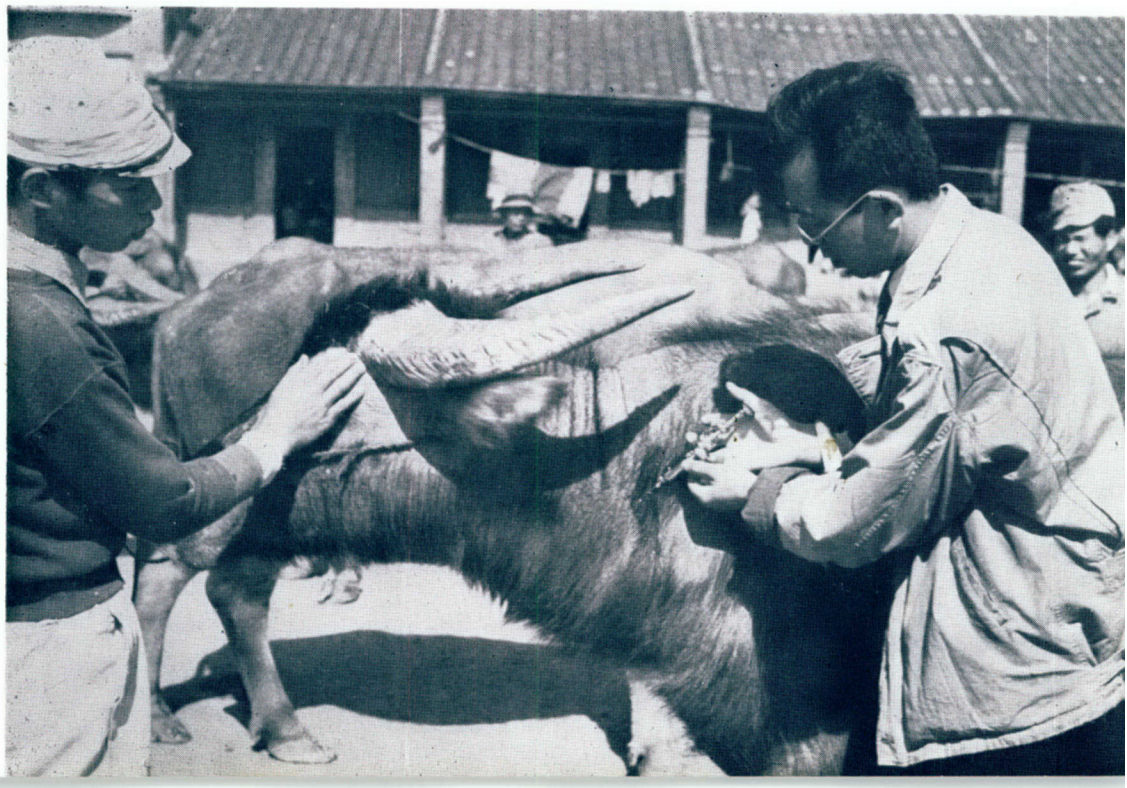
HYBRID HOGS

Development of highly productive hybrid hogs with JCRR assistance accounts largely for the nearly three hundred percent increase in pork production on Taiwan during the past ten years. In 1948, only 540,000 hogs were slaughtered as compared to over 2,000,000 in 1957. Almost 170,000,000 kilograms of pork on live weight basis were produced in 1957—more than four times the 38,626,000 kilograms produced in 1948.

The cross-breeding program was carried out with the importation of a small number of foreign breeds. A total of but 656 Berkshire hogs was imported from the United States and Japan in 1950 and 1951. Since then only ten additional Berkshire boars and ten Hampshire gilts and five boars have been brought into Taiwan. The general response to the program on the part of the hog-raising farmer, however, has been most enthusiastic. This is evidenced by the fact that by 1957 over 90 percent of the feeder hogs on the island were hybrids of the Berkshire boar and native sow.

JCRR has helped in the selection and production of superior native sows and in maintaining an adequate number of them for crossing. Several such projects are already underway in Hsinchu, Taitung and Chiayi Hsien.

Water buffalo receives preventive injection in rinderpest control.



An experiment of three-way crosses of Berkshire, Yorkshire, and native breeds which has been carried out by the Taiwan Sugar Corporation has brought about favorable results. The findings show that the offspring of this triple cross are healthier, grow faster and produce leaner meat of better quality than two-way crosses. Further studies are being made to determine the best combinations for adoption on Taiwan. A small number of Hampshire, Yorkshire and Duroc Jersey and Landrace hogs are being imported for that purpose.

RINDERPEST CONTROL

Taiwan's eradication of rinderpest, the scourge of cattle, is attributed to a vigorous control program carried out with JCRR assistance. It is now almost eight years since the last outbreak of rinderpest was reported on the island.

Japanese occupation authorities on Taiwan tried for 25 years before they succeeded in wiping it out in 1920. But, in October 1949, the disease broke out again, believed to have been brought over by hogs imported from Hainan Island.

The disease was first discovered at the Taipei Dairy Farm. JCRR helped the government send specialists to the scene immediately. Tested strains of lapinized rinderpest virus were immediately obtained for the manufacture of vaccine. Strict quarantine and slaughter of sick and suspected cattle, followed by incineration of the carcasses, were enforced. Cattle in quarantine and around the farm were vaccinated. But, despite these measures, some cases were also discovered in several other areas in Taipei *hsien* in early December of the same year.

To prevent the virus from spreading, a protective belt was established across the southern part of the present Ilan, Taipei, Taoyuan, Hsinchu and Miaoli *hsien*. This was accomplished by restricting the movement of cattle in the northern area and by mass vaccination.

In addition, slaughter and incineration of cattle were strictly enforced at the discovery of a case, while all cattle within the immediate surrounding vicinity of infection were vaccinated. Illustrated posters, lectures, news-

papers, radio and official proclamations were also used to stress the imperative measures of prevention. The last case was reported on January 30, 1950 at Taipei *hsien* about three months after the first outbreak.

In carrying out the control program, JCRR assisted in registering and checking 71,999 head of cattle and vaccinating 62,876 animals. JCRR also contributed US$11,377, largely used for paying the travel expenses and per diem of technicians, and half of the indemnity to owners of sick animals whose carcasses were burned and buried.

