

AIRGRAM

DEPARTMENT OF STATE

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FROM : SEOUL

SUBJECT : End-of-Tour Report, Louis A. Gattoni,
Horticulture Advisor

REFERENCE :

Attached is the End-of-Tour Report of Mr. Louis A. Gattoni, who is leaving this Mission after completing five years as Horticulture Advisor.

The report provides an excellent picture of the progress and present status of the horticultural aspects of the rural development program, and makes many valuable suggestions for the future.

Mr. Gattoni's personal contribution to the program has been considerably greater than the report might indicate. His efforts have advanced the program substantially, not only with report to horticultural production but also into the subsequent phases of agribusiness development based on horticultural crops.

PORTER

Attachment: End-of-Tour Report
of Louis A. Gattoni

PAGE 1 OF PAGES 1

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END-OF-TOUR REPORT

(Control No. U-513)

Name: Louis A. GattoniJob Title: Horticulture AdvisorCountry of Assignment: Republic of KoreaTour of Duty Began: September 29, 1965Tour of Duty Ended: June 29, 1968Prior Country of Assignment and Years: Republic of Korea (2 years)Project Activity (Name and No.): 489-11-110-594
Rural Development Policy Planning Survey

Introduction

At the end of this second tour, June 29, 1968, the writer will have spent five years as an Horticulture Advisor in USOM/Korea.

The preceding and first end-of-tour report for the period of June 12, 1963 to June 30, 1965 was an extensive twenty-five page study depicting the entire Korean horticulture situation and the present 1965-1968 report has been prepared to serve as a supplemental progress report.

For future planning of U.S. horticulture activities in Korea a 45 page bulletin, entitled Korean Fruit Culture and other important publications have also been prepared. Prospective investors in food processing in the country and overseas have shown a particular interest in these publications. Furthermore, these technical bulletins that cannot be included in an end-of-tour format may be considered as comprehensive additional Korean horticulture references and records.

A. Summary - Special Duties Involved

1. With Headquarters at the Sunon Rural Development Division major assistance is being provided to the Horticulture Station that moved to the Sunon area the beginning of 1967. Since then, advisory activities have been centered

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on fruit and vegetable varietal evaluation. The evaluation and descriptions of fruit varieties introduced by the Rural Development Division, Agency for International Development and the Horticulture Experiment Station, ORD, Sunon constituted an extensive meticulous study of 432 fruit varieties that have been introduced and planted at the Horticulture Station over the period of 1955 to 1967. This significant report has been printed and copies were sent to USDA and AID/Washington in April 1968. A similar report on horticulture research consisting of 13 species and 44 varieties of vegetable crops tested and selected from a large number of imported seeds was printed and copies were also distributed to USDA and AID/Washington in August 1966. The research and experimental work at the Horticulture Station also included periodic visits to the Tongnae and Kimhae Branch Stations, Kyongsang-Nam Province, the Alpine Research Station, Kangwon Province, and the Cheju Experiment Station (vegetables and citrus) on Cheju Island.

2. Considerable time was also spent at the USOM-RDD Office in Seoul and at the MAF Agriculture Production Bureau in connection with the USOM Agribusiness activities, food processing studies, agri-industrial development, etc. Of outstanding importance is the fruit and vegetable industry which has great opportunities for development not only for internal trade demands but to seek expansion on the foreign market. The present picture of the horticulture processing industry in Korea shows that it is expanding at a rapid pace. This can be attributed to the rising standard of living and the implementation of the successful agribusiness program in operation.

Responding to ROK policy of promoting the export of agricultural and fisheries products by means of exploring overseas markets, a large group of businessmen representing the American, Japanese and West Germany food processing industry have visited Korea during 1966-67. Several of the capitalists came to seek investment opportunities, specifically to study the fruit and vegetable processing feasibilities and investments through joint foreign ventures with Korean businessmen. Ball Brothers Company, Green Giant Company, Paul A. Mariani Company, Corn Products Company, Emmet Purcell, and Suntory Limited (Japan) are examples.

3. With the establishment of the provincial field operations to provide agricultural advisory service to nine provincial government offices, the Horticulture Advisor has been in steady demand. Special problems and intensified horticultural work has been carried out in Chejudo, Cholla-Namdo, Kyongsang-Namdo and Kangwon-Do since the middle of 1965.

