CHINESE-AMERICAN

JOINT COMMISSION ON RURAL RECONSTRUCTION

Plant Industry Series: No. 7

CROP VARIETY IMPROVEMENT AND SEED MULTIPLICATION WORK IN TAIWAN

— A Summary Report —

By

The Plant Industry Division, JCRR

TAIPEI, TAIWAN, CHINA

MAY, 1956

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FOREWORD

This report gives a brief description of the present status of the seed improvement work on various important crops in Taiwan. It is intended to present the types of work being done on this Island without going into details on the methods used and results obtained. More comprehensive reports on the work progress of each individual crop will be prepared separately.

From the present report, it may be seen that (1) crops with a well developed breeding program and a well established seed multiplication and distribution system include rice, sugarcane, sweet potato and wheat; (2) crops with a rather newly developed breeding program and a newly revised official seed multiplication program include peanuts and tobacco; (3) crops with a developing breeding program but not yet an officially established seed multiplication system include soybean, tea, jute, pineapple and citrus fruits.

Seed improvement works on other crops, such as cotton, flax, pasture crops, vegetables, etc. are not included, as they are relatively new and the results accumulated are yet fragmental.

A limited copies of this report have been distributed in mimeographed form previously. Some minor changes have been made in the contents since then. The present pamphlet will supersede the mimeographed copies.

H. T. Chang
Chief, Plant Industry Division
JCRR

May, 1956

1. RICE

I. Background information.

A. Acreage and production:

Rice is the most important staple food crop in Taiwan. It is also the second most important crop for earning foreign exchanges, next only to sugar. The following table gives the acreage, production and unit yield of rice of the various years:

Year	Acreage (ha.)	Production of brown rice (M/T)	Unit yield (kg/ha.)	Remark
1934-38	662,048	1,337,698	2,024	Pre-war average
1938	625,398	1,402,414	2,242	Pre-war record year
1944	600,688	1,068,121	1,778	
1945	502,018	638,828	1,273	The year of recovery of Taiwan
1950	770,262	1,421,486	1,845	
1951	789,075	1,484,792	1,882	
1952	785,729	1,570,115	1,998	
1953	778,384	1,641,557	2,109	
1954	776,660	1,695,106	2,183	
1955	750,739	1,614,953	2,151	

B. The rice groups:

The rice grown in Taiwan may be classified into two main groups, the Paddy rice and Upland rice. Under Paddy rice group, there are commercially classified into four sub-groups. These are 1) Ponlai rice (Japonica type), 2) Native rice (Indica type), 3) Round glutinous rice and 4) Long glutinous rice. Under Upland rice group, there are two sub-groups, namely Glutinous Upland rice and Non-glutinous Upland rice. Among these six sub-groups, the Ponlai and Native rice are the most important ones which constitute 92.5 percent of Taiwan rice production. The acreage and production of these six rice groups in the last five years may be illustrated by the following table:

Year	Paddy Rice								Upland Rice			
	Ponlai Rice		Native Rice		Round Glutinous		Long Glutinous		Glutinous		Non-Glutinous	
	Acreage (Ha.)	Production (M/T)	Acreage (Ha.)	Production (M/T)	Acreage (Ha.)	Production (M/T)	Acreage (Ha.)	Production (M/T)	Acreage (Ha.)	Production (M/T)	Acreage (Ha.)	Production (M/T)
1951	385,455	781,123	328,703	609,132	10,379	19,450	7,187	12,751	56,216	61,413	1,135	923
1952	399,963	874,459	313,244	604,820	11,854	23,967	7,753	14,614	51,743	51,404	1,172	851
1953	395,966	892,169	317,852	661,979	10,661	22,194	6,484	12,845	46,514	51,580	907	790
1954	388,869	911,554	324,209	711,041	10,002	20,981	6,483	13,504	46,160	37,196	937	830
1955	386,129	901,910	308,098	537,649	9,769	20,998	5,898	11,720	39,920	41,926	925	749

C. Producing areas:

Although rice is being planted all over Taiwan, the majority of rice plantation is along the west coast. In Taiwan, there are six rice producing regions. The acreage, production and unit yield of each region from 1951 to 1955 are as follows:

Region	Acreage		Production		Unit yield
	Ha.	%	M/T	%	Kg/ha.
Taipei	96,546	12.4	183,480	11.4	1,900
Hsinchu	138,408	17.8	262,023	16.4	1,893
Taichung	201,130	25.9	485,647	30.3	2,414
Tainan	177,084	22.8	333,382	20.8	1,882
Kaohsiung	127,889	16.5	278,375	17.4	2,176
East Taiwan	35,060	4.6	58,398	3.7	1,666
Total	776,117	100.0	1,601,305	100.0	2,063

D. The planting system:

Ordinarily rice is planted twice a year in Taiwan, except in some small areas, due to the insufficiency of irrigational water; where rice is planted only once a year. According to the planting season, the rice crop may be classified into the first rice crop and the second rice crop. Those which are harvested before August 15 are habitually grouped as the first rice crop; after that date, the second rice crop. Within Yunlin, Chiayi and Tainan Prefectures, due to the practices of a particular irrigational system (3-year rotational irrigation system), some of the land have to depend entirely upon the rainfall for irrigation water. Within these areas, the so-called intermediate rice crop prevails. In order to synchronize with the rainfall, the intermediate crop is planted only once a year after the usual planting time of the first but before that of the second rice crop. The intermediate crop is classified either as the first or the second crop according to its harvesting time. The distribution of the first and the second rice crop from 1951-1955 is as follows:

Crop	Acreage		Production		Unit yield
	Ha.	%	M/T	%	Kg/ha.
1st Crop	339,864	45.1	752,299	46.9	2,211
2nd Crop	436,253	54.9	849,006	53.1	1,946
Total	776,117	100.0	1,601,305	100.0	2,063

II. Varietal improvement.

A. Varieties grown at present:

According to a survey made in 1953, there were some 367 varieties grown in the first rice crop and 404 varieties in the second rice crop. However, this does not mean that a total of 771 varieties grown in Taiwan because most of the Ponlai rice varieties were grown both in the first and in the second crops. The most popular varieties grown at present are as follows:

1. Ponlai rice varieties

   Taipei 127, 177
   Kwanfu 1, 401
   Hsinchu 24, 50, 56
   Taichung 65, 150, 153, 155
   Taichung Special 6
   Chianan 2, 8, 14
   Kaohsiung 22, 24, 27

2. Native rice varieties

1st rice crop	2nd rice crop
Pei-mi-fung	Mingtang
Tsai-yuan-chung	Green fruit sticky
Yi-kung-pao	Shun-chiang
	Kuo-tze

B. New varieties under trial:

Since 1950, a province-wide regional test on Ponlai rice has been conducted by the Taiwan Agricultural Research Institute to test the adaptability of new varieties bred by the various stations. The new varieties now under regional test are as follows:

Nung-yu 2092, 2136
Chung-nung-peng 117, 367, 376, 389
Hsin-nung-yu 72, 73
Nung-shih 4, 5, 10, 18
Taichung-yu 171, 172, 176, 177, 179
Chia-nung-yu 242, 411, 428, 478
Kao-yu 41, 42, 44, 45, 53
Nan-kai-yu 2
Taitung 1, 16, 19, 24

For Native rice, the variety trial and pure line selection have been conducted since 1950. The number of varieties and pure line strains now under advanced test in six places are as follows :

1st crop	2nd crop
14 varieties	12 varieties
54 pure line strains	68 pure line strains

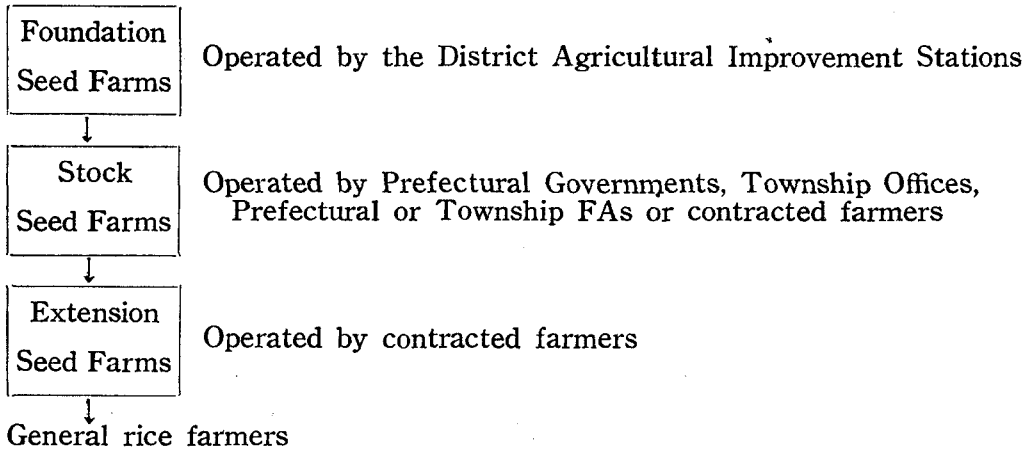
C. Agencies undertaking rice improvement work :

1. Taiwan Agricultural Research Institute (TARI)
2. Chiayi Agricultural Experiment Station, TARI
3. Taipei District Agricultural Improvement Station
4. Hsinchu District Agricultural Improvement Station
5. Taichung District Agricultural Improvement Station
6. Tainan District Agricultural Improvement Station
7. Kaohsiung District Agricultural Improvement Station
8. Hwalien District Agricultural Improvement Station
9. Taitung District Agricultural Improvement Station
10. National Bureau of Agricultural Research, Ministry of Economic Affairs

III. The rice seed multiplication and renewal system in Taiwan.

A. The seed multiplication system :

The rice seed multiplication program for Ponlai rice is conducted under three stages, i.e. the foundation seed farm, the stock seed farm and the extension seed farm. For Native and Upland rice, it is also conducted in three levels, viz. the head selection, the primary seed farm and the secondary seed farm. Rice farmers usually get the pure seeds either from the extension seed farm (Ponlai rice) or the secondary seed farm (Native rice) through bartering with their own seeds at equal amount or up to 20% premium. Starting from 1949, through the assistance of JCRR, the rice seed multiplication system is considerably strengthened. The following diagram shows the operation of rice seed multiplication program :



The amount of pure seeds of Ponlai rice to be multiplied and the number of seed farms operated in 1956 are as follows:

	No. of seed farms	Acreage of seed farms	Projected amount of pure seeds to be produced
		(ha.)	(kg.)
Foundation Seed Farm	7	3.75	5,625
Stock Seed Farm	161	93.75	225,000
Extension Seed Farm	4,000	3,750.00	9,000,000*

* For each hectare of rice field, 60 kg. of seed is needed so the total amount of pure seeds produced will be enough to renew 150,000 ha. Under this setup, the rice seeds of rice farmers in Taiwan will be renewed once every three years.

B. The distribution of pure seeds is carried out as follows:

1. The foundation seeds are distributed to the stock seed farms free of charge.

2. The stock seeds are purchased by the Prefectural government and given to the extension seed farm free of charge.

3. The extension seeds are bartered with farmers' own seeds either at a ratio of 1:1 or with a premium about 10-20%.

2. SWEET POTATO

I. Background information.

A. Acreage and production:

Sweet potato is used both for human food and animal feed. Its acreage is

second only to rice. The acreage and production during the past few years are shown in the following table:

	1952	1953	1954	1955
Acreage (ha.)	233,502	237,788	247,551	226,004
Production (M.T-)	2,090,463	2,276,942	2,556,823	2,290,426
Unit yield (kg/ha.)	8,953	9,576	10,328	10,134

B. Producing area:

Although sweet potato is grown almost everywhere in Taiwan, about 35% is found in Tainan, Yunlin and Chiayi Prefectures. The distribution of its acreage is roughly as follows:

Tainan Prefecture Yunlin Prefecture Chiayi Prefecture	35%	Hsinchu Prefecture Miaoli Prefecture Taoyuan Prefecture	12%
Changhwa Prefecture Taichung Prefecture Nantou Prefecture	18%	Taipei Prefecture Ilan Prefecture	7%
Pingtung Prefecture Kaohsiung Prefecture	16%	Taitung Prefecture Hwalien Prefecture Penghu Prefecture	8%
		Others	4%

C. Planting seasons:

About 85 percent of sweet potatoes is planted in August and September and 15 percent in April or May. Harvesting is made five to six months after planting. In southern Taiwan, sweet potatoes are often intercropped in autumn crop with sugarcane, while in Taichung and Changhwa Prefectures, it may be planted in rice fields about 20 to 30 days before the second rice crop is harvested.

II. Varietal improvement.

A. Varieties grown at present:

There are reportedly over 200 varieties of sweet potatoes grown commercially in Taiwan. Improved varieties such as Tainung 31 and Tainung 17 have become the leading varieties in Tainan, Yunlin and Chiayi Prefectures. Native varieties still dominate in most of the other areas. Some popular improved and native varieties are as follows:

Improved varieties	Native varieties
Tainung No. 31	70-day Early
Tainung No. 17	Green-tuber-tail
Tainung No. 10	Red-tuber-tail
Tainung No. 9	Iron-wire Variety
Tainung No. 3	5-catty Variety
White Holland	

B. Some promising varieties under demonstration and trial planting:

Varieties	Origin
P 30	By Taiwan Agricultural Research Institute (TARI)
Tainung 44	By Chiayi Agricultural Experiment Station, TARI
Tainung 45	By Chiayi Agricultural Experiment Station, TARI
K2	By Chiayi Agricultural Experiment Station, TARI
C137, C162	By Chiayi Agricultural Experiment Station, TARI
Hsin-yu 25 & 30	By Hsinchu District Agricultural Improvement Station

C. Other new varieties under testing:

1. A province-wide variety regional test of sweet potatoes is installed in 1956, in which all new varieties produced by different agricultural experiment stations will be put together for comparison. The varieties include: P6 and P46 from TARI; C169, C347, C424, and colored varieties C381, C382, C430, C454 and C356 from Chiayi Agricultural Experiment Station of TARI; Hsin-yu 24, 25, 30 and 34 from Hsinchu District Agricultural Improvement Station; Taichung-yu 5 and 6 from Taichung District Agricultural Improvement Station; and Tainan 9, Nan-hsien 2 and 4 from Tainan District Agricultural Improvement Station.

