

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523
BIBLIOGRAPHIC INPUT SHEET

FOR AID USE ONLY

Batch 70

1. SUBJECT CLASSIFICATION	A. PRIMARY Food production and nutrition	AF00-1300-G748
	B. SECONDARY Plant production--Vegetables--Taiwan	

2. TITLE AND SUBTITLE
Taiwan's specialized vegetable production areas, an integrated approach

3. AUTHOR(S)
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4. DOCUMENT DATE 1975	5. NUMBER OF PAGES 25p.	6. ARC NUMBER ARC
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7. REFERENCE ORGANIZATION NAME AND ADDRESS
AVRDC

8. SUPPLEMENTARY NOTES (*Sponsoring Organization, Publishers, Availability*)

9. ABSTRACT

10. CONTROL NUMBER PN-AAE-676	11. PRICE OF DOCUMENT
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12. DESCRIPTORS Taiwan Vegetables	13. PROJECT NUMBER
	14. CONTRACT NUMBER AID/ta-G-1260 GTS

15. TYPE OF DOCUMENT

TAIWAN'S SPECIALIZED VEGETABLE PRODUCTION AREAS:

AN INTEGRATED APPROACH *

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INTRODUCTION

The farmers of Taiwan are well known throughout Asia as efficient producers of quality vegetables and for their use of such cultural practices as frequent pesticide application, increasing use of fertilizers, multiple cropping techniques, etc. In fact, a sizable segment of the overseas Chinese living in Southeast Asia are noted for their vegetable-related activities. These include the cultivation of vegetables in the highlands of Baguio (Philippines) or in the lowlands around Bangkok (Thailand) as well as the operation of marketing systems that supply consumers in many urban centers.

The urban-industrial expansion now taking place in the rapidly changing environment of Southeast Asia continues to absorb the land customarily devoted to vegetable production around the municipal areas. Yet at the same time, the increasing populations of these urban complexes demand greater quantities of food. In the case of Taipei City, this loss of productive farm land is accentuated because the hilly terrain and the water-logged land surrounding the city are not well suited for vegetable production. In addition, the damage caused by the increased incidence of disease and insect attack during the summer months is dwarfed by the very heavy rain and strong winds of that season's typhoons. Coinciding with or partially caused by this wide range of environmental problems are the fluctuating market prices

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that can ruin a vegetable producer as easily as any catastrophe of nature.

Recently the "Specialized Vegetable Production Areas" (SVPA) program was initiated by the Joint Commission on Rural Reconstruction (JCRR) in Taiwan to deal with the inherent difficulties of vegetable production and marketing, particularly during the summer season. This program was designed to create a system to compete with the existing way of growing and marketing vegetables (Chart 1) by introducing cost-saving production techniques, improved cultural practices, and efficient marketing channels linked directly to major consumption centers. The program's organizers expect that the resulting increase in supply during the summer months should help to stabilize vegetable prices.

From a marketing perspective, the basic idea was to improve the existing infrastructure in key vegetable production areas and link these areas directly to the wholesale markets in both Taipei City and Kaohsiung City. Although the initial benefits are directed towards these two wholesale markets, the other wholesale markets in Keelung, Taichung, and Tainan will subsequently be affected. This system reinforces the strengths of select locations with their experienced vegetable producers by lowering production costs and organizing more direct market linkages instead of changing traditional cultivation patterns.

The approach of SVPA program was integrated as follows: (i) to identify and organize groups of interested vegetable growers located in favorable vegetable producing areas with suitable climate and sufficient water supply; (ii) to provide production incentives such as credit, inputs, and technical assistance; (iii) to form a collective marketing system based on a network of strategically located assembly stations linked through the Farmers Association (FA) organization to a large wholesale market in major consumption areas (e.g., Taipei City's Hwa Chiang Market and Kaohsiung City Fruit and Vegetable Market).

With the intention of observing Taiwan's vegetable farmers and understanding how this approach could both benefit the rural farmer and urban consumer, all 10 of the specialized vegetable production areas were visited by AVRDC staff members*. An overview of the SVPA program, characteristics of representative farmers, and comments on various aspects of this integrated approach are presented

* Field survey conducted summer 1974.