4. Intense participation, counsel work and support has been provided to the Asian Regional Vegetable and Marketing Research Institute in Taiwan since 1966. With an expanded war on hunger program in view the ROK accepted a proposal to become a country member of the Asian Institute and the Horticulture Experiment Station in Sunon was selected as a regional sub-center for research on vegetables grown in a temperate climate. Adaptive research as well as marketing studies will be also conducted in coordination with the parent center in Taiwan.

During the past seven years, the ROKG has exerted every possible effort to increase vegetable crop production for national diet improvement and it is now expected that the cooperation of the Regional Institute in Taiwan will benefit Korea considerably. But even more, the scientific professional linkage of the new Horticulture Experiment Station in Suwon with the Institute in Taiwan will accredit and validate a modern research program, a basic objective to make the Korean horticulture industry very prosperous.

5. Continued valuable technical assistance has been provided to the NACF and the U.S. Korean Procurement Agency on western vegetable quality improvement and sanitary production of fruits and vegetables to supply the U.S. Eighth Army. ~~Introduction~~ Introduction of seeds from the U.S.A., experiment and production of better commercial varieties, improvement in cultivation methods, etc. have been carried out from 1963 to the present.

Winter vegetable production protected in vinyl houses started to develop rapidly as a result of significant demands made by the U.S. Eighth Army. Today, in less than five years, this new Korean practice of "off-season" production of tomatoes, celery, head lettuces, cucumbers, etc., particularly in the Kimhae area, has grown tremendously successful. The area covered with vinyl houses in Kimhae alone exceeded 650 acres in 1967. Therefore, one of the faster growing horticulture enterprises in Korea is that of forcing vegetable production under vinyl protection.

6. Provided support and coordinated the technical survey project on fruit evaluation to be used by staff members of the Institute of Industrial Sciences at Kyongpuk National University, Taegu.

This fruit study is now in operation throughout the whole province and financed by the Trust Fund Program signed by MOST and USOM on September 12, 1967.

7. Professional refresher trips on several occasions to Japan and in connection with R&R constituted a valuable educational opportunity to the advisor for comparing and measuring Japanese and Korean horticulture standards. Brief studies of hydroponic gardening, landscape gardening and Bonsai ~~has~~ ^{have} been interesting and useful.

8. Technical assistance in winery and enology has also been provided to the Pomology Section, Horticulture Experiment Station. The cooperation between the Viticulture Section and the College of Agriculture in training courses in enology and wine making to a large group of students every year during the vintage season also deserves special mention.

9. The contribution of several special studies carried out by the advisor and printed by the USOM (AID) Communication Media Division are serving as references for counterparts and other officials. Those publications are:

Citrus Culture on Chejudo Island	- July 1964
Weather and farming in Korea	- November 1964
Viticulture and winery as a Korean industry	- February 1965
Prospects of grape processing in Korea	- November 1965
Citrus culture feasibility on the southern islands	- December 1966
Report of horticulture research (vegetables: 13 species, 44 varieties)	- August 1966
The pineapple situation in Korea	- February 1967
Attempts to grow European grape varieties	- August 1967
Korean fruit culture, revised	- November 1967
Report on evaluation and descriptions of 432 fruit varieties	- December 1967
Wine experiments	- March 1968

The USOM (AID) Communication Media Division has contributed in preparing and printing of all these reports and bulletins.

2. Existing Differences Between the United States and the Republic of Korea

The differences and the local problems have been amply described in the 1963-1965 report. Nevertheless, a significant improvement and expansion of fruits and vegetables has been achieved in recent years. But for the best understanding of horticulture progress in Korea it is necessary to indicate that as the country has been immersed in the immediate problems of rice and other cereal food production, fruit and vegetable crops have not figured prominently in regional or provincial planning as yet. Consequently, fruit farming is performed mainly on a self-supply basis without the necessary technical knowledge and research support. There is too much complacency due to the frequency of crop failures, poor harvests and high production costs.

Research aims to counter the adverse seasonal influence on vegetable and fruit production and to devise methods to reduce crop failure and to promote optimum yield at lowest production costs. But in the past, horticulture research has been able to touch only the fringe of the subject.

a. Purposes served by the activity

We are all quite conscious that fruit and vegetable culture, production, marketing and preservation in Korea require considerable scientific study. In contrast with well-planned and highly organized horticulture production in many parts of the world most of the Korean fruit farms are yet in initial stages of progress.