2. Many new seedlings from crosses have been obtained by different experiment stations, especially the Chiayi Agricultural Experiment Station of TARI. Attempt is being made to breed some colored sweet potato varieties with higher nutritional value for table use. Recently, a Hawaiian variety Onolena was introduced by JCRR from Hawaiian Agricultural Improvement Station.

D. Main agencies working on sweet potato improvement:

1. Chiayi Agricultural Experiment Station, TARI

2. TARI, Taipei

3. Hsinchu District Agricultural Improvement Station

4. Tainan District Agricultural Improvement Station

III. Production and distribution system of seed potatoes and cuttings.

A system of potato seed production and distribution was established many years ago, dating back to the Pre-War days. As it was proved too complicated and not effective, a thorough revision was made in the fall of 1955. The revised practice has been started this year, and may be outlined as follows:

A. Foundation seed potato farms — are operated by the District Agricultural Improvement Stations with the running expenses received from the Taiwan Provincial Department of Agriculture and Forestry (PDAF). Seed potatoes produced therefrom are distributed free of charge to the stock seed farms in different prefectures.

B. Stock seed potato farms — are operated by the prefectural farmers' associations. There will be only 1-3 of such stock seed farms in each prefecture at every crop season in order to facilitate the supervision. Foundation seed potatoes are planted on these farms. Potato cuttings produced therefrom are distributed to the first cutting multiplication farm growers in townships also without charge, but prefectural farmers' associations or the contracted farmers who operate the stock seed farms will receive compensation from PDAF based on the number of cuttings distributed.

C. First potato cutting multiplication farms — are operated by township farmers' associations or farmers contracted by them, and there are also only 1-3 of such farms in each township. Potato cuttings produced by them are sold to the second cutting multiplication farm growers at a minimal price. The township farmers' associations or the contracted farmers who operated these farms will receive also a small subsidy from PDAF.

D. Second potato cutting multiplication farms — are operated by farmers contracted by township farmers' associations with potato cuttings obtained from the first potato cutting multiplication farms. Potato cuttings produced from the second cutting multiplication farms are sold to ordinary farmers for general planting at a reasonable price decided upon by township farmers' associations with the approval of PDAF.

The establishment of the second multiplication farms is necessary because potato cuttings supplied from stock seed potato farms from prefecture are not enough for distribution to different townships.

The quantity of seed potatoes and potato cuttings to be produced from these multiplication farms in 1956 is shown in the following table:

	Acreage	Seed potatoes produced	No. of cuttings produced
	(ha.)	(kg.)	
Foundation seed potato farms	5.0	60,000	
Stock seed potato farms	5.0	—	3,750,000
First cutting multiplication farms	62.5	—	30,000,000
Second cutting multiplication farms	500.0	—	180,000,000

The cuttings produced from the second cutting multiplication farms will be enough to renew 6,000 hectares in 1957.

3. PEANUTS

I. Background information.

A. Acreage and production:

The acreage of peanuts in Taiwan has steadily increased in recent years, because of the demand for more supply of peanuts for food, feed and oil on this Island. The trend of increasing production may be seen from the following data:

	1952	1953	1954	1955 (Estimated)
Acreage (ha.)	80,975	82,590	94,028	98,000
Production (M.T.)	60,037	60,104	65,868	69,686
Unit yield (kg/ha.)	741	728	701	711

B. Producing area:

Primarily in Yunlin, Chiayi, Tainan and Hwalien Prefectures with Yunlin Prefecture alone occupying over 30% of the total acreage.

C. Planting seasons:

About 60% is planted in spring and 40% in fall. Spring-planting is made in late February and March and fall planting in July and August. Harvesting commences July and December respectively.

II. Varietal improvement not seriously carried out until 1954.

A. Varieties grown at present:

1. Native varieties (about 85%)
   a. Spanish type or erect type (90%)
   b. Virginia or runner type (10%)
2. Varieties improved before the War (about 15%)
   a. Tainan Pei-yu-dou No. 1
   b. Tainan Pei-yu-dou No. 2

B. Some promising varieties under trial planting:

Variety	Selected by
Tsingtao	Taiwan Agricultural Research Institute
Lungtung yu-dou	Taiwan Agricultural Research Institute
P-49B-146	Taiwan Agricultural Research Institute
Tainan Pei-yu-dou No. 5	Tainan District Agricultural Improvement Station

C. New improved varieties in Regional Test:

Tainan Improvement No. 1
Tainan Improvement No. 4
Tainan Improvement No. 7
Tainan Improvement No. 10
Tainan Improvement No. 13
Tainan Improvement No. 14

P-49B-3
P-49B-52
& P-51B-166

Most of these new varieties were obtained from crosses between Tainan Pei-yu-dou Nos. 1 and 2 and the native varieties. Preliminary tests show that they sometimes outyielded the Tainan Pei-yu-dou No. 1 by 10% to 30%.

D. Other new strains under testing:

With the financial assistance of JCRR, the Tainan District Agricultural Improvement Station and Taiwan Agricultural Research Institute had in 1954 collected over the whole Island 2,600 single plants and 2,000 groups of peanut seeds from the farmers' fields. Selections from these sources have produced vast

materials for further selection. At present, 126 lines were advanced to comparative yield tests and 1,008 in 2-rod-row trials.

E. New varieties introduced recently from foreign countries:

Many peanut varieties have been introduced to Taiwan during the past. Newer varieties are Dixie Spanish, Spanish 18-38-42, Florispan runner, Kinorales, Dixie Giant and others. Dixie Giant is a good breeding parent, from which many commercial varieties in U.S. have been produced.

F. Breeding for disease resistant varieties:

In Taiwan, Cercospora leaf spot and Sclerotium wilt diseases are most serious peanut diseases. None of our commercial varieties or new seedlings under testing prove satisfactorily resistant. Since Virginia type is known to be relatively resistant to these diseases, attempt will be made, therefore, to cross the Spanish type with the Virginia type for the selection of resistant varieties. Attempts are also being made to acquire resistant varieties recently produced in the States from atom-irradiated material.

G. Agencies working on peanut improvement:

1. Tainan District Agricultural Improvement Station
2. Taiwan Agricultural Research Institute

III. Seed production and distribution.

A. Peanut seed multiplication system:

In order to gradually renew the seed peanuts of the farmers and to introduce better peanut varieties for general planting, a system of peanut seed multiplication was established by Taiwan Provincial Department of Agriculture and Forestry (PDAF) in 1952. When it was proved to be not very effective, the system was revised in the fall of 1955. Starting the current year, the system under operation is as follows:

1. Foundation seed farms — Operated by District Agricultural Improvement Stations with the labor expenses subsidized by the PDAF.