Chart 1. Existing Vegetable Marketing Channels.¹

"The vegetables from the farmyard flow through a variety of channels to get to the hands of the consumer. The typical patterns of flow, with some minor exceptions, can be depicted as follows:

- (a) Producer -- consumer
- (b) Producer -- retailer -- consumer
- (c) Producer -- shipper -- terminal market -- wholesaler -- retailer -- consumer
- (d) Producer -- assembly market -- shipper -- terminal market -- wholesaler -- retailer -- consumer
- (e) Producer -- assembly market -- shipper -- terminal market -- wholesaler -- jobber -- retailer -- consumer
- (f) Producer -- terminal market -- wholesaler -- jobber -- retailer -- consumer

Vegetables produced in the major commercial growing areas are generally marketed through patterns (c), (d), or (e), while those produced in the suburbs of large cities like Taipei follow pattern (f) and those consumed off-farm in the producing areas follow pattern (b). Direct transactions between producer and consumer are declining in importance as specialization and commercialization progress."

in this paper. Although the author's intent is to describe this worthwhile program, various possible improvements are also suggested.

SVPA OBJECTIVES

The objectives of the SVPA program were:

- 1) To increase the supply of quality vegetables during the summer (hot and rainy season);
- 2) To practice group production and collective marketing of vegetables in order to promote the vegetable farmers' welfare and to reduce the number of marketing transactions between the farmer and the consumer;

¹ Hsin-Yin Chen, "A Study of Vegetable Retailing Costs in Taiwan," Herman Southworth, Some Studies of Fresh Fruit and Vegetable Marketing in Asia. (Singapore, The Agricultural Development Council, Inc., 1974).

- 3) To promote the hygienic production of vegetables;
- 4) To make possible the timely use of production inputs through loans from a 'revolving fund'; and
- 5) To reduce both losses and costs of shipping vegetables by improving Taiwan's farm to market road system.

ORGANIZATION

The SVPA integrated production and marketing system evolved from a number of earlier small projects in Peitou and Shihlin (near Taipei City), and in a major vegetable production zone of central Taiwan (e.g., Hsilo). The experiences of those projects and the successful organization of production-marketing systems for such crops as mushroom and asparagus served as program guidelines.

Areas traditionally known for their experienced vegetable farmers were selected. Forming the system within such a favorable environment had the distinct advantages of requiring very few changes in cultivation patterns, shorter duration for implementation, relatively low administrative cost, and fewer organizational staff members. In short, this approach simply increased the dimensions of both the local cropping patterns and the existing institutional structure. Yet, on the other hand, a disadvantage is the program's 'demonstration of impact' effect. It may be difficult to measure immediate significant improvements over the previous system since the level of production was already high in these particular areas. Therefore, until the new system encompasses a large area or benefits a large number of farmers, its effect may initially appear to be marginal.

STRUCTURE

This program, entitled "Establishment of Specialized Vegetable Production Areas," was initiated and financed by the Joint Commission on Rural Reconstruction's Plant Industry Division. It consisted of three phases, namely "phase one" from January 1973 through June 1973, 'phase two' from July 1973 through June 1974, and 'phase three' from July 1974 through December 1974.

The budget granted by the Central Government was allocated according to specific priorities within each phase. The timeliness of each priority rather than the actual amounts spent are relevant because any adaptation of this system would probably require substantially different amounts of funding. During phase one, the largest expenditure (more than 80 percent of the phase one budget) was for the construction of 29 assembly stations and 300 screen houses. Additional screen houses were constructed in subsequent phases. The second phase emphasized salaries and travel costs (37 percent of its budget) as well as pesticide costs (25 percent). During the final phase, the emphasis centered on the improvements of feeder roads (65 percent of the phase three budget) while the costs of chemicals and biological pest controls required less (13 percent). Phase one received 75.7 percent; phase two, 8.3 percent; and phase three, 16 percent of the total SVPA budget. Clearly, the emphasis was on physical infrastructure rather than building institutions.

The Provincial Department of Agriculture and Forestry (PDAF) was to sponsor and promote the program, supervise its implementation by other agencies, and act as coordinator of the program's various segments.