It was in recent years that the importance of the cultivation of fruit trees in suitable climatic areas and sites was stressed. Before that farmers did not pay much attention to climatic factors, soil selection, fertility of the land, pest control, etc. Fruit planting was encouraged without the selection of suitable varieties to find superior types.

In Korea fruit and vegetable farms require considerable technical attention and the greatest opportunity for expansion of horticulture industry in the immediate future depends on increasing the quantity of high quality fruits and vegetables produced per tree or per hectare.

It is important for the modern fruit industry to increase commercial varietal tests so that Korean fruit may count, in the future, on suitable industrial fruit varieties for canning and drying as well.

In accordance with climatic conditions the Koreans have developed many hardy disease resistant and cold resistant varieties and for a long time Korea has depended on the traditional hardy table fruit; but today there are about 432 varieties on experimental trial introduced by USOM-RDD since 1960, and production of fruit is definitely being improved and increased.

In the last few years there has been a growing interest and concern over the importance of expanding fruit culture and fruit processing. Growers understand that setting up a fruit plantation today requires a detailed study of many factors and solving a large number of problems that bear on production success. If the fruit grower is to succeed financially, he now understands that his enterprise must be large enough to employ efficient modern techniques. He knows that tools and machines, special buildings and good water supply are needed. Selection and grafting of varieties, pollination, liming and fertilization, irrigation, insects and diseases must be combated, frost protection, pruning, storing, grading, packing and marketing must all be carried out properly.

Another and equally important consideration in determining the expansion of fruit culture and viticulture is the problem of marginal climate and soil which should eventually be eliminated. Growers should revise now their methods so as to increase efficiency for producing more and better fruit at low production costs.

New commercial fruit orchards should be planted only in regions or districts where soil and climatic conditions are recognized as the most satisfactory. This large local variation due to several basic environmental elements known as microclimate has an important influence in the blooming season, the period required from fruit set to maturity, fruit quality, yield, etc. Damage caused by certain plagues and diseases can be reduced to the minimum by planting in more adaptable soil or sites or by planting a type or variety less susceptible to attack.

Considering the scarcity of agricultural climatic information, soil map surveys, etc. a whole national study should be made to determine and establish the prospects of most of the fruits that grow in Korea at present, indicating the best growing districts for future planting.

Right now each kind of fruit is growing in variable and in many cases in unfavorable ecological conditions which may not be suitable for high commercial production standards. Limiting new planting to specially adaptable areas, districts and sites for fruit growing is another step in the right direction.

b. Methods, procedures, and standards used

Fruit production is becoming an important source of farm income but, in general, fruit culture has been dedicated to table fruit varieties to supply domestic needs and very little processing has been undertaken as yet.

Local fruit production could be very successful by increasing fruit production techniques. At present more attention is given to site and soil selection to correct soil acidity, fertilizer unbalance, the control of physiological disorders, irrigation, improvement of present varieties by introducing promising varieties for processing, storage, controlling of insects and plant diseases and adequate marketing.

Korea has little additional land that can be brought into production but slopes in the mountain areas offer great potential for the growth of fruit and mulberry trees. To achieve success in expanding fruit crops complete land tenure, effective soil and water conservation practices and a combined fertilizer program of commercial fertilizer, green manures and mulching are essential and of indispensable value.

Climate is a predominant factor in fruit culture and in some cases, such as citrus production on Cheju Island, climate is a marginal factor.

Korean climate closely resembles that of the northeast coast of the United States. Seoul, Taejon or Taegu in July can be as hot as Washington, D. C. and in January as cold as New York.

Rainfall exceeds 40 inches (1,000 millimeters) everywhere in Korea, while in some places along the south coast and Cheju Island it averages more than 55 inches (1,400 millimeters).

Of the 12 months of the year there are about 80 days of rainfall representing the rainy season, from May to September; but the heavy rains are concentrated in the hot days of summer from June to August and some years they continue until September.

Summer conditions in general are very rainy and warm. This humid and warm weather in the early summer during the fruit maturing and harvesting time creates favorable conditions for extensive disease and insect development. These are vital factors requiring appropriate pest control knowledge, especially when farmers are dealing with new imported superior varieties, which are more sensitive to unfavorable weather, rains, diseases, etc.

c. Organizations and institutions involved

There are a number of potentially attractive opportunities in Korea to develop processed food. Processed fishery products for domestic and export markets are being successfully increased. Similar opportunities could exist for fruits and vegetables, but, as Korea has never developed processing varieties, there is a surplus of fruit during the peak production season causing market flooding and costly spoilage.