2. Stock seed farms — Operated by the township offices or by the farmers contracted by township offices. Only one township in each prefecture is selected to establish these farms in each crop season.

3. Extension seed farms — Operated by contracted farmers. In every crop season, however, not more than $^1/_4$ of the number of townships in a prefecture is chosen to operate these farms in order to facilitate supervision.

The acreage of these farms established during 1954 and 1955 and projected for 1956 is shown in the following table :

Year	Foundation seed farms		Stock seed farms		Extension seed farms	
	Acreage	Seed produced	Acreage	Seed produced	Acreage	Seed produced
	(ha.)	(kg.)	(ha.)	(kg.)	(ha.)	(kg.)
1954	10.0	6,600	79.30	77,700	—	—
1955	11.0	9,286	47.08	45,020	644.30	640,300
1956	10.6	10,650	77.63	75,850	438.60	438,600

B. Peanut seed distribution system :

1. Seed peanuts produced from foundation seed farms are distributed free to stock seed farms by District Agricultural Improvement Stations, the latter receiving running expenses from PDAF.

2. Seed produced from stock seed farms are used to establish extension seed farms and seed produced therefrom are distributed for general planting.

3. Seeds multiplied from stock and extension seed farms receive a price 5% higher than the market price with farmers paying according to the ordinary market price, and organization concerned (at present, JCRR) paying for the price differentials.

4. Procurement, storage and distribution of seeds is handled by township farmers' associations, who receive handling commission from PDAF, Provincial Food Bureau and JCRR.

4. SOYBEAN

I. Background information.

A. Acreage and production :

Soybean used to be a minor crop in Taiwan, but has become important because of increasing local demand for oil and beancakes. The annual consumption is estimated at 170,000 M.T., of which the local production constitutes less than

one-eighth of the total. The acreage and production for the last few years are shown below:

	1952	1953	1954	1955 (Estimated)
Acreage (ha.)	24,315	28,225	30,048	32,527
Production (M.T.)	14,627	17,426	20,310	23,572
Unit yield (kg/ha.)	602	617	676	725

B. Producing area:

Mostly in the southern part of this Island around Pingtung and Kaohsiung Prefectures, the percentages based on the acreage planted being approximately as follows:

Pingtung Prefecture 40%
Kaohsiung Prefecture.....16%
Tainan Prefecture 10%
Chiayi Prefecture 10%
Changhwa Prefecture..... 7%
Yunlin Prefecture 6%
Taitung Prefecture 4%
Hwalien Prefecture 4%
Others 3%

Starting 1956, a small acreage of soybean will be planted in Miaoli Prefecture, which will be the first time that soybean will be grown commercially in Northern Taiwan.

C. Planting seasons:

Soybean is planted in Taiwan in spring (February-March), summer (June-July) and also in autumn (October-November). However, in Pingtung area, which composed of over 40% of total acreage, soybean is grown primarily in winter time as a catch crop between two crops of rice. In this case, soybean is sown in the rice fields in late October about 10 days before the second rice crop is harvested and harvested before the first rice crop is planted in late January. Similar practice is gradually being used in Taichung and Changhwa areas.

II. Varietal improvement.

A. Varieties grown at present:

Very little varietal improvement work has been done on soybean before, the varieties grown at present are native ones and are badly mixed.

Types	Acreage % (approximate)	Remarks
Green beans	41	Used as green manure crop; or for bean curd.
Black beans	40	70% of soybeans grown in Pingtung Prefecture is of this type; used for seed, soybean sauce and animal feed.
Yellow beans	17	For bean curd and oil extraction.
White beans	2	For bean curd and oil extraction.

B. Some introduced varieties under trial:

Variety	Origin	Remarks
"San-kuo"	Japan	Grown very well in Miaoli.
"Mei-yu"	Japan	Quite promising in Miaoli.
Yellow Autumn	Japan	Quite hopeful in Pingtung.
Acadian	U.S.A.	Quite hopeful in Pingtung.
Improved Pelican	U.S.A.	Quite hopeful in Pingtung.
Seminole	U.S.A.	Quite hopeful in Pingtung.

Recently, JCRR introduced seven more from U.S. Soybean Regional Laboratory: Perry, Wabash, Lincohn, Harosoy, Adams, Clark and Hawkeye.

C. New natively selected varieties under testing:

1. Soybean varietal improvement work started rather lately in Taiwan. In 1953 and 1954, under the financial assistance of JCRR, the Kaohsiung District Agricultural Improvement Station of PDAF made single plant selections from the farmers' fields in Pingtung and Kaohsiung area. Over 5,000 individual plants were collected. Some strains from these collections show quite promising at their early stages of testing.

2. Starting the spring of 1956, a province-wide variety regional trial is installed, in which all promising varieties selected from previous experiments of various Stations will be put under one experiment and tested in different areas to test their regional adaptability.

D. Agencies working on soybean improvement at present:

1. Kaohsiung District Agricultural Improvement Station, PDAF.

2. Provincial College of Agriculture at Taichung.

3. College of Agriculture, National Taiwan University, Taipei.

4. Hsinchu District Agricultural Improvement Station, PDAF.

III. Seed production and distribution.

A. No province-wide soybean seed production and distribution system is in existence at present.

B. In fall 1955, after the soybean variety "San-kuo" was found to be adaptable in Miaoli Prefecture, a seed multiplication plan was formulated for that area projected at 4,800 hectares of soybean in 1959 for Miaoli alone. The plan is as follows:

Types of seed farms	Acreage planned (ha.)			
	1956	1957	1958	1959
Foundation seed farms	0.5	0.5	0.5	0.5
Stock seed farms	1.0	2.0	2.0	2.0
Extension seed farms	20.0	40.0	80.0	80.0
Acreage to be extended	200.0	1,200.0	2,400.0	4,800.0

Seed distribution will be made through same procedure as for peanuts.

5. WHEAT

I. Background information.

A. Acreage and production:

Comparatively, wheat is a minor crop in Taiwan with an acreage less than 15,000 hectares every year:

	1952	1953	1954	1955 (Estimated)
Acreage (ha.)	14,582	13,506	11,089	12,761
Production (M.T.)	16,604	14,288	15,493	19,457
Unit yield (kg/ha.)	1,139	1,058	1,397	1,525

B. Producing area:

Over 80% of wheats is grown in Taichung and Changhwa Prefectures. Only small acreage is found in Miaoli, Tainan, Taitung and other Prefectures.

C. Planting season:

Wheat is grown as the winter crop in between two rice crops. It is planted ordinarily in late October or early November and harvested in March of the next year.