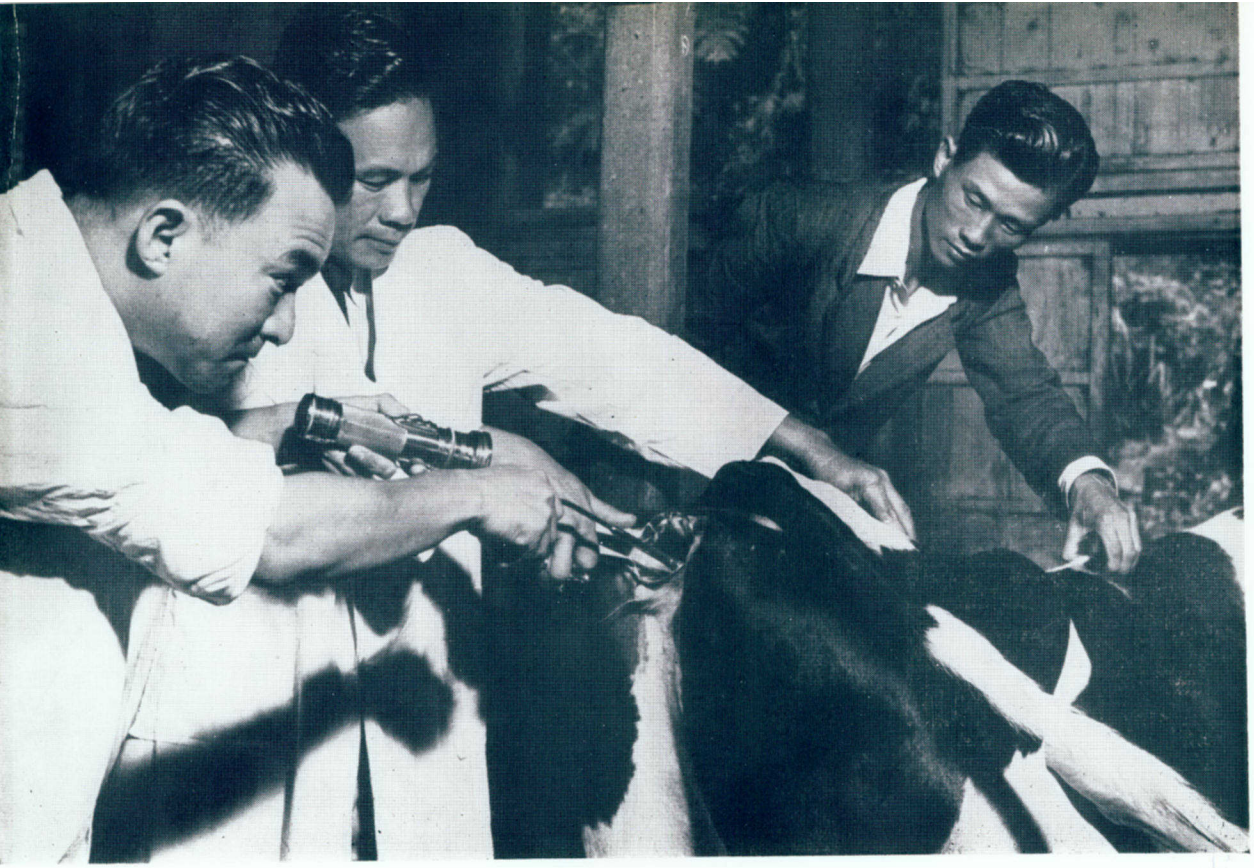
ARTIFICIAL INSEMINATION

Animal industry on Taiwan has developed to such an extent that artificial insemination has been successfully adopted to improve livestock breeds. Technical and financial assistance from JCRR accounts for the firm foundation that has been laid for the development of this phase of animal industry.

Artificial insemination was introduced on the island in 1952. Techniques were perfected and technicians were trained to perform the service. Preparations for launching the program on a wide scale basis were completed in July, 1957. By working with the governments of Tainan and Pingtung *hsien* and the Provincial Department of Agriculture and Forestry, JCRR has helped to have 8,460 sows in the two *hsien* artificially inseminated between July, 1957 and May, 1958. A conception rate of 80 percent was obtained, which is considered very high for the artificial method of breeding, particularly with hogs. Farmers are well satisfied because the rate is as good as with natural breeding. To a lesser extent, cattle and goats in the same two *hsien* have also been subjected to this experiment with good results.

Plans are afoot to artificially inseminate about 30,000 sows in Tainan and Pingtung *hsien* and to improve the techniques with cattle and goats during the year. Before June, 1959, a similar project is scheduled to be carried out in yet another *hsien*.

The provincial and prefectural governments have adopted a unified



One phase of artificial insemination of cattle. Injection of semen is administered by trained technicians.

system for artificial insemination of animals. According to this decision, the livestock Research Institute at Hsinhua is to direct all artificial breeding work and be responsible for the training of technicians. They will also select, raise and train breeding sires. While most artificial insemination is to be carried out by technicians assigned to local farmers' associations, the technicians of the Institute will give assistance whenever called for.

JCRR is procuring the necessary equipment for use in freezing and storing semen at a center in the institute. This will be used in setting up a bank for storing the semen of the best local and foreign animal sires for scheduled use. Negotiations are underway to import the semen of the best dairy bulls in New York State and Wisconsin.

The center has already conducted nine classes for training 135 technicians in the most effective methods of inseminating hogs, cattle and goats. The trainees who came from the *hsien* and local farmers' associations will carry out the insemination work primarily with hogs in their own localities.

FISHERIES

The fishing industry came within JCRR's working scope as early as 1950 when a project was set up to rehabilitate the carp hatchery at Taoyuan. Since then, JCRR assistance has accounted for substantial improvements in both fish culture and coastal fisheries on Taiwan.

A large part of JCRR subsidy to fisheries has been spent on the building and rehabilitation of fishing harbors. Construction of nine of the twelve fishing harbors projected with JCRR assistance has been completed, and an increasing number of fishing craft has been noted in these harbors. At Tsing-kwan-sen, there are 130 powered fishing vessels as compared with 54 before the construction. At Aoti, the number of vessels has increased from 14 to 50. There were only four fishing vessels at Paisha Lun formerly, but now the number has gone up to 210 and a new fish market has been built to handle the increased catch.

Taiwan's fishermen have shown a high appreciation of JCRR's help in improvement of shore installations. The assistance has been channeled through the fishermen's own associations. Installations include fish drying grounds, net treating centers, warehouses, battery charging units, fuel oil and water service stations, cold storage rooms and fish processing plants. Of the 74 fishermen's associations on the island, 65 have received this type of assistance.

JCRR started in 1954 to provide loans to the fishermen for installing

small diesel engines on their sampans. The powered sampans double the catch.

By the end of 1957, the number of mechanized sampans reached 1,218 out of a total of 7,672 such craft on the island. JCRR loans have been responsible for the installation of engines on 260 of these sampans. Loans were also granted to fishermen to enable them to replace obsolete kerosene engines with modern diesel power plants on 58 boats ranging from five to twenty tons.

JCRR has used minimum funds to get maximum results in improving fish culture. Two exotic species, the bullfrog and Yamato carp, have been successfully introduced into the island. Carp and tilapia hatcheries have been set up in ten *hsien* to supply fish seeds to pond farmers at low cost. More than ten million fish seeds are produced and distributed annually by these hatcheries. JCRR has assisted in the experimental use of chemical fertilizers in milkfish ponds, and in demonstrating the new method involved. Another JCRR-supported experiment proved the value of using pesticide in milkfish ponds.

Fishermen in Suao remove the day's catch from the hold of their vessel.

FORESTRY

AERIAL SURVEY OF FOREST RESOURCES

The aerial survey of Taiwan, started in April, 1954 and completed in March, 1956, has provided accurate information on various categories of forest land and their use, a dependable inventory of forest resources, and an up-to-date forest-type map. The findings of this project, to which JCRR lent both technical and financial assistance, form the basis for charting the future course of forest work on the island.

The aerial photography of Taiwan was obtained for inventory use early in 1954 as a result of negotiations between the Chinese military authorities and JCRR. The Land Use and Forest Resource Survey of Taiwan then was established under the sponsorship of JCRR, with technical assistance from the U. S. Forest Service. Technical personnel were furnished by various cooperative agencies including the Provincial Department of Agriculture and Forestry, the Taiwan Forest Administration, the Taiwan Forest Research Institute, the Taiwan Agriculture Research Institute and National Taiwan University. The project was also actively supported by the Chinese Ministry of National Defense, the Chinese Air Force, the Chinese Combined Service Forces, the Bank of Taiwan and the U. S. Military Assistance Advisory Group.

After completion of the survey, the final analytical reports, entitled "Forest Resources of Taiwan" and "Land Use Conditions of Taiwan," both in Chinese and English, were published and distributed to concerned agencies. In addition, a set of 1:50,000 land use and forest type maps for intensive planning use, and 1:250,000 colored maps for overall planning purposes were made.

The survey also brought about three outstanding events in the history of forestry development on Taiwan. Firstly, it provided facts essential to the revision of Taiwan's forest policies. A team of three senior U.S. Forest Service policy and management technicians were invited to Taiwan in 1956 to help the Chinese government formulate sound forest policies and programs. In the same year, the Forest Policy Committee was set up under the PDAF. Early in 1958, after a series of meetings, the policies and programs proposed by the committee on the basis of the survey findings were officially approved by the Taiwan Provincial Government.

Secondly, the Agriculture and Forestry Aerial Survey Team was established, immediately after the completion of the survey, as a permanent governmental unit under the Provincial Department of Agriculture and Forestry. The Team consists largely of the original team members.

Thirdly, as a result of the survey, the use of aerial photography has been more extensively permitted for various purposes. Taking advantage of this liberal policy, the Chinese Society of Photogrammetry was established in 1954, and has been a member of the International Society of Photogrammetry since 1955.

A tedious part of the aerial survey of the island's forests. Technicians study aerial photographs to obtain information needed for the survey.

WINDBREAK PLANTINGS

An effort made by JCRR to help local governments and farmers build windbreak forests and farm windbreaks during the past eight years has paid off in excellent returns to the economy of Taiwan. Thousands of hectares of coastal farm land and numerous dwellings and other structures have been saved from being buried under the sand. Crop production has increased up to 30 percent on the protected farms.

The flat west coast areas of Taiwan are almost continuously exposed to winds, often of high velocity. For centuries the coastal sands, stirred by ocean waves, have been whipped up by the winds and deposited inland along the coast, gradually covering productive lands and even buildings.

The need for protection against the wind in the form of seacoast windbreak forests and farm shelterbelts was recognized early. By the outbreak of World War II, about 14,000 hectares (35,000 acres) of seacoast forests and an intensive pattern of farm shelterbelts had been established.

Windbreaks protect roads, crops and people. Here a section of farm land in southern Taiwan is shielded by a row of windbreaks.