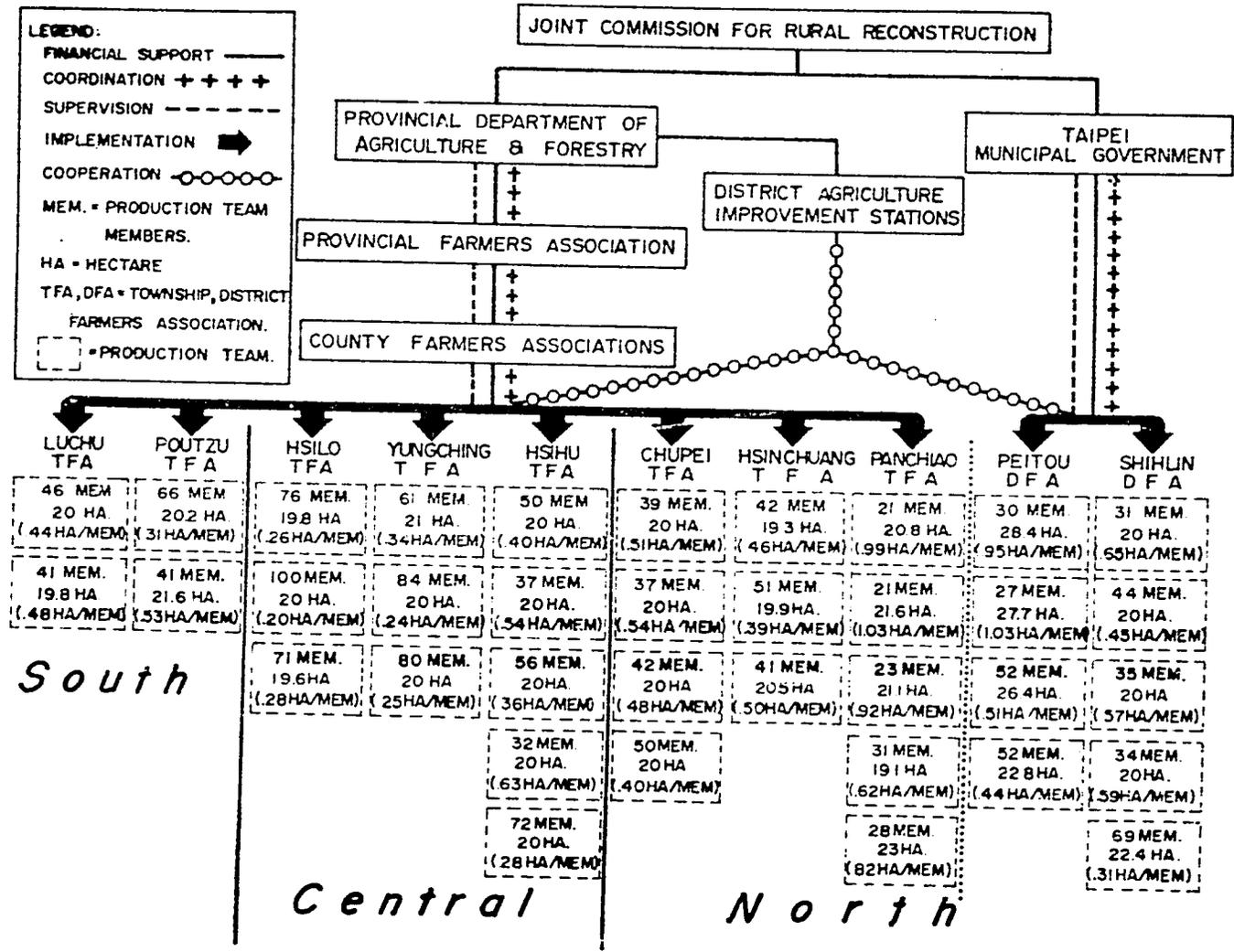
The Reconstruction Bureau of the Taipei Municipal Government (TMG) was initially in a collaborating role but, as the program developed, became a sponsor promoting the program in the Taipei area. It was directly responsible for the two Township Farmers Associations (TFA)* within the immediate Taipei area (Chart 2).

The respective District Agricultural Improvement Stations (DAIS)** cooperated by advising on technical matters and examining the activities of the local Farmers Associations related to vegetable production and marketing.

* There may be some confusion here since the local FAs in the municipalities (e.g., Taipei) are referred to as District FAs. In this paper, however, I've referred to all local FAs as TFAs.

** Taiwan is divided into seven "agricultural improvement" districts.

Chart 2. The SVPA organizational chart



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The Provincial Farmers Association (PFA) and the respective County Farmers Associations (CFA) were mainly responsible for supervising and coordinating the implementation of the program. This included assisting the Township Farmers Associations in making shipment plans with wholesale markets.

The SVPA program was implemented on the local level by the various Township Farmers Associations. The TFAs organized the vegetable farmers; encouraged them to use hygienic cultivation practices; stressed the safe and collective use of pesticides; promoted the community operation of the local assembly stations for mutual benefit; and supervised the grading, packing, and other marketing activities at those facilities.

IMPLEMENTATION

Several potential SVPAs were selected according to their high level of vegetable production, the status of their local TFAs, and their accessibility to major highways. These selected TFAs were asked to determine the interest of the local vegetable farmers and to organize the interested farmers into 'production teams', usually on an individual 'li'* or village basis. This grouping was designed to avoid the usually 'isolated' or 'scattered' vegetable-grower situation, so that the production and marketing functions could be organized more efficiently.