II. Varietal improvement.

A. Varieties grown at present:

Both improved and native varieties are grown. The common improved varieties are Taichung Nos. 31, 32 and 2 as may be seen from the following table:

Varieties	Acreage % (approximate)	Degree of resistance to rust
Taichung 31	60	Average
Taichung 2	17	Moderately resistant
Taichung 32	10	Moderately resistant
Taichung 29	7	Susceptible
Yu-chih 27	3	Susceptible
Taichung 23 & others	3	Susceptible

But none of the above varieties are found adaptable in Tainan area.

B. Varieties under testing:

1. Eleven new varieties were put in regional tests in 1953 and 1954 at Taipei, Taichung and Taitung, of which only "Motigo Wheat" (from India) showed good yielding ability.

2. Another eight new varieties tested at eight localities in the Taichung area indicated that "Taichung-yu Nos. 133, 136 and 137 led in yield in many places.

3. Over 245 varieties including those introduced formerly from U. S. and Argentina were put under the observation tests at Tainan District Agricultural Improvement Station.

4. Only recently, 16 other wheat varieties have been introduced from U. S.

including a new released variety Selkirk.

C. New strains tested for rust resistance:

Crosses have been made by Taichung District Agricultural Improvement Station between rust resistant variety Newthatch and local commercial varieties Taichung Nos. 31 and 32. A number of new strains have thus been obtained and tested for rust resistance.

D. Agencies working on wheat improvement:

1. Taichung District Agricultural Improvement Station.
2. Tainan District Agricultural Improvement Station.

III. Seed production and distribution.

A. Wheat seed multiplication system:

1. Improved varieties

Seeds of the improved varieties such as Taichung Nos. 31 and 32, which are grown in Taichung, Changhwa, Miaoli and Taitung Prefectures, are multiplied according to the following system:

a. Foundation seed farms — Operated by District Agricultural Improvement Stations with labor expenses subsidized by PDAF and JCRR.

b. Stock seed farms — Operated by Prefectural farmers' associations or farmers contracted by the associations.

c. Extension seed farms — Operated by township farmers' associations or farmers contracted by them.

Acreage and amount of improved wheat seed multiplied each year in 1954, 1955 and 1956, expressed in round number, is as follows:

	Acreage	Seed production
	(ha.)	(kg.)
Foundation seed farms	5.0	3,500
Stock seed farms	50.0	35,000
Extension seed farms	500.0	350,000

Seeds produced from extension seed farms are enough for planting 6,000 to 7,000 hectares by general wheat growers each year.

2. Native varieties

Since improved wheat varieties are not adaptable to the environment of Tainan area, selection and multiplication of better native varieties are necessary. The multiplication of seeds is carried out as follows:

a. Mass selection of better native wheat seeds from farmers' fields — Done by District Agricultural Improvement Stations.

b. Primary seed farms — Operated by Prefectural farmers' associations and contracted farmers.

c. Secondary seed farms — Operated by township farmers' associations and contracted farmers.

Acreage and amount of better native wheat seeds produced by the above procedure each year in 1954, 1955 and 1956, in round number, is as follows:

	Seed selected	Acreage	Seed production
	(kg.)	(ha.)	(kg.)
From farmers' fields	840	—	—
Primary seed farms	—	8.0	5,600
Secondary seed farms	—	80.0	56,000

Seeds produced from secondary seed farms will be enough for planting 800 to 920 hectares by the general wheat farmers each year.

B. Distribution of wheat seeds:

1. Seeds produced from the foundation seed farms and those selected from native varieties are distributed to the stock seed growers free of charge.

2. Seeds produced from the stock seed farms are purchased by township farmers' associations at market price immediately after they are harvested and dried. The seeds are kept in tight steel bins. If the farmers' associations are not able to purchase all of these seeds due to lack of funds, the Provincial Food Bureau (PFB) will buy and preserve the seeds for them. Prior to the planting time, these seeds will be sold or loaned to the extension seed growers.

3. Seeds produced from the extension seed farms are used for exchange of common seeds from or cash sale to the ordinary wheat farmers. The ordinary farmers will pay, either in kind or cash, 10% premium for the extension seeds.

4. In case the farmers do not want to exchange their seeds until wheat planting time, the PDAF should make special arrangement so that the seeds would

be bought either by PFB or by township farmers' associations with 10% premium and kept in good condition. These seeds will then be sold or loaned to the ordinary farmers at the planting time.

6. SUGARCANE

I. Background information.

A. Acreage and production:

Sugar export accounts for 60 percent of foreign exchange earned by Taiwan. The acreage of sugarcane and production of sugar for last four years are shown in the following table:

	Crop year 1952-53	Crop year 1953-54	Crop year 1954-55	Crop year 1955-56 (Estimate)
Acreage (ha.)				
White sugar	108,351	93,256	76,374	87,635
Brown sugar	4,963	3,140	2,703	4,042
Production (M. T.)				
White sugar	882,141	701,155	733,160	770,000
Brown sugar	19,022	11,828	14,832	17,903
Unit yield (kg/ha.)				
White sugar	8,955	8,195	10,490	8,412
Brown sugar	3,833	4,046	5,015	3,898

B. Producing area:

Primarily in Tainan, Chiayi, Yunlin, Pingtung and Kaohsiung Prefectures, though it is grown throughout the whole Island except the northern part, where a few patches may be seen which are used for manufacturing brown sugar.

C. Planting seasons:

At least 2/3 of canes are planted between August and September, the other 1/3 may be spring-planted or ratooned.

II. Varietal improvement.

While the varietal improvement work of most of other crops is carried out by

Stations of the Taiwan Provincial Department of Agriculture and Forestry, that of sugarcane is carried out by the Sugar Experiment Station and District Sugarcane Improvement Stations of the Government owned Taiwan Sugar Corporation.

A. Varieties grown before and after 1945:

Variety	1941-42	1944-45	1953-54	1954-55
	(%)	(%)	(%)	(%)
F 108	31.5	43.4	9.7	2.3
POJ 2725	22.2	16.3	—	—
POJ 2878	6.2	3.2	—	—
POJ 2883	37.8	33.0	18.3	8.6
F 134	—	—	23.3	16.8
N : CO 310	—	—	43.0	68.3
Others	2.3	4.1	5.7	4.0
	100.0	100.0	100.0	100.0

N : Co 310 is a medium to thin stalked variety introduced from Natal, South Africa, in 1947. It was recommended for commercial planting in 1952 and now become the leading commercial variety in Taiwan,

B. Some promising varieties under demonstration or trial planting:

Name of variety	Origin
34-1428	Taiwan
36-1119	Taiwan
P. T. 50-2	Taiwan
H. 37-1933	Hawaii
H. 32-8560	Hawaii

C. New seedlings of sugarcane under testing:

The Taiwan Sugar Experiment Station and its Pingtung and Wantan Breeding Stations raise over 200,000 new seedlings every year from crosses. Many thousands of these seedlings are at present under different stages of testing. Regional variety test is carried out at all sugarcane growing districts.

D. New varieties introduced from foreign countries:

Over 400 new varieties of sugarcane have been introduced by the Taiwan

Sugar Experiment Station from different parts of the world during the past few years. This adds up to over thousands of foreign varieties now in possession by the Taiwan Sugar Experiment Station. All new introduced varieties must be grown in the Quarantine Station at Shih-tze near Taipei for one or two years before they are permitted to move to southern part as breeding material or for trial planting.