The ill effects of wind were largely checked and the dunes were stabilized by vegetative cover. Reclamation of damaged or lost lands was progressing rapidly.

During the war, however, both farm windbreaks and seacoast windbreak forests were drastically cut, partly for military reasons and partly due to lack of control. By 1950, only 20 percent of the seacoast windbreak forests remained. The most pronounced destruction had taken place along the west coast plains areas where practically no fuels other than wood were available.

Through the combined efforts of local governments, farmers and JCRR, nearly 12,780 hectares (31,895 acres) of windbreak forests and 7,160 kilometers (4,446 miles) of farm windbreaks have been planted since 1950. Thus, more than 85 percent of the seacoast windbreak goal has been achieved, and completion of the program is in sight. The dunes have again been stabilized for the most part and damaged or lost lands reclaimed.

ISLAND-WIDE REFORESTATION

Taiwan must reforest 20,000 hectares (54,800 acres) a year for the next 15 years if the island aims to attain self-sufficiency of forest products on a sustained yield basis.

Within that reforestation period a minimum total of 200,000 hectares (548,000 acres) should be planted with trees, in addition to the annual planting of areas being progressively clear-cut.

Forest surveys show that there are 425,000 hectares (1,050,000 acres) of idle land on Taiwan. In addition, 581,000 hectares (1,436,000 acres) of forested land are covered with brush and undesirable hardwood species, or are poorly stocked. Most of these idle and poorly stocked forest lands are unsuitable for agriculture but good for timber production. Of the total of 1,006,000 hectares (2,484,000 acres) in need of reforestation, 728,000 hectares (1,798,000 acres) are accessible at present.

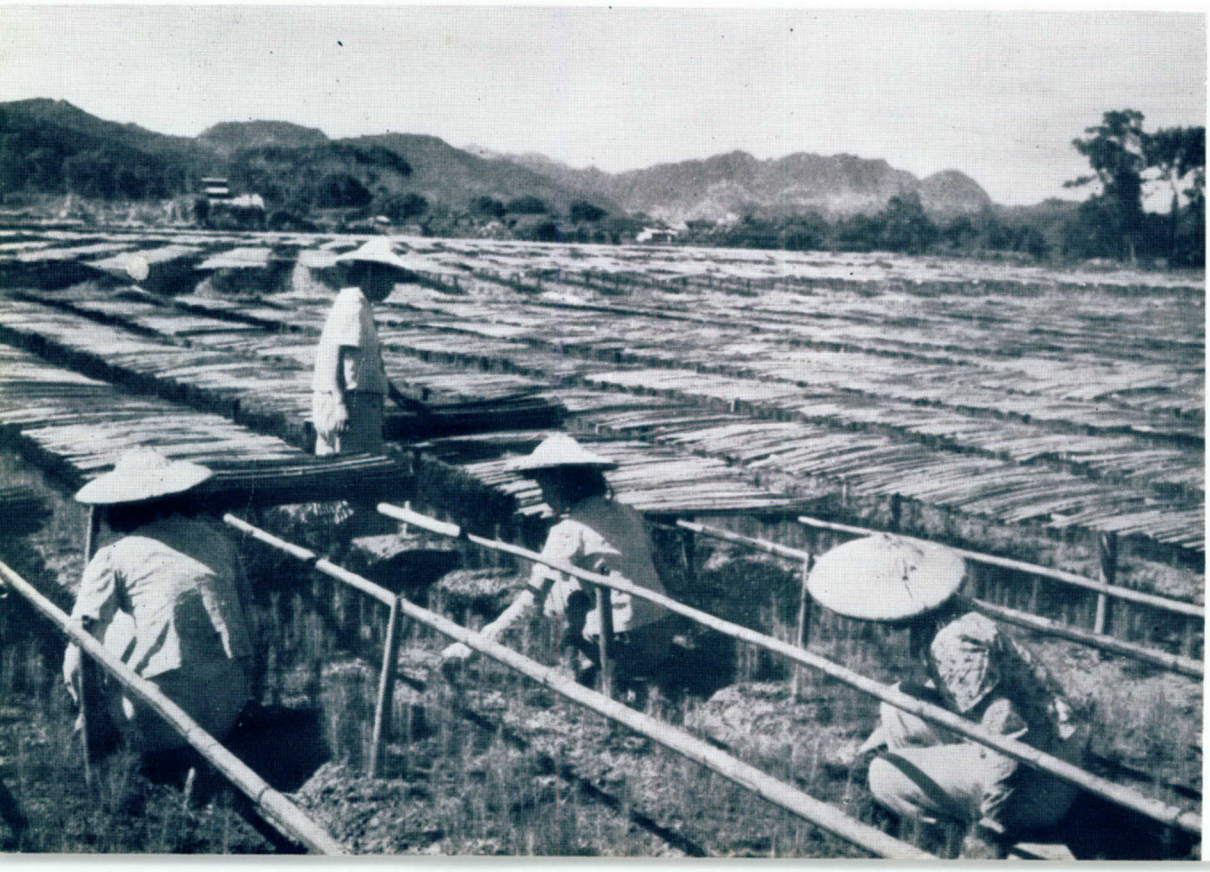
JCRR assistance in carrying out the reforestation program on the island has placed emphasis on the production of planting stock, resulting

in the establishment and strengthening of seedling nurseries. Beyond a program of increasing the collection of local forest seed, JCRR has undertaken the large-scale importation of seed of exotic tree species which had proved successful in test plantings on the island. These species are thriving especially at the lower elevations which formerly were occupied only by local low-value forest species.

Thousands of hectares of slash pine from the United States and luchu pine from Okinawa have been successfully established throughout the northern part of the island, and larger plantings are planned. Within a few years these plantations will yield enough pulp logs to continuously supply capacity demands of the large paper mill at Lotung.

Southward from Taichung, teak and mahogany plantations are being extended to yield valuable cabinet woods. At elevations above one thousand meters, planted cryptomeria is growing better than some of the native conifers. Together with the superior China fir, which is being planted in ever-increasing areas, these readily accessible plantations will provide the much-needed softwood for construction and processed wood uses.

Slash pine seeds introduced from U.S. produce excellent seedlings for reforestation in northern Taiwan.



Tree seedlings produced under the reforestation program are distributed free of charge to public and other local agencies, and through them to private individuals and concerns. JCRR participation in this program from early 1951 to July 1957 has involved 160 projects.

Accomplishments to date include the production of 438,000,000 tree seedlings and the reforestation of nearly 110,000 hectares (271,000 acres) of mountain land. The program will help Taiwan increase future forest production to a sustained yield basis. It will also safeguard other reconstruction investments, particularly hydro-electric installations, and irrigation and agricultural developments.

Forester marks cryptomeria stand for thinning to produce poles.

LAND USE AND SOIL CONSERVATION

Perhaps the most basic of all measures imperative to keeping the limited arable area of Taiwan producing sufficient food for its growing population are those which deal directly with proper land use and soil conservation. JCRR has, for the past four years, pursued a policy of providing technical and financial assistance to government organizations working on a number of scientifically conducted projects concerned with maximal land utilization and protection.

Taiwan's plain is well cultivated and its high mountains are stocked with forest. The zone between, however, presents many land-use problems. Vast areas of low hills are occupied by assorted hardwoods of low economic value. Where the lands are penned for planting tea, fruits, and other crops, soil conservation measures have been neglected.

Better utilization of the crop-forest marginal land is a long-range goal of agricultural resources development on the island. JCRR has helped to carry out necessary preparatory works since 1954 to reach that goal. Projects include: (1) a complete land-use survey of the sloping land below an elevation of 1,000 meters in order to classify the land into grades according to its capabilities, (2) training and demonstration of soil conservation principles and methods, (3) introduction of and experimentation with deciduous

fruit trees rather than crops, (4) development of grazing land, and (5) acceleration of reforestation.

The field work of the survey will be completed in 1958 and maps for unit areas will be prepared. Three experiment stations have already been set up on high land to test the production of deciduous fruits and vegetables.

The effective work of soil conservation trainees after returning to their regular extension jobs is reflected in the greatly increased interest in conservation measures among farmers in their areas. JCRR has additionally provided equipment, travel funds, administrative expenses and incentive payments to farmers to help the trained personnel in arousing interest in soil conservation among farmers. Thirteen soil conservation field offices have been established and soil conservation practices applied in numerous small demonstration areas where trained personnel help farmers put them to use on their own farms.

Members of a demonstration group climb a paved waterway in a bench terraced pineapple plantation to show essentials of soil conservation.

REORGANIZATION OF FARMERS' ASSOCIATION

One of JCRR's prime rural development activities is to help maintain Taiwan's farmers' associations as organizations of *bona fide* farmers, controlled by and aimed at serving the farmers themselves.