Taking into consideration the Oriental fruit type, variety problems and the limitation of the domestic market in a very short production period, a fruit processing industry appears to be the eventual solution.

A look back in history shows that before the second World War there were some 50 canneries operating in the country. Most of these plants processed fish and other marine products and switched to fruits, vegetables and other agricultural crops during the peak production season. Although this combined or double purpose canning operation does not seem to be strictly scientific or hygienic, economic factors and short seasonal production forced the Japanese to establish such a system in Korea.

How important is this system today and how many of these old plants are qualified to absorb and preserve seasonal crops and surplus vegetables and fruit? A great deal of attention and study should be given to the problem of answering this question accurately. Considerable research, modern techniques, and economic feasibility must be taken into consideration.

For example, in recent years glass containers are being made in the country in order to avoid importing of tin plates. Worldwide, there also exists a remarkable degree of technical improvement in the manufacture of modern food processing equipment. It is simpler, more compact and more efficient.

The improvement in dissemination of technical knowledge on fruit preservation is desired and serves as an incentive for modern fruit and vegetable growing.

There are certain important factors of the cannery operation that should be investigated and there is a need for intensive research to determine the best varieties of fruits and vegetables for canning as well as for other products.

d. Human and material resource factors

In Korea the processed product, such as fruits and vegetables, should have a definite cost advantage in competing with foreign markets because of existing low labor production costs. Actually, canneries cannot depend on the domestic market exclusively; profits are too low to attract the canneries. On the other hand, in order to compete with the strict international market, canneries have to make substantial technical reforms in processing equipment and processing techniques. Low production capacity and inefficiency at many food processing plants should be revitalized. The fundamental principles of processing should be investigated. The use of fruit and vegetable varieties especially suitable for canning in accordance with established commercial standards is one of the many problems encountered in local fruit and vegetable processing. Generally, in Korea, canned fruit is uneven in size, color, texture, maturity, unattractive in appearance and is not a product of high quality.

It is desirable, therefore, to study several varieties of fruits and vegetables in relation to adequacy, length of the canning season, etc. In Korea the canning season could begin with the canning of strawberries in June and end with the canning of apples and persimmons in November.

During the peak vegetable production season (June to October), only a very small amount is preserved through canning and drying.

Vegetables for processing could be produced by contract on a low-cost basis similar to those produced now for the U.S. and UN Armed Forces.

In July, particularly, markets and retail stores are abundantly stocked with fruits, vegetables and all other kinds of agriculture food products.

At such a time, unfortunately, the consumers cannot buy so much of the various products. Losses are high because of so much perishable food in stock, high humidity, limited cold storage, and the lack of other market facilities.

Home-drying and storing of vegetables in outdoor pits and cellars during the winter has long been the farmer's defense against extreme losses. Rewarding results have been obtained with the dry weather and low temperatures

in October and November. Drying sweet potatoes, peppers, persimmons, jujubes, pumpkins, and radishes is a very common activity carried out by farmers and villagers in the fall. But where unfavorable climatic seasonal conditions make it impossible to dry or to store vegetables for "off-season" use, canning, freezing and pickling should be substituted.

As the highest fruit and vegetable yields occur during the rainy season the use of dehydrators should be studied in order to protect the products from rain and humidity damage.

The commercial dehydration of products such as peaches, apples, persimmons and pears is very promising. Some grapes such as the Delaware variety should also be considered. Production of onions, potatoes, pumpkins, Chinese radishes, carrots, peppers for paprika and cayenne, tomatoes and garlic should be increased for dehydration.

Frozen preservation of fruits and vegetables for the retail trade would be another probability for study to avoid market flooding and costly spoilage of products during the peak production period and ensure an adequate domestic supply during the months when such food is not in season. Strawberries, blueberries, raspberries, peaches, apples, spinach, sweet corn, green soybeans and peas, broccoli, cauliflower and asparagus are some of the suggested items.

3. Korea's Vegetable Production Capacity

In ~~the~~ taking a quick glance at vegetable production capacity we will find that good coordinated planning of annual vegetable production between MAF, NACP, RDD and KPA has been responsible for Korea's ability to meet its enormous and rapid production capability.

Hundreds of years of Korean history show that resident Chinese families worked on specialized vegetable production, the resident Japanese people specialized and worked on fruit orchard production and the Korean farmers dedicated themselves exclusively to paddy rice production; the "daily bread of the Orient".