These 'production team' members designated, as a group, a total of approximately 20 ha of their land for the SVPA program. Each participant set aside a certain portion of his land for year-round vegetable production. This portion was not necessarily the same size as that of other participants nor the same parcel for the whole year. However, it had to be located in the same general location as the land of the other production team members. The flexibility of this group approach is illustrated by one of Hsilo's production teams, which consisted of 100 farmers with an average of 0.2 ha of vegetable land per team member, whereas one of the teams near Panchiao with only 21

* The smallest political subdivision in Taiwan.

farmers committed an average of over 1 ha per member for this program. Thus, instead of a concentrated 20 ha plot as a SVPA, one usually found vegetables being cultivated in various small parcels within a particular area. This approach was compatible with each farmer's particular multiple-cropping system and required little change in existing production patterns. Also, as a basis for the collective purchases of various chemicals and use of the unique marketing channels, this type of organization appears flexible enough to be practical.

Each production team's farmers elected a team 'chief' from among themselves to represent them and manage their group activities. The chief then chose a 'vice-chief' to coordinate most of the inter-group activities (often a younger farmer with some technical capabilities) and a secretary to keep records and schedule various team projects. These officers managed matters concerning the supply of materials, technical assistance, and public relations. They also served as a source of feedback to the participating institutions and the program's organizers.

Communications

Monthly or bi-monthly production team meetings were held to keep the channels of information, advice, and feedback functioning. Meetings were organized by the team's chief and vice-chief, and varied from regular sessions related to the team activities and production problem to special sessions. Extension and research workers from the respective DAIS introduced new varieties, improved cultivation techniques, and crop planting advice through these meetings. The frequency and importance of such meetings differed considerably from team to team.

Production Inputs

To increase farm income through the reduction of production costs, capital was provided to each team in the form of a NT\$80,000 "revolving fund" for the purchase of production inputs such as seeds, fertilizer, pesticides, plastic screen, water pumps, etc. A local SVPA committee, usually consisting of one representative from the DAIS, the CFA, the Township Government, and the TFA in addition to the production teams' chiefs, reviewed each loan from this fund. The loan was repaid by deducting the amount loaned

from the revenue received from the vegetables sold through the collective SVPA marketing system. When the loanee was not actively participating in this marketing system, the repayment arrangement was similar to that of other FA loans.

The fertilizer allocation scheme was especially attractive during the recent fertilizer-scarcity* period. Priority was generally given to production team members for the TFA's allotted quota of fertilizer from government sources. Amounts allocated were on a per area basis rather than a per farm basis. In some of the northern SVPAs (those located in mountainous areas), the quantity of fertilizer was usually sufficient, although the type of fertilizer was a serious problem. More phosphorous and potassium fertilizers were urgently needed, whereas mostly nitrogen types, e.g., urea, were consistently provided. Awareness of local soil fertility requirements is an important allocation consideration.

Pesticides were provided free or at a nominal price in special bi-yearly distribution schemes. It appeared that the proper use of appropriate insecticides and fungicides were frequently discussed at the monthly meetings, and that technical advice was often given to the participating farmers. One strategy was to organize "on-farm" demonstrations of a spraying program covering a concentrated 20-ha area for one cropping season, thus showing the benefits of collective efforts. Detailed evaluations of this approach are not yet available.

Seeds, except for special introductions from the DAIS, were generally purchased locally by the individual farmers. Other subsidized inputs, such as pumpsets and drainage materials, were provided through special grants. These subsidies were determined by the particular requirements of each local SVPA. For instance, Hsilo obtained 25 subsidized pumpsets and Panchiao, 118. Panchiao also received funds for the construction of at least 1,482 meters of drainage ditches covering an area of 82.7 ha. Usually these subsidies offset one-half to two-thirds of the total cost with the farmer paying the remainder.

* Related to the oil crisis which began to seriously affect fertilizer production in 1973.