A farmers' association is somewhat similar to a farmers' cooperative. The first one was organized on Taiwan in 1900 during the Japanese occupation. Taiwan now has 340 such associations. They are an important adjunct of the rural community, offering services and materials to the farmer as well

The newly established credit department of a chen *farmers' association.*

Staff members of farmers' associations undergoing training to meet new work demands after reorganization.

as providing an outlet for his agricultural produce. As a result of war and other adverse conditions, many farmers' associations had deteriorated by the early 1950's, thus posing a threat to further development of their services to members.

In 1953, JCRR helped the government effect a fundamental reorganization of the island's farmers' association set-up. The process of reorganization took seven months to complete, ending in February 1954. Field work was divided into three steps including reclassification of membership qualifications, re-election of officers and representatives, and election of general managers as a step in strengthening the entire managerial structure. JCRR provided a subsidy of NT$ 666,870 to the Provincial Department of Agriculture and Forestry to carry out this program through certain *hsien* and municipal governments.

The success achieved may be seen in the fact that control of the associations is now entirely in the hands of the farmers themselves and the services of these organizations have been substantially expanded and improved. Membership has jumped by more than 62,000 to a total of 652,112. Deposits and loans are increasing each year with the banking service the associations offer. A growing number now make available to their members an agricultural extension service.

Farmers associations collect and process 700,000 metric tons of rice, and distribute 600,000 metric tons of fertilizer and 100,000 metric tons of feeds per year. During the past five years, JCRR assisted associations in renovating or constructing 674 paddy or fertilizer warehouses to bring the total to 1,854. The construction and repair of 61 rice mills during that period brought the number in operation to 326 with a daily milling capacity of about 6,700 metric tons.

LAND REFORM

Free China's land reform program, a peaceful social revolution, has benefited nearly a half million—some 66 percent—of the farm families of Taiwan. JCRR, with technical and financial assistance, worked closely with the Government in carrying out the much-needed redistribution of farmland throughout the island.

The primary aim of the reform is to provide land to the tiller, for a contented, progressive, land-owning agricultural population usually produces more than a system of tenancy. JCRR helped the Government design a three-stage program which it took five years to effect. Only a third of Taiwan's farmers owned all of their land and 23 percent part of their land in 1949. Today only 16 percent of the farm land is operated by tenants.

Farmer and wife smile over their new lease which calls for rent equal to only 37.5 percent of the main crop.

Pleased farmer reads notice from Land Bureau on reduced rent in early stage of the land reform.

As a first step, it was considered necessary to free the tenants from excessively high rents. They were paying landlords an average of 50 percent and as high as 70 percent of the main crop as rent. The initial move of the land reform, started in 1949, was to cut down rent to a maximum of 37.5 percent of the main crop. This gave the tenants a chance to save money with which to buy their own land. The reduction of 25 percent from the original land rent frequently meant a wide enough financial margin in favor of the tenant to enable him to build his own house, marry, and plan for the future. Moreover, it gave him the incentive to improve the land since he himself would reap the benefit of his additional investment and labor.

After the land rent reduction program was successfully carried out, the Government began in 1951 to sell public farm land to tenants and farm laborers. Thus was set the pattern and pace of providing land to the tiller. By the end of 1953, a total of 63,000 hectares (151,000 acres) of public lands had been sold to 120,000 farm families. The purchase price was set at 2.5 times the total annual yield of the land. This was to be paid in 20 installments over a period of 10 years.

The final stage of the land reform program involved the transfer

of lands held privately by absentee landlords to the actual tillers. To implement this phase of the new design for land proprietorship, the Government purchased 145,000 hectares (343,000 acres) from absentee land holders and sold it to 200,000 tenant families.

Landlords received 70 percent of their land price in land bonds, redeemable in kind, and 30 percent in government enterprise stocks. The stocks were in the Taiwan Agriculture and Forestry Development Corporation, the Taiwan Industrial and Mining Corporation, the Taiwan Cement Corporation and the Taiwan Paper and Pulp Corporation. Land bonds are redeemable in unhulled rice or in cash in 20 semi-annual installments plus a yearly interest of four percent.

The purchase price with interest is also to be paid off by the erstwhile-tenant-buyer in 20 installments over a period of ten years. The yearly payment made by the farmer, plus his land taxes and water costs,

Intensive training of field and desk workers assures the orderly carrying out of Taiwan's land reform. The trainees shown here are some of the 4,000 administrative personnel and leaders and some 29,000 local committee members and helpers trained for handling the program.

is almost equivalent to the annual 37.5 percent land rent he formerly had to pay. The payment record of the new owners has in most cases been satisfactory.

A landlord may own three hectares (7.2 acres) of medium grade paddy land or six hectares (14.4 acres) of dryland. Even if he himself farms part of it, he is limited to that amount if he rents any land to others. A farmer may own any amount of land he actually operates with immediate members of his family.

The land reform has enabled the farmers to make improvements on their land, build new houses, and purchase more equipment. With improved economic and social status, they are taking greater responsibilities and interest in community activities.

AGRICULTURAL CENSUS

A census of rural life conducted over a period of one year provides the basis for obtaining vital statistics on a wide range of subjects pertaining to Taiwan's agriculture. JCRR in 1957 assisted the Provincial Department of Agriculture and Forestry and the Food Bureau in making such a survey.

The five percent sample study covered 4,000 sub-villages, or 37,000 farms. It went into such vital agricultural matters as farm population, labor, land, crops, livestock, other products, fertilizers, equipment, implements, farm improvement and living conditions.

The sample census was later checked to determine its degree of reliability. Changes in land use in recent years were re-polled. All agricultural sub-village samples were rechecked for accuracy, as were unit yields of such major crops as rice, sweet potato, peanut, wheat and corn.

JCRR-supported project of teaching farmers keep their own accounts helps in conducting the agricultural census.

AGRICULTURAL EXTENSION AND INFORMATION

AGRICULTURAL EXTENSION

Agricultural extension, an educational program which is growing steadily throughout rural Taiwan, is one of the most important activities in which the Joint Commission on Rural Reconstruction participates with the Free Chinese Government. The program has three essential elements: practical educational work with adult farmers, 4-H club activities with rural youth, and home economics work with farm women and girls.

Started on the island in 1955, the extension program has proceeded on the basic policy of dealing with the entire farm enterprise as an entity. This approach aims at helping the farm family solve all of the problems it faces.

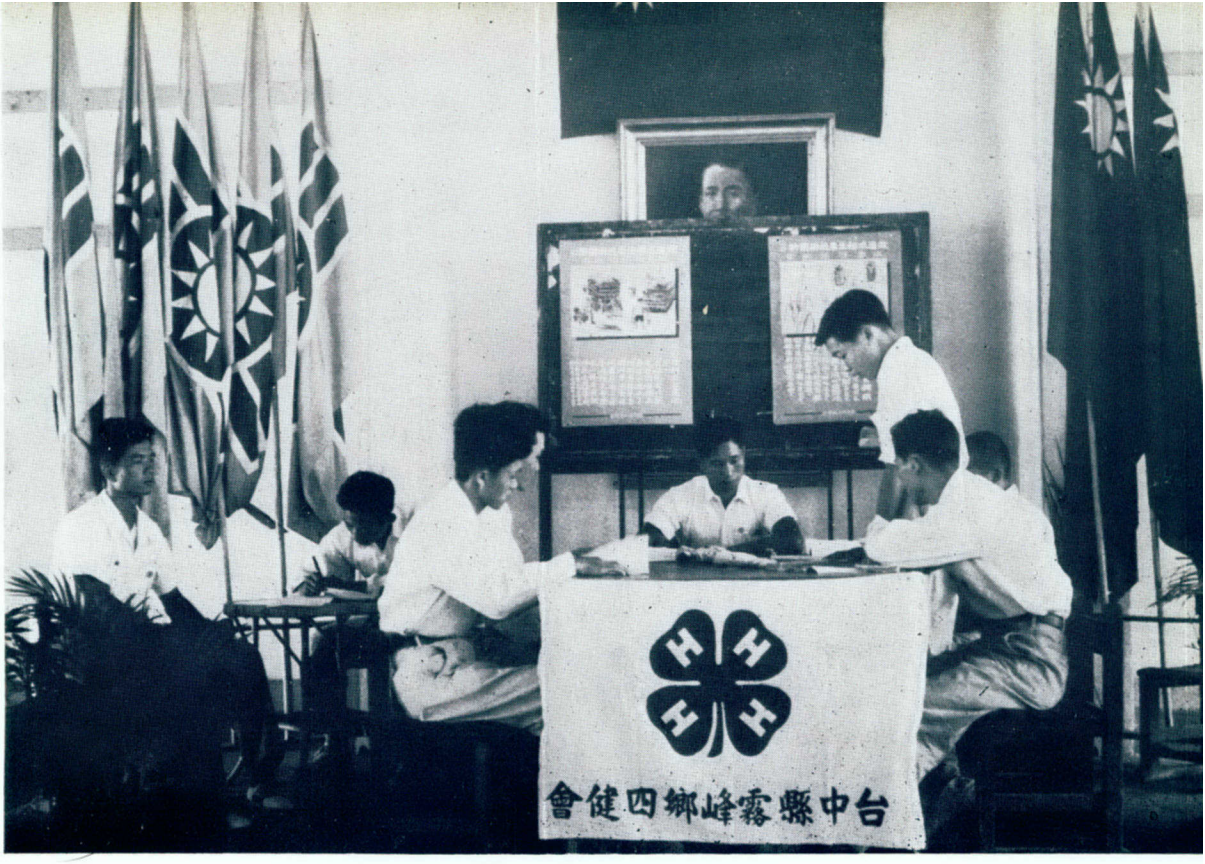
Extension workers all too often formerly had regulatory and fiscal duties to perform in addition to their work of taking information on better farming methods to the field. While their efforts bore fruit as far as individual crop and livestock questions were concerned, integrated, all-inclusive farm extension help was lacking.