E. Agencies working on sugarcane improvement:

1. Taiwan Sugar Experiment Station at Tainan with its
   a. Breeding Stations at Pingtung and Wantan, and
   b. Variety Quarantine Station at Shih-tze near Taipei
2. District Sugarcane Improvement Stations at Taichung, Huwei, Hsinying, Chun-yeh and Pingtung

The Sugar Experiment Station, Quarantine Station and Sugarcane Improvement Stations all belong to the Taiwan Sugar Corporation.

III. Seed production and distribution.

A. A mountain nursery for sugarcane seed-pieces production had been set up in Prewar time at Tung-shih near Taichung. This practice is now abandoned; and the Tung-shih Station has been turned into one subordinate to the Taiwan Provincial Department of Agriculture and Forestry for the multiplication of many kinds of crops.

B. At present, seeds for planting are propagated by the plantations of sugar mills themselves. The size of seed nursery in each plantation depends on the acreage of cane to be planted. Seed-pieces for seed nurseries are usually carefully selected and, in recent years, they are treated with hot water to be free from diseases. Before the canes from seed nurseries are cut for seeds for subsequent planting, several roguings are made in the field to eradicate the diseased plants.

C. Newly released varieties from experiment stations including the introduced ones are propagated and multiplied first in the District Sugarcane Improvement Stations, from which seed canes are then distributed to mill plantations and later to farmers for general planting. New varieties are not permitted to be sent directly to mill plantations from the experiment stations unless they are planted first in the District Sugarcane Improvement Stations to watch for diseases.

7. TEA

I. Background information.

A. Acreage and production:

Over 90 percent of tea produced in Taiwan is for export. The acreage and production of tea during the past four years are as follows:

	1952	1953	1954	1955 (Est.)
Acreage (ha.)	44,120	44,655	46,186	45,971
Production (M.T.)	11,582	11,903	13,007	14,000
Yield (crude tea) (kg/ha.)	305	267	282	291

B. Producing area:

Over 90 percent of tea are produced in four Northern Prefectures on the west coast of Taiwan, i. e., Taipei, Taoyuan, Hsinchu and Miaoli. Almost all of the tea in these Prefectures are of small leave varieties of Chinese origin. About 1,000 hectares of large leaved Indian variety are grown near the Sun-Moon Lake in Nantou Prefecture of Central Taiwan.

C. Planting season:

Tea seedlings, usually one year old, are transplanted in January and February in the main tea producing area. In Central Taiwan, they may be transplanted as late as March or early April. Plucking of tea leaves starts in April and continues, off and on, until October. When the export of tea is strong, small amount of plucking is made even in November, which, however, is considered unadvisable.

II. Varietal improvement.

A. Varieties grown at present:

1. Native varieties of Chinese origin — About 40 percent of total acreage.

2. Improved varieties of Chinese origin released before the War — About 58 percent of total acreage.

3. Indian Assam variety — About 2 percent of total acreage.

B. Varietal improvement work in progress:

1. Pure line selection:

a. Mother tree survey.

b. Multiplication of seedlings from selected mother trees by cuttings.

c. Plant row test — One to two rows for seedlings of each mother tree.

d. Yield and quality test — Strains selected from the plant row test are multiplied and tested in comparison with check varieties. Randomized blocks are used.

Some of the material were started by the Pingchen and Yuchih Tea Experiment Stations before the War. New work have also been started after the War.

2. Hybridization:

After F1 plants are obtained (at least 25 plants for each cross), they are multiplied vegetatively and tested by the same procedure as described under pure line selection. Some breeding stock were left over from Prewar experiments and new crosses have been made since the War.

3. Regional test:

Twenty superior strains 19 selected from pure line selection and 1 from hybridization have been put to regional test since 1949; 5 are found to be especially promising.

All the above 3 lines of work are in progress.

C. Agencies working on tea improvement:

1. Pingchen Tea Experiment Station, PDAF.
2. Yuchih Tea Experiment Station, PDAF.

III. Multiplication and distribution of seedlings of superior tea varieties:

No regular multiplication and extension system for tea seedlings is in existence at present. Farmers produce their own seedlings, mostly by layering. From 1951 through 1953, JCRR subsidized the Provincial Department of Agriculture and Forestry to multiply a total of 16 million tea seedlings of the 4 superior varieties improved before the War, for the purpose of helping farmers to fill up numerous missing hills on their plantations. These seedlings were extended to farmers on a 5-year loan basis. After 5 years, the recipient farmers will return the same

number of seedlings to the Department for reallocation to other needy farmers.

Seedlings of Assam tea varieties are being multiplied by seeding in nurseries of the Taiwan Tea Corporation. They are being sold to tea growers.

8. JUTE

I. Background information.

A. Acreage and production:

Jute is used largely for making gunny bags for packing sugar and rice for export and domestic storage. A small amount (about 2,000 to 3,000 M. T. annually) is consumed by villagers for making twines. The acreage and production of jute during the past four years are as follows:

	1952	1953	1954	1955
Acreage (ha.)	17,500	7,290	11,230	14,810
Production (M. T.)	21,724	5,780	12,805	19,457
Yield (fiber) (kg/ha.)	1,241	793	1,140	1,314

B. Producing area:

Primarily (around 80%) in three Prefectures on west coast; Yunlin, Chiayi and Tainan. Secondarily in Changhwa, Taichung, and Pingtung Prefectures.

C. Planting seasons:

The planting season of jute is from later part of March to May, with a peak around April 15. Harvest starts in later part of July, reaches peak in the later part of August and early September, and ends in early October.

II. Varietal improvement.

A. Varieties grown at present:

The more popular varieties are as follows:

1. Improved varieties obtained through selection from farmers' fields and released by the Taiwan Agricultural Research Institute:

a. Hsin-Fong Green Bark
b. Hu-Wei Green Bark
c. Taichung Special No. 1 (light red bark)

2. Popular farmers varieties:

a. Shui-Shang Green Bark
b. Bamboo jute (green bark)
c. June jute (green bark)
d. White dew (light red bark)

B. Variety improvement work in progress:

1. Pure line selection:

1952 — Plant selection, 11,037 plants selected.
1953 — Plant row test, 7,466 plant rows.
1954 — 3-rod-row test, 714 selected strains, 3 replications.
1955 — Preliminary yield trial, simple lattice design, 3-row plot, 4 replications, 3 localities, a total of 102 strains.
1956 — Advanced yield trial, randomized block, 5-row plot, 4 replications, 9 superior strains.

2. Hybridization:

1952 — 5 combinations of selected local varieties.
1953 — 6 combinations between local varieties and Capsularis varieties. 1 combination between 2 local varieties.
1954 — 1 combination between local variety and Capsularis, 1 between 2 local varieties.

The purpose of the above hybridization work was to obtain new varieties resistant to Anthracnose. The progenies (F5, F4, F3) obtained are not very hopeful for those showing good resistance to the disease have low yield.