Cultivation Techniques

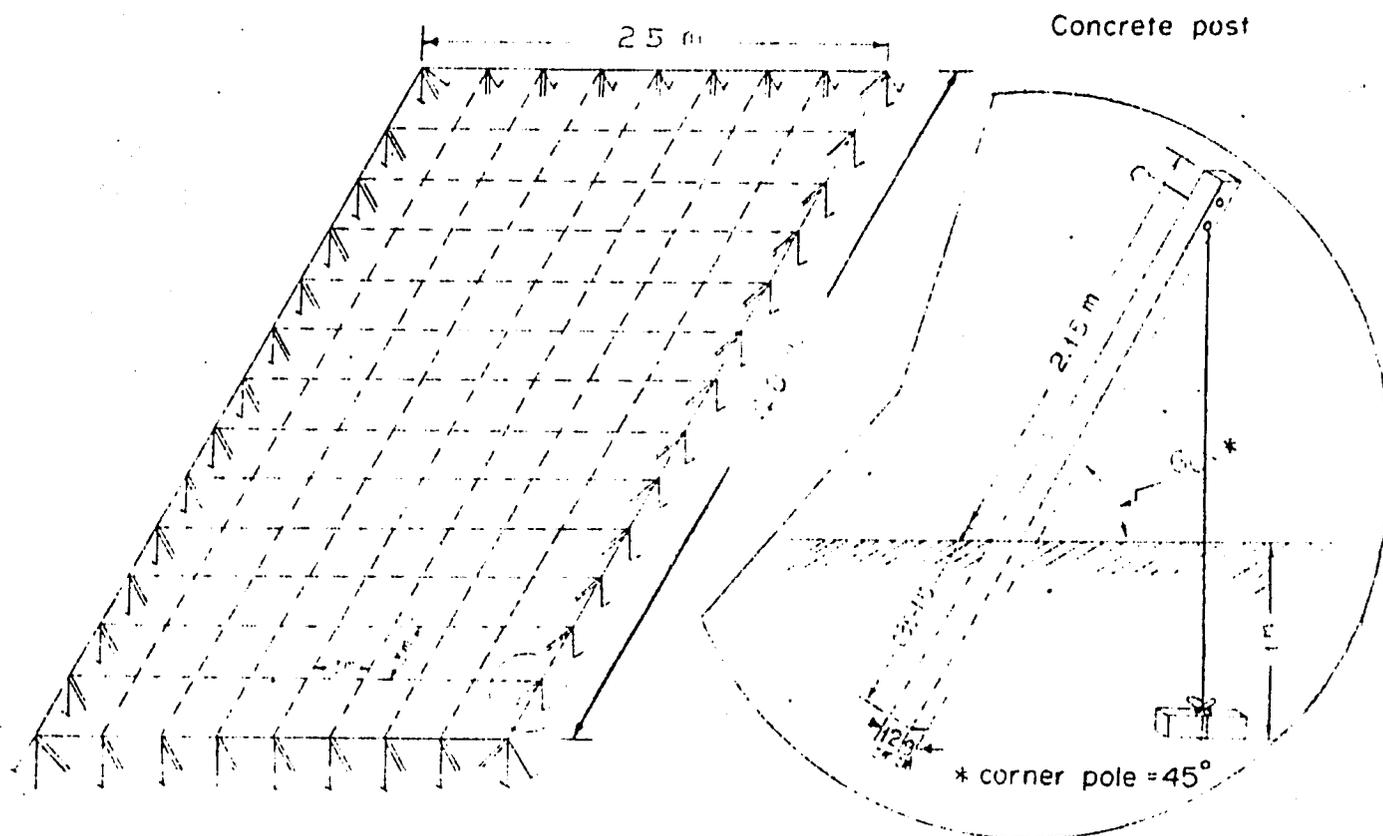
Cultivation techniques refer to 'hygienic' cultivation practices, the safe use of pesticides, and the screen house. 'Hygienic' cultivation initially meant discontinuing the use of night soil (human feces) and some other forms of compost. However, two factors have changed that approach, namely the recent fertilizer scarcity and the farmers' convictions that these forms of compost are beneficial for vegetable production. One TFA extension head mentioned that some farmers complained of yield reduction after discontinuing the use of compost for an extended period. Our observations of the SVPA program, especially in the Taipei area, would confirm the continued wide-spread use of night soil, which when properly handled is an effective and safe form of compost.* Further research on the different composting procedures would definitely be useful to the vegetable growers and SVPA administrators.

Promoting the safe use of pesticides meant disseminating information on the proper amounts to use, methods of spraying, and especially the timing of pesticide applications. In addition, chemicals with low toxicity were recommended to replace the more toxic chemicals. Conversations with farmers and newspaper articles indicated that the Chinese consumer is concerned about toxic residues on vegetables, whereas the farmer who sprays the day before taking his vegetables to the market is more concerned that they have an insect-free appearance. In an attempt to correct this situation, methods of growing and using natural enemies of harmful insects were introduced on a limited scale. AVRDC's research on biological control agents will benefit from the findings of this experiment, and the further development of this technique should be of special interest in the future.