The broader concept was put into practice as a pilot activity in

three *chen*, and subsequently extended to 40 *chen*. In 1957, it was combined with 4-H club and home economics work to form an overall farm extension program. This program has come to be known as the Cooperative Extension Work in Agriculture and Home Economics. It is carried on by the provincial, *hsien* and *chen* farmers' associations under the sponsorship of the Provincial Department of Agriculture and Forestry and the *hsien* governments. JCRR lends technical and financial assistance.

The integrated program with adult farmers had, by 1958, been adopted in 92 *hsiang/chen*, including three on the offshore islands of Kinmen. A total of 195 *hsiang/chen* farm advisors, working under the direction of *hsien* supervisors and the Provincial Farmers' Association, have been maintaining actual contacts with farmers. They work with adult farm operators to familiarize them with new agricultural practices, organize discussion groups and hold demonstrations on selected farms. The advisors cooperate closely with workers of other government agencies in carrying out their work.

Rat control campaign is pushed with the help of audio-visual facilities. Here a three wheeler mobile unit from a farmers' association displays instructional rat control posters.



Four-H club members from a village in central Taiwan demonstrate how to conduct club meetings.

4-H CLUB PROGRAM

The 4-H club program has been responsible for the training of more than 36,000 rural youths of Free China in self-reliance, self-discipline and industry. Thus an excellent example of good citizenship and healthy, profitable living has been established for Taiwan's young farmers.

The four H's stand for Head, Heart, Hands and Health. Club members pledge their Head to clearer thinking, Heart to greater loyalty, Hands to greater service and Health to better living. Clubs in Free China are patterned closely after the rural youth organization of the same name in the United States.

The program, to which JCRR gives technical and financial support, was started in 1952 when 4-H clubs were set up in seven vocational agricultural schools, and in one *chen* in each of four *hsien*. Now, there are 3,002 clubs with a total membership of 36,079 in 102 *chen* on Taiwan, in

Four-H club member shows a good breed of sweet potato vine.

three *chen* in the offshore islands of Kinmen, and in 37 vocational agriculture and community middle schools. There are 4-H clubs in every *hsien* on Taiwan. Total membership includes 29,952 boys and 6,127 girls.

Four-H club members learn improved farm and home practices for agricultural production increases and better living. They raise their own hogs, plant their own rice, grow their own chickens and work at other agricultural jobs. Through the 4-H organization they also practice fundamentals of democracy and inspire the farmers to adopt new scientific agricultural methods.

JCRR worked as a supervising agency at the beginning of the 4-H club movement. Later, the 4-H club work in schools was turned over to the Provincial Department of Education, while the farmers' associations assumed the responsibility of carrying out village 4-H club work. JCRR now stands behind to provide only technical and minimal financial assistance.

HOME ECONOMICS

Improvement of farm home living conditions is being carried out on Taiwan with the financial and technical assistance of JCRR through its home economics section. Some 4,000 4-H club girls have been enrolled in the work which is now a regular activity of the island's farmers' associations sponsored by the Provincial Department of Agriculture and Forestry.

The home economics projects are practical. Through these projects 4-H club girls and farm women learn how to produce more food for home use, and so conserve family resources. They also learn how to plan healthful and inexpensive meals, using as much of the home-grown foods as possible, and how to cook rice and vegetables to preserve their food value.

Another example of farm household betterment carried out under this program is the improvement of kitchen stoves. The stoves commonly used in rural homes waste fuel. By merely adding an inexpensive, home-made door to control the draft, farm women can save one-third to one-half in fuel whether it is rice straw, sugar cane leaves, weeds and twigs or wood. Much time for bundling and storing fuel is also saved.

Farm women and 4-H girls have learned to make from native materials simple kitchen gadgets such as racks for knives, utensils and towels. They have also learned to make food covers, covered garbage pails and fly swatters. They keep their toilets clean and covered. Their yards and drainage ditches have been cleaned and improved. Rural families are being taught the danger of using fresh night soil. How to install a sink, provide more work and storage space and get more light and ventilation in farmhouse kitchens have also been taught in the home economics program.

JCRR, in cooperation with the Provincial Farmers' Association, helps train home economics extension workers to work directly with farm wives

Women learn about food and nutrition under a JCRR-supported program.

and 4-H girls through the farmers' associations. Seventy-five of these trained young women are now engaged in this type of home economics work.

HARVEST MAGAZINE

JCRR finances publication of a magazine called "Harvest" to make available to Taiwan's farm folk current information on agricultural and related rural subjects. Jointly sponsored by JCRR, USIS and ICA, this semi-monthly has won a growing readership and is moving steadily toward its goal of self-support.

The first issue of "Harvest" appeared July 15, 1951, in tabloid form and was distributed free of charge through all farmers' associations and agricultural small unit chiefs. It reached a peak circulation of 70,000 copies in the first fiscal year. Within that year "Harvest" had become so popular that it was decided to levy a nominal subscription fee (NT$ 0.50 per copy) for the rural periodical in the second year of its existence.

Paid subscriptions amounted to 37,000. The sustained interest shown by the farmers in the magazine prompted JCRR to recommend in early 1953 that "Harvest" be placed on a business basis by raising the subscription rate to one NT dollar per copy to cover a larger percentage of its operating expenses. The increase in subscription rate caused an acute drop in subscribers. In November 1953, the tabloid was changed into a magazine. This helped to improve the financial status of the publication and paved its way to the ultimate goal of self-support.

The total of paid subscriptions was brought up from a low of 18,500 in July, 1954, to 24,000 in July, 1955. This was due to untiring promotion work as well as improvement of the periodical, which became 49 percent self-supporting. Manned by a Chinese staff, most of whom have considerable experience in the editorial and information field, "Harvest" maintained its appeal by publishing information of general interest and use to farm people. One popular feature, for example, was a series of articles well illustrated with cartoon-type drawings, on rural health and sanitation.

The magazine's continued gains in popularity through the present

can be credited to further improvement and variation of the editorial content with careful attention to the wants and needs of readers as determined by frequent surveys of their attitudes. Good business management and effective promotion methods have also contributed, as have the integrity and efficiency of the magazine staff, the clock-like regularity of issue and quality printing.

Although "Harvest" is approaching self-support, to bring revenue into balance with rising costs of publication still remains the biggest problem. While the magazine fills a definite need in the overall informational impact, it still needs to reach on a paying basis a greater number of literate people in the low-income rural areas.

"Harvest", entering its eighth year of publication, sees more significant achievements than in any previous year. The periodical, now costing NT$ 1.50 per copy, is in a stronger financial position than ever, again having reached 37,000 paid subscriptions. "Harvest" is now 64.5 percent self-supporting.

"Harvest" magazine reaches farmers all over the island.

FARM RADIO

The initial step in JCRR's farm radio program was to distribute a sufficient number of receiving sets to the rural public to arouse the farmers' interest in this effective medium for the dissemination of agricultural news and information.

In 1954, JCRR procured 6,000 small, inexpensive sets and started to loan them to farmers' organizations, rural health units, and agricultural unit chiefs. Availability of small sets, along with the prospect of being able to receive good programs, has prompted farmers to purchase their own radios. Estimates place Taiwan's rural radios at 20,000 sets with a listening audience of 100,000 persons.