Therefore, it is not surprising that in Korea the production and supply of Asian vegetables such as Chinese cabbage and radishes, garlic, onions and hot peppers is maintained fairly well. Marketing (storing, distribution and preserving) is the present problem.

Whoever says that Korean people do not eat enough vegetables are in error; I would dare to say that this is not so.

About one half million tons of Chinese cabbage and more than a half million tons of Chinese radishes are produced annually for use in processing Kimchi.

In addition, some one half million tons of other vegetables such as onions, garlic, peppers, tomatoes, pumpkins, squash, melons, watermelons, cucumbers, spinach, etc. are fresh vegetables sold daily in markets all ~~throughout~~ over the country from June to December.

The annual production of tuber crops such as white potatoes and sweet potatoes, ~~are~~ ^{is} estimated at about two million tons.

Besides this, more than two and a half million tons of western vegetables, mainly cabbage, lettuce, carrots, tomatoes, celery, onions, squash, watermelon, etc. are produced on a contract basis by a number of farmers to supply the U.S. and UN Forces in Korea. A large amount of the over-production of western vegetables that exceeds the estimated production is absorbed by local market.

We are almost sure that in the national census figures the vegetables grown in thousands or maybe millions of very small garden plots we see near the villager's houses all over the country are not included. Korean people are very concerned with the food problem and, to some extent, with the food value of vegetables so that there is not a single little piece of land in the house yard near the road or the street that is not planted with green onions, eggplant, squash and some kind of leafy vegetables.

The famous Korean "sauerkraut", Kimchi, composed largely of a semi-fermented mixture of cabbages and radishes conditioned with plenty hot pepper, garlic, etc. is eaten practically in every home.

We believe that Kimchi is one of the most important sources of minerals and vitamins for the 30 million people who live on a heavy rice diet.

We believe, also, that nourishing qualities of Kimchi are responsible for the healthy, dynamic red-cheeked children we see in the streets all day long.

Of course, a nutritionist will say that, in general, the Asian people need more protein and more green or leafy vegetables in their diet.

Several "western vegetable types" such as head lettuce, head ~~ing~~ cabbage, spinach, broccoli, cauliflower, Brussels sprouts, Swiss chard, beets, carrots, tomatoes, asparagus, etc: would be useful to increase variety and seasonal availability of vegetables. Introducing more new vegetables into Korea would also help and increase the possibility of a vegetable processing industry. Reading the Regional Vegetable Production and Marketing Report of the Research Center for the Far East, Taipei, Taiwan, May 1966, the following ~~s~~ suggestions were pointed out "As a result of over population, the diet of Asian people is preponderantly starchy and lacking in protective foods. The necessity for growing

more vegetables of high nutritive value has become increasingly urgent because of the rapid growth of population and the need for a balanced diet of plant nature". The increase of more vegetable consumption proposed by members of the Asian Vegetable Research Institute constitutes an easy way to provide the major source of the vitamins essential for human growth and development.

According to the 1966 Year Book of Agriculture and Forestry Statistics vegetable crops occupy some 364,207 hectares (874,096 acres) of land and production represents a total of 3,407,426 metric tons.

<u>Vegetables</u>	<u>Planted Area</u> (ha)	<u>Production</u> (MT)
Cabbage, Chinese type (<i>Brassica pekinensis</i>)	39,131	519,924
Cabbage, Western type (<i>Brassica oleracea</i>)	1,633	31,867
Cucumber (<i>Cucumis sativus</i>)	4,782	47,248
Eggplant (<i>Solanum melongena</i>)	1,847	18,162
Garlic (<i>Allium sativum</i>)	10,553	66,110
Melon, Oriental type (<i>Cucumis melo</i>)	6,184	59,913
Onion (<i>Allium cepa</i>)	2,867	52,590
Onion, Welsh or green type (<i>Allium fistulosum</i>)	3,708	47,658
Pepper, red, (<i>Capsicum annuum</i>)	23,148	67,039
Potatoes (<i>Solanum tuberosum</i>)	60,940	688,254
Pumpkin & squash (<i>Cucurbita pepo</i> , <i>C. moschata</i>)	7,411	87,025
Radish, Chinese type (<i>Raphanus sativus</i>)	42,218	596,658
Spinach (<i>Spinacea oleracea</i>)	1,037	8,451
Sweet potatoes (<i>Ipomoea batatas</i>)	149,114	2,690,239
Tomatoes (<i>Lycopersicon esculentum</i>)	2,217	29,778
Watermelon (<i>Citrullus vulgaris</i>)	4,037	55,257
Taro (<i>Colocasia antiquorum</i>)	50	446
Burdock (<i>Arctium lappa</i>)	55	438
Carrot (<i>Daucus carota</i>)	218	1,137
Other vegetables	2,201	18,513
Grand Total	364,207 (874,096 acres)	3,407,426

The "western vegetable group" is mostly new to Korea and production has been increased since 1960 to supply the US and UN Forces.