Screen houses were developed for vegetable production and tested for several years at the DAIS in the Taipei area (Figure 1). They were designed to increase the production of quick maturing, leafy vegetables during the summer season, usually a low vegetable production period. A

* According to several studies in Japan.

Figure 1. 0.1 ha screen house



screen house is a structure covered with green plastic screen supported by a wire network attached to reinforced concrete pillars, 1.8 m high. The pillars lean outward from the center to keep the wire taut. The screen houses were provided to several SVPA farmers on a subsidy basis, i.e., at approximately 75 percent of the total cost (in early 1973, a 0.1 ha screen house cost approximately NT\$12,000)*. The size initially recommended was 0.1 ha. However, several of the observed screen houses exceeded that size. These structures provide protection to the crops from heavy rain and wind damage, especially during the typhoon seasons. Other reported advantages included reduced production costs per crop because of a shorter growing period, less evaporation, and maintenance of the proper balance of moisture in the soil.¹

¹"High-raised Screen House Vegetable Cultivation" by Wu-Tung Lu, Agricultural Improvement Station, Taipei District (in Chinese).

* Exchange rate : approx NT\$ 40 = US\$ 1.

Disadvantages included high construction cost, questionable life expectancy of the plastic screen (approximately 18 months)*, unsuitability for raising fruit and root vegetables, ** and limitation of locations where the screen house can be used, e.g., not in Keelung or Chitu where there is heavy fog. Other reported shortcomings ranged from reduction in yield in the cooler seasons to decreased storage life of leafy vegetables*** as well as possible damage from small insects and diseases.**** The use of screen houses for vegetable production is receiving further study by the Taipei DAIS.

We observed that several farmers accepted the screen house on a subsidy basis, but few (whom we asked) seemed willing to try it at their own expense. However, a modified version found in one farmer's field was becoming popular. This portable unit, approximately 30-40 cm high and as wide and long as the row, seems to be a practical adaptation of the 'screen house' technique, giving nearly the same benefits as the larger structure but with considerably reduced costs. The portability of this modified screen house allows it to be removed easily at harvest time or when another crop is to be planted in the field.

In addition to the above-mentioned cultivation techniques, the respective DAIS was responsible for giving the farmers specific, problem-oriented technical assistance as well as improved varieties and pesticide information.

Marketing

Marketing involved two major components at the producer level, namely the assembly station (first phase) and feeder road improvements (third phase). At the consumer level, the Hwa Chiang Wholesale Market in Taipei

*The deterioration is believed to be caused by the lack of an "UV inhibitor" in the plastic. Plastic screen containing this inhibitor should last longer in the field.

**Generally, only leafy vegetables have been commercially grown inside screen houses.

***In the case of headed Chinese cabbage; after harvest the heads were more easily contaminated by soft rot bacteria and spoiled more quickly than heads grown in open fields, according to several growers.

****The high humidity environment appeared especially suitable for high aphid populations and the diseases they transmitted.

was to be a major improvement in the total vegetable marketing system of Taiwan. The lowland assembly stations are open-sided structures,(Figure 2),

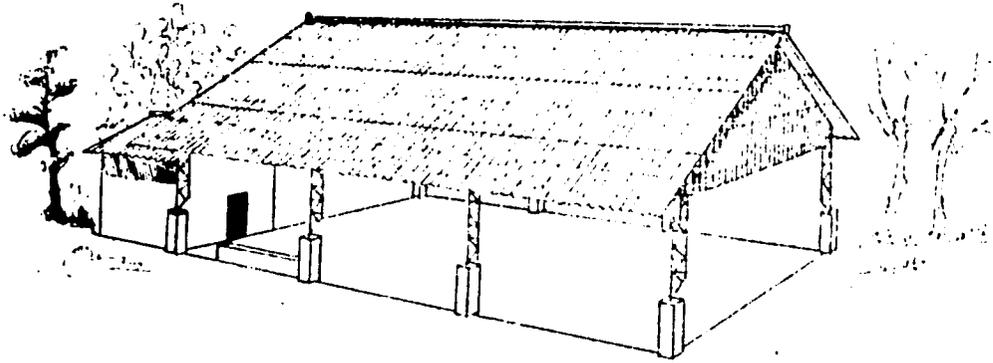


Figure 2. Lowland assembly station.