JCRR followed up radio distribution work with setting up two broadcasting programs to meet the growing demand of rural radio audiences. The first program, the "Good Farm", was started at the end of 1955, through the island-wide network of the Broadcasting Corporation of China. The second program, the "Happy Farm", was inaugurated in 1956 through the Farmers' Broadcasting Station. JCRR assistance to these programs has been channelled through the Provincial Department of Agriculture and Forestry.

Both programs demonstrated a self-help spirit from the outset. While JCRR assumed the largest burden of subsidy, the Taiwan Sugar Corporation offered to pay the balance. The informational effectiveness of

One of the 6,000 radios JCRR has loaned to farm organizations and agricultural unit chiefs. It is "Farm Hour" and neighbors have also gathered to listen to the program.

these programs interested other agricultural organizations. By 1957, the Land Bank and the Taiwan Forest Administration joined the Taiwan Sugar Corporation as sponsoring agencies for the "Good Farm" program by jointly sharing about one-third of the total expenses. Additional sponsoring agencies for the "Happy Farm" program included the Taiwan Tobacco and Wine Monopoly Bureau and the Taiwan Forest Administration. While JCRR cut down its subsidy more than 20 percent for the "Good Farm" and more than 30 percent for the "Happy Farm" for the past year, two of the sponsoring agencies increased their share of costs.

The broadcasting stations have received a growing volume of rural mail, and response to contests and surveys has been unusually heavy. Listeners want more and longer programs and 90 percent express the hope the current ones will keep going indefinitely. Mail volume is so large that the stations are hard pressed to service answers.

The 30-minute "Good Farm" program is broadcast Monday through Saturday and the one-hour "Happy Farm" program every day plus additional Sunday re-broadcasts on three other outlets.

MOTION PICTURE

he first motion picture made by JCRR for teaching rural people improved agricultural practices was a documentary film on the distribution and application of chemical fertilizer, completed in October 1951. The film was shot with a small, hand-held 16mm movie camera operated by a single specialist. Now the studio has a staff of three and an estimated US$33,000 worth of motion picture, sound and recording equipment—in fact, all facilities needed to produce a motion picture with the exception of film processing.

JCRR has completed production of ten films in the past seven years. In addition, five contract movies have been made by commercial studios under JCRR supervision. The motion pictures range in length from 11 to 60 minutes. Copies are made in Chinese and English, and sometimes also in the Taiwanese dialect.

After completion of a movie, JCRR distributes copies to Provincial

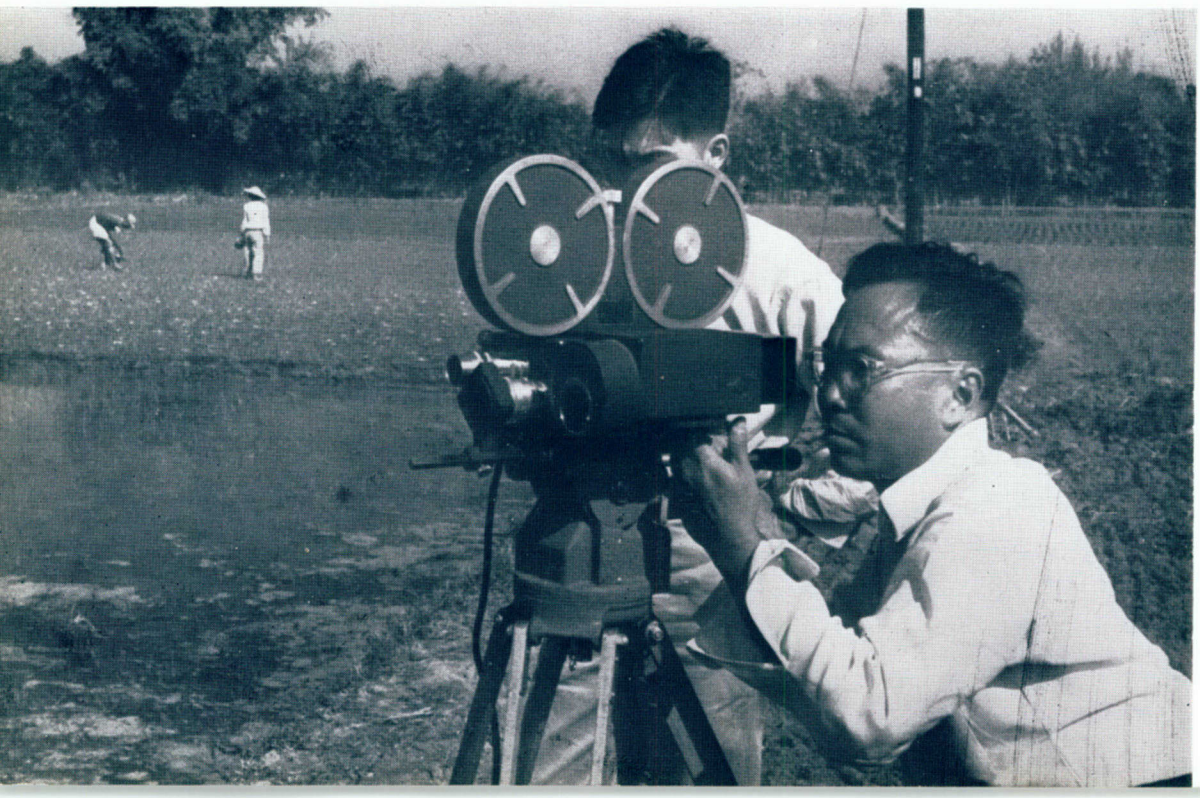
Department of Agriculture and Forestry mobile units for showing in rural areas, to USIS for loan to other organizations, and, upon request, to the Government Information Office, the Ministry of Foreign Affairs, the Overseas Chinese Affairs Commission and some local agents. Copies in English also go to ICA Washington.

In addition to producing films with rural themes, the JCRR motion picture unit has assisted ICA in making documentaries on a variety of other subjects.

JCRR also records narration for color slide series and for classroom lessons on agricultural subjects. Projection of movies and color slides is another of the film section's activities. Training classes in the operation of projectors and cameras have been conducted by JCRR film specialists.

Several documentary films are still in the making. They cover subjects on nutrition, rodent control and the operation of power tillers. Four color films—on land reform, soil conservation, the cross-island highway and 4-H club activities—are in the planning stage. Documentary films have proved to be an effective medium for agricultural extension and education. Promotion work is underway to expand film projection units among provincial organizations in order to intensify the use of this modern information medium.

JCRR cinematographer S. C. Chuck making a feature film, "Happy Farm Life".



AGRICULTURAL EDUCATION

A long-range program JCRR has stressed in recent years is the strengthening of agricultural research and education in Free China.. The effort is aimed at exploring new fields of experimentation and study that will speed the further crop-development plans of the government.

In providing assistance to agricultural research work, JCRR has placed emphasis upon those projects which help to solve problems faced by farmers in general. Help has been extended to research institutes and improvement stations by procuring for them new equipment and supplies, financing construction of necessary buildings, providing working funds for conducting experiments and surveys, and advancing experimental methods.

JCRR first helped to change the prewar Japanese pattern of field experimental designs to the new orthodox field plot technique and analytic methods now used in agriculturally advanced countries. The new methods based on the principle of modern statistics have been introduced to the workers of various experiment stations. The next step taken to improve agricultural research on the island was to achieve better coordination of effort among various experiment stations.

Another outstanding activity in the upgraded research program is the introduction of more than 500 varieties of crops for purpose of testing at various experiment stations and agricultural colleges, and the sending abroad of local crop varieties to more than 20 countries in response to

requests. JCRR has helped introduce new studies in the fields of seed analysis, small-powered farm machineries, the grading, packing and handling of vegetables and fruits, biological testing of modern pesticides, and soil analysis.

Education of agricultural technicians on Taiwan has also been carried out with JCRR assistance. Basic training facilities have been improved at the College of Agriculture of the National Taiwan University and the Provincial College of Agriculture at Taichung. NTU has signed a three-year contract with the College of Agriculture of the University of California under which American professors have been sent to Taiwan to assist in raising standards of research, the revision of curricula and improvement of teaching methods.

JCRR has also helped to strengthen teaching facilities and improve the quality of teachers in all the agricultural vocational schools. In-service training classes have been conducted for research workers at various agricultural experiment stations. In addition, numerous short training courses have been offered each year to agricultural extension workers in the ***hsien*** government, ***chen*** offices and farmers' associations.