Improvement in cultivation methods, production of better commercial varieties, introduction of U.S. seed, fertilization, disease and insect control, harvesting, grading, packing, shipment and marketing are carried out in the new western vegetable program.

On the basis of a preliminary survey in the most important horticulture areas the "western vegetable group" production, consumer requirement and tentative possibilities to preserve the excess was determined in the summer of 1967. The following are the figures obtained:

<u>Items</u>	<u>1967 HAF Production plan (lb.)</u>	<u>1967 US KPA requirement (lb.)</u>	<u>Supply for processing (lb.)</u>
<u>Total</u>	<u>56,944,000</u>	<u>20,240,654</u>	<u>36,703,356</u>
Cabbage	3,600,000	1,161,679	2,438,321
Melons	1,200,000	480,375	719,625
Carrots	3,140,000	1,118,027	2,021,973
Calery	3,600,000	1,347,000	2,253,000
Cucumbers	960,000	357,400	602,600
Eggplant	160,000	27,618	132,382
Garlic	180,000	57,024	122,976
Head lettuce	4,600,000	2,373,840	2,226,160
Onions, dry	2,710,000	1,334,178	1,375,822
Onions, green	600,000	55,590	544,410
Radish	240,000	155,568	84,432
Squash	260,000	10,920	249,080
Tomatoes	3,000,000	892,620	2,107,380
Watermelon	1,800,000	516,050	1,283,950
Parsley	48,000	23,940	24,060
Green pepper	210,000	116,825	93,175
Sweet corn	1,215,000	405,000	810,000
Sweet potatoes	576,000	192,000	384,000
White potatoes	28,845,000	9,615,000	19,230,000

According to these figures the Inchon Horticulture Cooperative Association established their own production processing plant. Some of the 1967 production was:

<u>Products</u>	<u>Quantity</u>	<u>Unit cost (\$)</u>	<u>Amount (\$)</u>
Kinchi	1,664,800	0.082 per F#3	138,706.81
Pickled cucumbers	4,800	0.184 per pint	881.78
Pickled egg plant	4,800	0.261 per pint	1,255.11
Pickled scallions	4,800	0.414 per pint	1,988.44
Tomatoes	48,000	0.121 per #4 can	5,817.69
Mushrooms	128,160	0.386 per pin jars	49,450.77

The schedule of phases for planting and production of the most important vegetables are:

<u>Items</u>	<u>Planting period</u>	
Cabbage	June 15	Through December 15
Carrots	August 15	" November 30
	September	" October (high altitude areas)
Celery	June	" July
	October	" November
	September 15	" October 15 (high altitude areas)
Cucumbers	June	" October 15
	March 15	" June (in vinyl hot houses)
Eggplant	June 20	" September
Lettuce	May 15	" July 15
	September 25	" November
	September 15	" October 15 (high altitude areas)
Onions (green)	May	" December
Onions (dry)	June	" July (stored through December)
Parsley	May	" November
Peppers (green)	June 15	" September
Radishes	May 25	" December
Radishes	August	" September (high altitude areas)
Squash (green)	June	" September
Squash (green)	April	" June (in vinyl hot houses)

<u>Items</u>	<u>Planting period</u>	
Tomatoes	(June	through September 30
	(April	" June, in vinyl hot houses
	(August	" September (high altitude areas)
Watermelons	July	" August

4. Vegetable Seed Production

Progress on vegetable seed production has been so rapid and effective that it could be considered one of the greatest genetic and plant breeding achievements carried out by the Horticulture Experiment Station during the past five years.

Progress resulted from improved techniques in modern seed breeding, pollination and isolation. By cross-pollination desirable genetic characters were obtained and pure line seed crops have been properly isolated to prevent contamination of undesirable pollen.

As the growing of seed for sale (seedage) is a highly specialized technical business, attention was focused on distribution of a great number of vegetable pure seed lines to privately organized seed breeding farms in Korea since 1961.