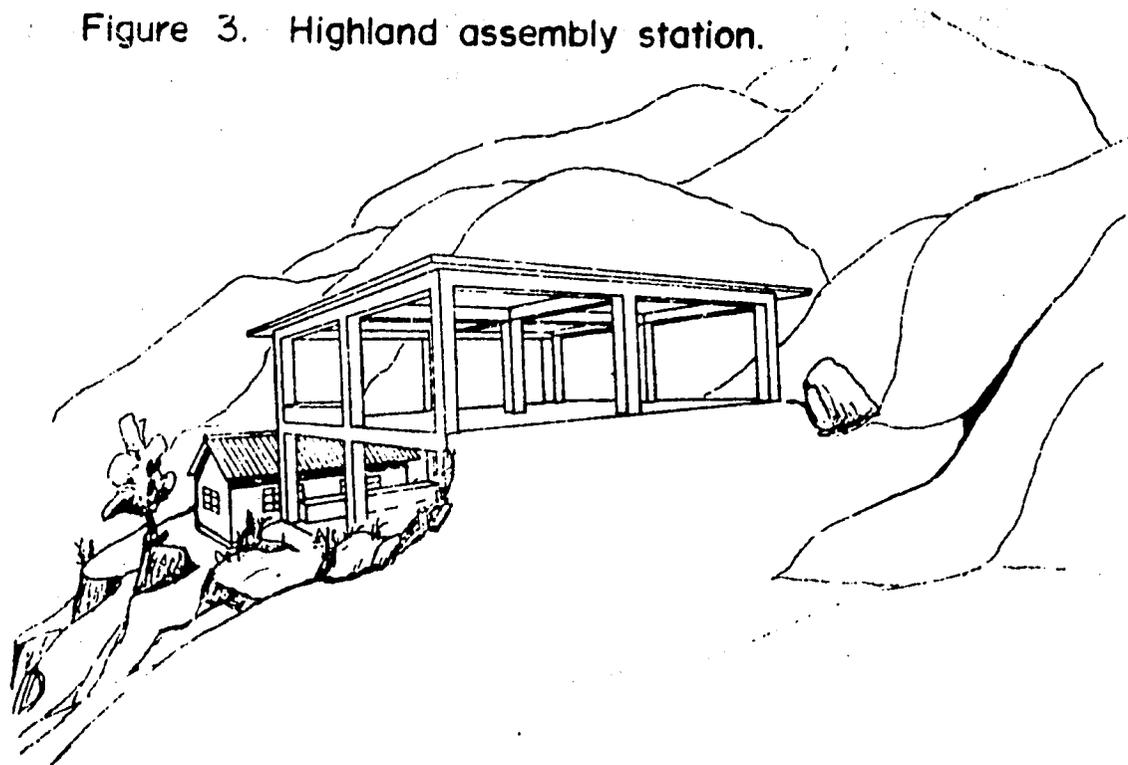
with corrugated asbestos roofs and a concrete floor space averaging 60 'ping'.* The assembly stations in the highlands, e.g., near Peitou (where high winds heavily damaged the lowland-type structures) are flat-roofed, open-sided, reinforced concrete buildings which varied widely in size (Figure 3).

Each production team has its own assembly station located near the group's fields. The team members bring their vegetables to the station to clean, sort, grade, and pack them for shipment. A rented truck collects the vegetables from the station and delivers them to a designated wholesale market. One or more of the TFA extension staff coordinates and supervises these activities and records the quantity that each farmer brings. We observed that while these facilities were generally serviceable, there were marketing problems limiting their efficient use. Sufficient coordinating and supervising staff were often not available.

A price incentive, which not only covered the extra labor costs required for grading the vegetables but also offset the farmer's advantage of having several competing buyers for his produce, was generally lacking. Frequently the lack of timely market information (e.g., daily wholesale vegetable prices in Taipei) seriously limited the farmer's ability to get a

* A 'ping' equals 3.3 m². Therefore, the total floor space averaged 198.7 m².

Figure 3. Highland assembly station.



fair price for his produce. Price manipulation by local vegetable merchants, the limited demand from the Hwa Chiang Wholesale Market,* and the costs of transporting the vegetables to Taipei from the southern and central areas were serious problems for SVPA farmers. The impact of price stabilization and related marketing factors require further study to make this aspect of the program more effective.