1955 — 3-way crosses including 1 Indian variety and 2 local varieties were made with the hope to obtain high yielding, Anthracnose resistant and flood tolerant strains.

C. Agency working on jute varietal improvement:

Tainan Cotton and Jute Experiment Station.

III. Seed multiplication and distribution:

No official seed multiplication system has yet been established for jute.

Farmers keep their own seeds. A system is to be established when new improved varieties shall be released from the pure line selection.

9. PINEAPPLE

I. Background information.

A. Acreage and production:

Pineapple is one of the principal fruit crops of Taiwan ranking second to banana in the acreage and as a fruit for export. It is used both as a table fruit and for canning. The area and production during the past few years are shown in the following table:

	1951	1952	1953	1954	1955 (est.)	1956 (goal)
Harvesting area (ha.)	5,661	5,848	5,670	5,489	6,000	6,500
Production (M.T.)	52,104	62,760	68,471	65,567	72,000	81,250
Unit yield (kg/ha.)	9,203	10,731	12,076	11,945	12,000	12,500

B. Producing area:

Pineapple is grown mostly in central and southern part of Taiwan along the west coast.

Central Taiwan			Southern Taiwan		
Taichung Prefecture	320 ha.		Yunlin Prefecture	200 ha.	
Changhwa Prefecture	2,800 ha.		Chiayi Prefecture	300 ha.	
Nantou Prefecture	1,560 ha.		Tainan Prefecture	1,300 ha.	
	4,680 ha.	58.50%	Kaohsiung Prefectrue	740 ha.	
East Coast			Pingtung Prefecture	270 ha.	
Taitung Prefecture	350 ha.			2,820 ha.	35.25%
Hwalien Prefecture	60 ha.				
	410 ha.	5.12%	Scattered in other areas:	90 ha.	1.13%

Total area to be planted as for 1956: 8,000 ha. 100%

C. Planting and harvesting season:

Pineapple is mostly planted from August to October, but a small amount in March or April. The plant-crop is usually harvested 20 months after planting and the first ratoon crop is harvested one year thereafter, and the second ratoon crop after another year. The peak harvest season of the year is in July and August.

II. Varietal improvement.

A. Varieties grown at present:

Only few varieties of pineapple are grown commercially in Taiwan, among them Smooth Cayenne is the leading variety. The native varieties such as Red Skin Spiny and Red Skin Spineless have been gradually replaced by Smooth Cayenne during recent years. The Smooth Cayenne itself, being brought into this Island before the War, however, has greatly degenerated and badly mixed with off-types in farmers' fields.

B. *Introduced strains under testing:*

In fall, 1950, JCRR assisted the Chiayi Station of the Taiwan Agricultural Research Institute by financing the introduction of seedlings of two improved varieties, namely, "Smooth Cayenne" and "Rough", from Australia. These seedlings were planted in October, 1950. So far, they have not shown to be promising.

C. Strain selection from local stock:

Since 1950, the Taiwan Pineapple Corporation, with subsidy from JCRR, started a long term project on pineapple seedling selection, using the following procedure:

	No. of seedlings selected	Area (ha.) planted
1. Mass selection		
a. 1950	2,510,000	97.38
b. 1951	2,750,000	106.69
2. Re-selection		
a. 1952	1,375,000	55.00
b. 1953	1,000,000	40.00
3. Selection of strains and establishment of nurseries		
a. 1954	120,701	4.80
b. 1955	226,767	9.00
4. Clone test and elimination of bad mutation		
a. 1956 (goal)	400,000	10.00
b. 1957	—	—

The result of this phase of work is very encouraging. Three strains, Typhone No. 1, 2, and 3, have been selected and will be multiplied for extension to farmers in the future.

D. Eradication of bad mutation :

While the Taiwan Pineapple Corporation works on seedling selection, the Provincial Department of Agriculture and Forestry carries out a project, also with JCRR assistance, on elimination of off-type pineapple seedlings which prevail in farmers' field. In June 1955, a total of 433,500 plants were eliminated.

E. Institutions participated in pineapple improvement:

1. Provincial Department of Agriculture and Forestry (PDAF).
2. The Taiwan Pineapple Corporation (Private).
3. Fengshan and Chiayi Stations of the Taiwan Agricultural Research Institute, PDAF.
4. Taitung District Agricultural Improvement Station, PDAF.

III. Multiplication of improved seedlings.

A. Multiplication of selected strains:

1. The seedlings of the improved strains selected by the Taiwan Pineapple Corporation are being propagated in the strain-nurseries of the Corporation. They are yet limited in quantity and will not be available for large scale extension until 1958.

2. Certification of farmers' seedlings—Before the seedlings of the selected strains are made available, farmers' fields with seedlings of good plant character are being certified for distribution to farmers under the supervision of PDAF and local governments.

B. Outlook :

A steady improvement of the pineapple strains grown by pineapple growers on this Island is taking place and a significant improvement is expected by 1960.

10. CITRUS FRUITS

I. Background information.

A. Acreage and production:

Citrus fruits ranks third in the acreage among three major fruit crops (led by banana and pineapple). They are mostly consumed locally. Amount of export has been very small in recent years. The area and production during the past few years are shown in the following table:

	1951	1952	1953	1954	1955 (est.)	1956 (goal)
Harvesting area (ha.)	4,899	4,610	4,763	4,831	5,400	5,600
Production (M.T.)	27,293	27,769	29,357	27,755	33,480	35,840
Unit yield (kg/ha.)	5,573	5,015	5,164	5,742	6,200	6,400

B. Producing area:

Citrus trees are concentrated in the northern part of Taiwan. Lesser amount is grown in central and east coast. The geographical distribution of citrus plantation is as follows:

Northern Taiwan		
Yangmingshan District	317 ha.	
Taipei Prefecture	1,200 ha.	
Taoyuan Prefecture	400 ha.	
Hsinchu Prefecture	1,550 ha.	
Miaoli Prefecture	400 ha.	
Ilan Prefecture	200 ha.	
	4,067 ha.	67.78%
Southern Taiwan		
Yunlin Prefecture	75 ha.	
Chiayi Prefecture	200 ha.	
Tainan Prefecture	200 ha.	
	475 ha.	7.92%
Central Taiwan		
Taichung Prefecture	150 ha.	
Changhwa Prefecture	420 ha.	
Nantou Prefecture	160 ha.	
	730 ha.	12.17%
Eastern Taiwan		
Hwalien Prefecture	100 ha.	
Taitung Prefecture	100 ha.	
	200 ha.	3.33%
Scattered in other areas	128 ha.	2.13%

Total harvesting area as for 1956: 5,600 ha. 100%

C. Planting and harvesting season:

Nursery trees of citrus are usually transplanted to orchards in early spring

and, when managed properly, a marketable fruit crop could be harvested 6 to 7 years after planting. The picking season of citrus fruits of early varieties begins in September and that of the late varieties will last to the end of March of the next year.