RURAL HEALTH

STUDY OF SOYBEAN DIET

An early JCRR health project helped to pave the way for the nutritional improvement of the diet of Free China's military personnel. In 1950, JCRR initiated a study of the soybean to determine its nutritional values for combatting the easy hunger and fatigue commonly found among soldiers in training. Acting upon the suggestion of American aid authorities in Washington, JCRR procured 90 metric tons of processed soybeans and 60 metric tons of raw soybeans for use in a diet experiment on Taiwan. JCRR further provided necessary operating expenses to the National Defense Medical Center, the sponsor of the project.

The experiment was carried out among 15,152 soldiers and 800 civilians between July, 1951, and April, 1952. Each adult was given 100 grams of soybeans daily for 80 to 90 days, each juvenile 50 to 65 grams daily for 150 to 160 days.

The findings of this experiment were that soldiers on the soybean diet no longer complained of hunger and exhaustion after drilling. In three months, 86 percent of the soldiers placed under the diet gained an average in body weight of 8 to 12 pounds. Among juveniles participating in the experiment, rapid increases in height were also registered. Another

improvement was found in eye sight of the servicemen. More than 50 percent of 1,873 soldiers examined before the experiment showed impaired darkness adaptation. After three months of soybean feeding, 43 percent of those with impaired vision showed marked improvement.

Since 1952, as a result of the experiment, and with the assistance of MAAG and ICA (MSA at that time), the armed forces of the Rebublic of China have been placed on an improved diet with emphasis on soybeans and other supplements.

DEVELOPMENT OF MULTILATERAL HEALTH PROJECTS

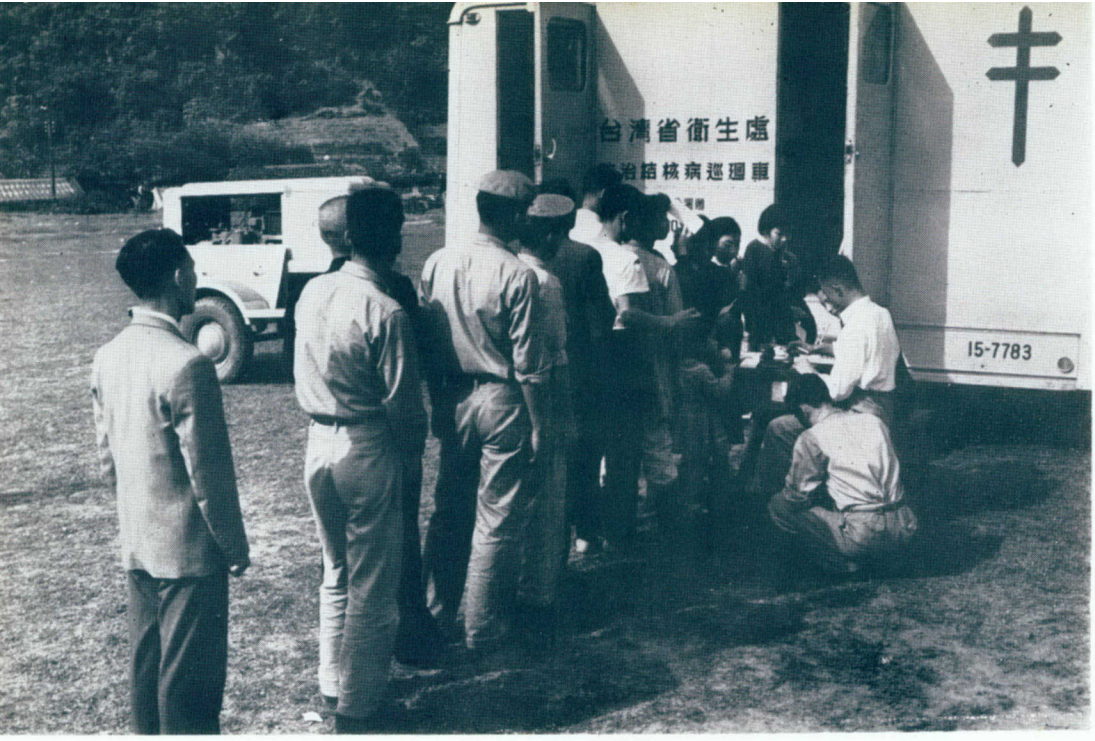
JCRR paved the way for inter-agency cooperation in the fight against certain endemic and insidious diseases on Taiwan and lent assistance to international organizations carrying out health projects. Several of the projects initiated by JCRR were subsequently taken over by international health teams. Funds for expenses of the members of such teams, invited to the island by the goverment, were provided by JCRR. The international teams included those sent by UNICEF and WHO.

Projects have included the control of tuberculosis, venereal disease, malaria, mother and child health and hospital nursing. It was after JCRR had assisted in these projects for one to two years that the provincial government assumed the responsibility of these health efforts and included them into its budget. Even now, however, JCRR continues to support such special multilateral projects as VD control, trachoma study and mother and child service.

The following are statistical data regarding the effectiveness of the multilateral projects jointly carried on by the Chinese government, WHO, UNICEF, ICA and JCRR:

Number of cases reduced

1) Malaria — from 1.2 million in 1950 to only 433 cases in 1957.
2) Trachoma – from September 1954, to February 1957, the total number of children examined was 1,848,000, of whom



Mobile X-ray vans such as this comb the island for tuberculosis cases in a vigorous effort to fight the disease.

1,314,000 were positive and were adequately treated free of charge. Trachoma and conjunctivitis incidence rate dropped from about 80 percent to 10 percent.

3) V. D. — from early 1954 to December 1957, of 1,593,752 persons examined by health organizations for serological test of syphilis, 83,897 were positive reactors; 55,932 required treatment of whom 43,071, or 77 percent, received treatment. The serological positive rate from mass examination has been declining. It was 13.1 percent in fiscal 1954, 7.5 percent in fiscal 1955, 4.9 percent in fiscal 1956, and 5.8 percent in fiscal 1957.

4) T. B. — from December, 1949, to March, 1958, mass tuberculosis testing was completed for 5,423,156 persons under the age of 20, of whom 2,105,124 (38.8 percent) were positive reactors and 3,345,317 given BCG vaccination. From September, 1953, to March, 1958, a total of 1,429,127 persons were X-rayed, with 4 to 5 percent having pulmonary tuberculosis. Tuberculosis mortality had dropped from 285 per 100,000 people in 1947 to 55 in 1957.

ESTABLISHMENT OF ISLAND-WIDE HEALTH STATIONS

Participation in rural health projects on Taiwan began for JCRR as early as 1949. The working plan at that time was to build a network of health stations with emphasis on community support.

JCRR assistance in setting up or strengthening a health station in a rural community required the establishing of a health board composed of local leaders for raising funds, and provision of adequate working space. A further requisite was employment of a minimum full-time staff, including a doctor, a nurse, and a midwife. JCRR provided unit packs of medical equipment, home-visiting bags, delivery bags and bicycles. A cash grant was made for per diem expenses of health workers making visits to schools and homes, and for specialists mobilized to conduct surveys and supervise various health projects.

There were, altogether, 104 health stations on the island in 1949, but 46 percent of them existed in name only. In the initial stage, JCRR helped to strengthen all such facilities in being, and went on to cooperate with other agencies in building 148 new ones. By another year, 104 additional health stations had come into existence. And 35 more were set up in subsequent years.

JCRR financial aid to local communities in this program has been merely symbolic in many cases where the local citizens were prosperous. Subsidies have ranged from the equivalent of US$100 to US$600 for one station. On the average, JCRR spent one dollar against 33 dollars put up by local communities for building these health installations.

The next step was to make the stations self-supporting. JCRR withheld free allocations of medical supplies and small cash grants for per diem expenses to these stations in 1952. The *chen* offices were also asked to provide other operating expenses of their health stations. By taking these two steps, JCRR saved the equivalent of US$200,000, which was then used for the standardization of the health stations.