Today, vegetable seed is produced by a relatively large number of seed growers supplying 95% of the national demand. Total national vegetable seed production for 1966 is estimated at 245 metric tons (1,370,000 liters).

The Korean Seed Producer's Association, representing 20 of the largest seed breeding farmers, produce 77% (650 metric tons) of the total national production.

Climatic conditions during the dry Korean spring season (April-June) is suitable to promote a rapid rate of photosynthesis for proper seed ripening, high quality and large yields. All of these conditions contributed to the development of a profitable seed breeding business and constituted the basis for a promising industry in the future.

A large number of experienced and qualified breeding workers at the Horticulture Experiment Station have been enticed to work for private seed breeders paying them higher salaries. This situation has also been advantageous for the improvement of national seed production.

The export of vegetable seeds to Japan, Taiwan and Vietnam is in progress.

4. Future Measures and Directions for U.S. Activities

I have worked for five years, with much interest, close to the Korean people and have enjoyed it. I like them, I admire their technical skill, intelligence, tireless effort in striving for superiority. Much progress has been achieved in working and cooperating with them. I have great hopes in the fast growth, modernization and future of Korean agriculture.

The horticulture research work is in its first step of progress; it still has a long way to go, but I have great hopes in the recent consolidation and reorganization of the new Horticulture Experiment Station. As a result of the 1967 consolidation plan, output of subordinate personnel has been strengthened with greater efficiency in the use of facilities and research design.

The new Horticulture Experiment Station is now located $7\frac{1}{2}$ miles north of the ORD Suwon Headquarters, on 50 hectares (123.6 acres). This will become one of the most modern stations where a large staff of horticulturists, pomologists, viticulturists and floriculturists are currently working together. Plans have been made so that the vegetable experiment work at the Horticulture Station will be carried out in cooperation with the Regional Vegetable Production and Marketing Institute for the Far East in Taipei, Taiwan. A sub-center might even function here in the near future.

The Mutual Cooperation of Batelle Memorial Institute (BMI) and the Korean Institute of Science and Technology (KIST) in carrying out investigations and studies of food technology and agriculture industries are of appreciable value in the development of new industries and food technology improvement in the country.

At the same time the Agriculture and Fishery Development Corporation (AFDC) in its first year of activities is promoting the development of industries, processing and marketing agriculture and fishery products. In the four groups of activities the large scale truck farming plan for vegetables, strawberries, raspberries and tangerines will be put on the market in part as fresh produce and in part as quick frozen and processed products. The project is now being reviewed by local experts with the advice of a USOM Food Technologist, Mr. J. E. Hall.

The Science and Technology Ministry, recently established, is also engaged in the organization of the progress of processed industry. Therefore, the food processing during 1967-68 has started to receive efficient technical aid and it will not be long until results will be noticeable.

Viticulture

Grape processing studies at the Horticulture Experiment Station, ORD, Suwon began in August 1964. The object of this study was to determine the industrial values of some grape varieties that have been cultivated in Korea for many years. These varieties are Campbell Early, Delaware, Niagara, Black Hamburg, Golden Queen, Kap Joo, Muscat Hamburg and Muscat Alexandria.

Besides these old varieties some of the best new varieties introduced since 1960 are being processed, particularly to evaluate their qualities as wine grapes. Some of these new grape varieties being studied are Alden, Portland, Schuyler, Neo Muscat, Muscat Bailey A., Sheridan, Early Muscat, Steuben, Kobong and Buffalo.

Many others are being studied in the collection of more than 80 varieties introduced in the past seven years.

The most promising grape varieties, especially for wine making, were imported and arrived in Korea at the end of 1966.

Among these new introductions are the following French-American hybrids: ten of the Seibel group, five of the Seyre-Villard and ten of the New York hybrids. This group of hybrid grapes promises great hope for the Korean wine industry in the near future.

The main reason that induces the Minister~~to~~ to support the development of the wine industry is the replacing of grain wines and brandies with grape wines and brandies. According to statistics, 150,000 metric tons (13 million dollars) of rice and other grains could be saved that are now used annually for grain wine and brandy making in Korea.

The prompt replacement of grain wine with grape wines, commencing with the production of wines based on Campbell Early stock, would allow time to acquire experience. Wine quality depends on the variety, the processing technique and mainly the number of years needed for aging the wine.