II. Varietal improvement.

A. Varieties grown at present:

There are several kinds of citrus fruits grown commercially in Taiwan and each important kind has several varieties. Their names are as follows:

1. Ponkan (Citrus poonensis)	1,763 ha.	11,058 M.T. in 1953
a. Var. Kao-jian ponkan (protruded stem-end)		
b. Var. Tee-jian ponkan (flatened stem-end)		
2. Tonkan (Citrus tonkan)	1,956 ha.	10,464 M.T. in 1953
a. Var. Hai-li (peel surface smooth) (Nitidum)		
b. Var. common tonkan (Rongosum)		
3. Sweet orange (Citrus sinensis)	85 ha.	468 M.T. in 1953
a. Valencia late		
b. Sikan		
c. Washington Navel		
4. Pomelo (Citrus grandis)	842 ha.	6,993 M.T. in 1953
a. Mato Buntan		
b. Pai-you		
c. Tou-you		

5. Others — Negligible amounts of Satsuma orange (Citrus unshiu), Sunki (Citrus sunki), Kumquat (Fortunella margarita), Grapefruit (Citrus paradisi), and Lemon (Citrus limon) are also grown.

B. Introduced varieties under testing:

1. Sweet orange varieties introduced from U. S. A. in February 1953:

a. Parson Brown	12 budsticks
b. Jaffa	12 budsticks
c. Avon Everbearing	50 budsticks
d. Lue Gim Gong	50 budsticks
e. Drake Star	5 budsticks
f. Pineapple	12 budsticks
g. Dream Navel	12 budsticks
h. Orlando Tangelo	12 budsticks
i. Nucellar Minneoal Tangelo	12 budsticks
9 varieties	177 budsticks

2. One-year old citrus nursery trees introduced from U. S. A. in March 1956:

a. Sweet orange:	
1) Valencia Late	60 trees
2) Seedless Valencia	60 trees
b. Lemon:	
1) Eureka	30 trees
2) Lisbon	30 trees
c. Grapefruit:	
1) Ruby	60 trees
3 crops, 5 varieties	240 trees

C. Strains selected locally since 1951:

1. Mother-tree survey:

Horticulturists from agricultural stations of the Provincial Department of Agriculture and Forestry and National Taiwan University, with JCRR financial assistance, conducted the mother-tree survey of sweet orange during 1951 through 1953, and of ponkan and tonkan since 1954. The number of mother-tree surveyed during 1951 and 1956 is as follows:

December 1951-January 1952	2,400 trees
December 1952-January 1953	2,849 trees
December 1953-January 1954	1,800 trees
December 1954-January 1955	2,400 trees
December 1955-January 1956	1,100 trees

The selected mother-trees are inspected from time to time and are used as parent stock for multiplication of nursery trees.

2. Selection of superior varieties from local stock:

From five years' work on mother-tree survey, the following varieties of citrus fruits have been identified and selected for multiplication of nursery trees:

a. Ponkan — Dwarf ponkan found in Linkou Township of Taipei Prefecture in 1954.

b. Sweet orange — Golden Seal found in Changhwa Prefecture in 1953.

c. Tonkan — Late season tonkan discovered in Yangmingshan in 1956.

D. Agencies working on citrus improvement:

1. Provincial Department of Agriculture and Forestry (PDAF).
2. National Taiwan University.
3. Taiwan Agricultural Research Institute and its Chiayi and Shihlin Stations.
4. Taitung District Agricultural Improvement Station, PDAF.

III. Multiplication and distribution of nursery trees:

A. The multiplication system:

The scionwood sticks from selected mother-trees are distributed to contracted nurserymen (farmers) for grafting and multiplication in selected nurseries.

The nurserymen are required to multiply the nursery trees by grafting the allocated scionwood sticks on 2-year old root stock, and sell them after one year to common growers at prices fixed by themselves.

B. The distribution system:

Under the government supervision, the following amount of superior nursery trees has been sold by contracted nurserymen to farmers:

January 1953 21,224 trees of sweet orange (one-year old)
January 1954 52,898 trees of sweet orange (one-year old)
January 1955 12,801 trees of sweet orange (one-year old)
January 1956 89,500 trees of 1-year old of ponkan, tonkan, and sweet orange.

The above amount are sufficient for planting of about 400 hectares. It is expected that more and more orchards will gradually be planted to superior planting material thus produced. The demand for the improved nursery trees is increasing every year.

11. TOBACCO

I. Background information.

A. Acreage and production:

The production of tobacco is under strict supervision of the Taiwan Tobacco & Wine Monopoly Bureau (TTWMB). All tobacco growers are required to register with the Bureau and to grow only the acreage approved by it. No private manufacturer is allowed to buy tobacco leaves or making cigarettes or smoking tobacco of any form. The acreage and production of tobacco in Taiwan in the last three years are as follows:

Year	Acreage	Production	Unit yield
	(ha.)	(M.T.)	(kg/ha.)
1954	5,577	9,674	1,734
1955	6,245	11,632	1,862
1956	8,050	14,825	1,842

B. Tobacco growing districts:

Tobacco is grown in various places from the central to southern Taiwan. Among these places, Taichung, Nantou, Chiayi, Kaohsiung and Pingtung are the most important ones. The acreage distribution in 1956 are as follows:

Locality	Acreage (ha.)
Taichung Prefecture	1,610
Taichung City	840
Nantou Prefecture	1,166
Changhwa Prefecture	494
Tainan Prefecture	27
Chiayi Prefecture	893
Yunlin Prefecture	472
Pingtung Prefecture	890
Kaohsiung Prefecture	1,236
Hwalien Prefecture	349
Taitung Prefecture	29
Ilan Prefecture	44
Total:	8,050 ha.

C. Planting season:

Because of the sub-tropical climatic condition, tobacco seeds are usually sown in fall (from mid-August to early October) and often transplanted to the field after the rice crop is harvested (from October to November). The harvest of leaves begins in December and ends in March.

II. Varietal improvement.

A. The tobacco varieties grown at present are as follows:

1. Bright Yellow.
2. Vesta 64.
3. Cash.
4. Yellow Orinoco.

B. Some new varieties under trial planting and observation:

1. Virginia Gold.
2. Bottom Special.
3. #402.
4. Hicks.

C. Conducting agency:

The improvement work on tobacco is conducted solely by the Taiwan Tobacco Research Institute, Taichung (TTRI) and its two branch stations (one in Pingtung and the other in Hwalien). The Institute is a subsidiary organization of the TTWMB.

III. Seed production and distribution.

The tobacco seeds are produced from the stock seed farm and the extension seed farms. The former is operated by the TTRI and the latter by the contracted tobacco growers. The stock seeds are distributed to the extension seed farms for multiplication and the extension seeds obtained are distributed to certified tobacco farms for general planting.

Since the production of tobacco in Taiwan is strictly a government monopoly, the total land area allocated for growing tobacco each year is decided by the Monopoly Bureau according to a production goal drawn with reference to consumption estimates, capacity of manufacturing plants and other related factors.