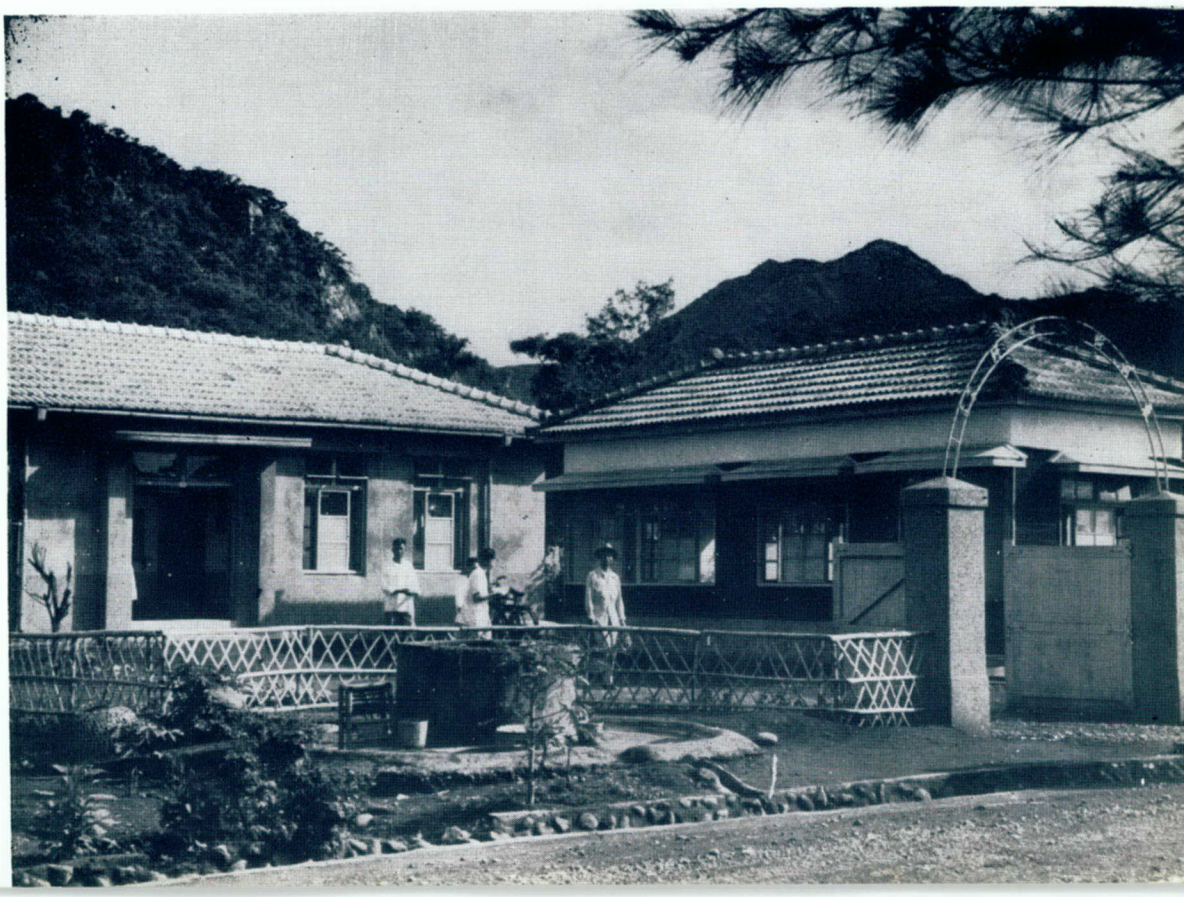
A JCRR-designed standard health station building cost the equivalent of about US$5,400. Local communities were asked to provide 3,600 square feet of land and the equivalent of US$3,000, or about 50 percent of the actual construction cost. Fifty *chen* gladly signed up, and the results proved

to be highly satisfactory. Many more *chen* applied. As another move towards local self-sufficiency, JCRR provided, in 1953, another five building blueprints to suit different needs. Where one of these was selected, the local community was requested to provide two-thirds of the construction cost plus the land and furnishings. A total of 133 *chen* readily participated in the project.

Beginning in 1952, staff salaries of all the health stations were included in the city and *hsien* budgets, thus making the maintenance of health station service a responsibility of the local governments.

On Taiwan, there are now 22 health centers, 391 health stations, 168 health rooms in aboriginal areas and 411 part-time health rooms, carrying out rural health work in almost every part of the island. The staff of a health center ranges from 14 to 72. The staff for a health station is two to three in fishing areas and salt fields but nine to 11 in prosperous *chen*. The health room is staffed with one midwife and an attendant.

A typical health station.



RECONSTRUCTION ON KINMEN ISLANDS

FOOD PRODUCTION ON KINMEN

One of the most spectacular results of JCRR cooperation with the Free Chinese may be seen on the Kinmen Islands, which are within sight—and artillery range—of the Communist-dominated China mainland.

With the exception of rice, Kinmen is now almost self-sufficient in food. This is in sharp contrast to the time, less than six years ago, when the population had to rely on imports for the supply of food for eight month of the year.

The phenomenal rise in hog production is, of course, a main factor. But JCRR assistance also accounts for the large increases in crop production. In general, these have been about 30 percent. For some crops, however, the production jump has been much higher. Cultivated acreages of wheat, barley and kaoliang (grain sorghum) have been expanded by 12 times, and today vegetable production is 40 times greater than before.

JCRR's efforts have been concentrated in showing the farmers how to increase production through pest and disease control, improved and introduced seeds, use of compost and chemical fertilizers, better irrigation facilities and more modern farming methods.

JCRR has also aided the islands' fishing industry in order to step up local food supply. Organization of the Fishermen's Association, training of fishing personnel, and extension of loans for the purchase of fishing gear are among the measures taken. JCRR assistance also accounts for the building of new sampans, rehabilitation of old junks for deep sea fishing and introduction of mechanized fishing to the islanders to ensure bigger catches.

This big melon also tells the story of JCRR assistance in works on Kinmen. Kinmen farmers have learned to grow such melons from an experienced farmer flown in from Taiwan. Selected seeds were given them gratis. Water melon crop is now another source of extra income for the farmers there.

Kinmen farmers have dug 3,000 wells with JCRR help. There is now enough water for crops.

HOG PRODUCTION ON KINMEN

Success or failure in raising hogs on Kinmen Islands depended on the whims of the Land God before JCRR came into the picture. At least that was what the farmers thought at the time.

There were reasons. Hog production on Kinmen had dropped from the prewar total of 6,000 head to 1,000 head in 1950. Feed was insufficient and hog cholera proved to be a terrible killer. The island imported at least 500 head from Taiwan every month to meet the needs of military personnel stationed there, but with the hogs also came hog diseases.

JCRR sought to control the diseases by calling for quarantine of imported animals and vaccination of all hogs on the islands against cholera and erysipelas. Veterinarians had to be trained to carry out these jobs. Kinmen farmers quickly saw that what JCRR taught them about better management, disease control and introduction of purebred boars was directly responsible for increased production.

Heavier hogs raised in Kinmen now call for larger scales. This farm woman is carrying a new beam scale to weigh her three hogs, each weighing 300 kilograms.

View of a 30-bed hospital in Kinmen which has an underground ward, an X-ray laboratory, an operating room and a dormitory.

Introduction of purebred Berkshire boars for breeding with local sows, together with cholera control, were the two main factors in boosting hog production on Kinmen. Offspring of the purebred boar-local sow crosses grew faster and heavier. Where formerly it took a farmer 14 months to raise a 150-pound hog, he now can raise a crossbred hog weighing 200 pounds in eight months or less on about the same amount of feed. Disease and pest control and improved sanitary conditions in the pig sties kept the hogs healthy.

Today there are 30,000 head of hogs on Kinmen Islands. The islands are in a position to export animals after meeting both the civilian and military needs. The value of the approximately 20,000 head of hogs slaughtered each year is greater than the cost of all JCRR assistance to Kinmen, Matsu and other offshore islands during the whole period of five years.

PLAGUE CONTROL

Control of human plague on Kinmen highlights JCRR-assisted accomplishments on the offshore islands. What was once a dreadful pestilence that visited the islands with fearful regularity now exists only in memory.

Eight thousand deaths due to plague were reported on Kinmen between 1890 and 1910. After that, the diseases took from 20 to 200 lives

Kinmen's rats met with the same fate as those on Taiwan. The poisonous bait which is being mixed here accounts for the elimination of 75 percent of the rats on Kinmen.

a year until 1952 when JCRR began to help in carrying out a control project. Not a single death from plague has been reported since.

The JCRR method of control is double-barreled. All Kinmen residents and visitors must be inoculated with plague vaccine. Since a certain type of flea carried by rats transmits the disease to humans, it was necessary to eliminate this flea. By dusting rat-infested places with five percent DDT and one percent BHC the fleas have been controlled. Spot checks are made periodically, and if more than one of the disease-carrying fleas is found on a rat the whole area is cordoned off and sprayed or dusted.

The follow-up step in plague eradication on Kinmen involved control of the host rats. A campaign coincident with the concerted sweep carried out on Taiwan with JCRR help has produced the same excellent results. By using warfarin mixed with rice, peanut oil and peanut butter, teams and individual farmers, often making bait stations from discarded artillery shell containers, have been able to reduce the rat population of Kinmen very considerably. That work is still going on.

A welcome corollary of rat control on Kinmen has been the great saving in field crops from the rodents.