Therefore, a coordinated plan for planting superior grape wine varieties adapted to the Korean environment and the processing of fine quality wines constitutes a potential economic plan for the future. It is a known fact that there are extensive areas of sloping upland with light-textured soils where thousands of chongbo of grapes can be planted without interfering with or affecting the needed expansion of other food crops.

Basically, development of a successful commercial wine industry in Korea depends on the planting and culture of better wine grape varieties and on an extensive increase of vineyard planting.

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Taking into consideration that 50 per cent of the present national grape production (18,500 metric tons) could be converted into wine the total wine industry capacity might be estimated at SEVEN MILLION LITERS annually.

Citriculture

Citrus fruit culture on Cheju Island and on some of the other southern islands is a large scale program being strongly pushed by the Provincial Governors.

At approximately 33 degrees North Latitude, Sogwipo is the central citrus district on the southern coast of Cheju Island and this is the only protected temperate area where some hardy citrus fruits such as tangerines or mandarins (*Citrus reticulata* Blanco) could be economically produced.

The possibilities of improving citrus culture on some of the islands depends on better understanding of essential citrus climatic factors, citrus environmental requirement, technical investigation and the degree of acceptance of the technical methods by the farmers. There is no citriculture tradition among farmers in Korea, therefore, more research attention and technical training ~~is~~ are needed.

As weather is the determining factor in limiting commercial citrus production, extensive weather records and agroclimate studies must be carried out on the southern islands to determine the length of critical freezing point temperatures, wind protection, rain distribution, etc.

Microclimate and site location for citrus planting will be technically selected and not left to the farmers to make a choice. Not all the islands or not all the land on favorable islands are suitable for citrus planting. It would be a serious mistake to plant citrus orchards improperly on sites where temperature and soil are not suited to fruit growing.

A qualified group of experts, on weather survey from the National Meteorological Office, soil scientists, agriculture engineers, etc. should investigate the agroclimate, microclimate, exposure sites, soil, terracing methods, and irrigation possibilities to determine extent of a citrus industry on the island.

Besides the serious weather difficulties that citrus are confronting, serious widespread pest-like nematodes, citrus leaf minor, bacterial canker, scab, several scales and other insistent plagues, should be corrected through application of technical knowledge on the part of the farmers.

But there are other problems involved in Chejudo citriculture - poor orchard management, particularly balanced fertilization and soil acidity

control; windbreak trees for orchard protection ^{are} also of utmost urgency to improve yield and fruit quality, such as color, sugar content and flavor. Other disadvantages in Korean citriculture are the high cost of production due to the high cost of land, severe plagues, poor yielding varieties, etc.

Years ago citrus growers were too insistent in planting a mixture of ordinary cold hardy citrus strains instead of planting only a few outstanding cold hardy trees of high commercial value such as the seedless mandarin and tangerine.

Special attention is given now to standardizing mandarin varieties and to the lengthening of the ripening season by planting early and late maturing varieties.

It may be commercially desirable to accentuate the need of planting only few outstanding cold hardy varieties of high commercial value. The yield and quality of fruit should also be improved by the selection of superior varieties. Twenty superior Tangerine and Satsuma (unshiu) varieties were introduced from Japan in 1964 and transplanted at the Sogwipo Experiment plot in 1967.

According to the Yearbook of Agriculture and Forestry Statistics the citrus crop has rapidly expanded during the past five years, from 80 hectares (192 acres) in 1959 to 400 hectares (960 acres) in 1966.

Citrus production starts late in October to the end of December. At present citrus production could be classified as follow: 40 per cent of tangerine or satsuma (Unshiu) type and 60 per cent of miscellaneous sour fruits including some pummelo and a few oranges.

The Miyakawa tangerine representing 12 per cent of the crop is the earliest of all; chikugo represents 24 per cent and matures in mid-November; and, Ikeda, four per cent of the "Unshiu" group is a late variety maturing at the end of December.

Total annual production of assorted citrus crops on Cheju-do is estimated at more than one million kilograms (2.4 million pounds), of which one million pounds are tangerines.

This quantity is not sufficient to supply the domestic citrus market demands that are increasing with the population. A great need of the use of citrus fruit as a source of vitamins and balanced diet is a vital necessity.

For all these reasons a carefully planned and coordinated program and study in the field of agroclimate, soil survey and fertility, citrus pests prevailing and their control, water supply for irrigation, citrus production costs and economics as well as the establishment of a citriculture research program in relation to varieties, rootstocks, plant physiology, etc. might well be founded as part of a successful agricultural project for the islands.

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