The Hsilo SVPA provides an example of how this marketing system with its network of assembly stations should work. A daily telephone call to the Hwa Chiang Wholesale Market is made to get an estimate of the volume of those vegetables available from this SVPA that could be sold within a given price range. With this information, the extension agents contact the farmers growing these particular vegetables and arrange for them to deliver a certain amount of their produce that day to the assembly station. The farmers bring their harvested vegetables to the assembly station where

*The Hwa Chiang Wholesale Market was closed December of 1974 and was replaced by the Taiwan Area Fruit and Vegetable Transportation and Marketing Company (see page 23).

they grade and pack them for shipment. TFA marketing clerks (usually one senior clerk and three junior clerks) record the amount per farmer and help supervise the grading, packing, and loading of the vegetables into the TFA's truck.* When the vegetables are sold to wholesalers in Taipei City, the amount is credited to the TFA's account which, in turn, credits each participating farmer's account. Payment to the farmer may take several days, depending on that day's volume. This exceptional example seems efficient. However, it still leaves farmers in the usual predicament of deciding which vegetables and the quantity of each to plant. Although production plans are drawn up by the TFA, their usefulness is questionable due to the uncertain market situation. In addition, the implementation of this approach on a large scale would require a very large support staff to maintain daily contacts between the farmers and the TFA's record-keeping system.

One frequently mentioned, cost-saving measure was the feasibility of each TFA purchasing its own trucks. If there are no policy restrictions on the use of such vehicles, i.e., the type of load hauled on the return trip, this measure could help reduce costs as well as ensure access to adequate transportation.

The improvement of feeder roads in the last phase of the program was intended to decrease marketing losses due to transportation problems and to give the farmers better accessibility to major transportation routes. The SVPA program subsidized 50 percent of the expense for this project with the remainder paid by the farmers or the local township office or both. Although certain mountainous areas need this construction because of frequent road damage caused by heavy rains, other priorities would have been more beneficial initially, such as price incentives or varietal improvements.

PRODUCTION TEAM CHIEFS

We interviewed 29 team chiefs and 2 vice-chiefs**to identify how

* The Hsilo TFA owns its own truck.

** The latter two individuals were recommended as more representative than their particular team chiefs.

these teams functioned, who actually participated, what common characteristics existed among them and what types of problems they faced. The interviews were conducted in July and August 1974 and represented 86 percent of all the team chiefs in the SVPA program. Basic data were gathered on farm size, the family labor force, major farm assets, cropping patterns, problems related to vegetable production and marketing, and team activities. Our intention was to form an overview of the SVPA's team chiefs who are representatives of the production team as well as farmers.

The team chiefs were distributed as follows: southern Taiwan townships of Luchu - 2 and Poutzu - 2; central Taiwan townships of Hsilo - 3, Yungching - 2, and Hsihu - 5; and northern Taiwan townships and districts of Chupei - 4, Hsinchuang - 3, Panchiao - 3, Peitou - 3, and Shihlin - 4. The map (see title page) shows these locations. We expected and found a very heterogenous population of farmers due to the variety of locations and the small size of the sample. Consequently, our remarks are indications of areas for further study.

On the average, a team chief was 48.7 years old with 5.4 years of education. His family consisted of eight to nine members; i.e., the farmer, his wife (who usually worked with him in the field), a few children of various ages and occupations, and one to two relatives such as a parent, a sister, or a son's wife and child. His average farm size was 1.3 ha (relatively large compared to Taiwan's average farm size of less than 1 ha)², and consisted of three or more parcels (i.e., separately located pieces of land).

Comparision of Team Chiefs

One way to consider these local representatives of the SVPA program was by location, i.e., southern, central, and northern Taiwan. However, the only clear differences attributable to location were in the man to land ratio and cropping patterns. The four families in the south averaged 3.2 persons per ha, the 10 from the central area averaged 9.9 persons per ha, and the 17 from the north averaged 6.2 persons per ha (7.1 in the lowlands

² "Historical Evolution and Future: Prospects of Multiple Crop Diversification in Taiwan", Y. T. Wang and Terry Y. H. Yu, Seminar on Multiple Crop Diversification in Taiwan and Its Relevance to Southeast Asian Countries, Oct. - Nov. 1973, Taipei, Taiwan.

and 4.1 in the highlands). These ratios agree with Taiwan's population distribution, showing relatively small, intensively cultivated farms in the central area, a somewhat lesser population per farmland-area concentration in the north and more sparse concentrations in the south.

The southern team chiefs generally planted an intermix of rice, field crops, and vegetables; those in the central areas emphasized vegetables and the two rice crops; and the northern team chiefs were predominately vegetable growers.

Another approach was to study the farmers' 'perceived' work schedule. In an attempt not to use preconceived standards related to working time, these farmers were asked how many hours per day and days per week do you usually work on the farm during both the summer and winter. Work in this context implied activities related to both production and marketing of crops and livestock. The consistent response of seven days per week led to further inquiries.

We found that unlike many other countries, holidays are taken mainly when brief slack periods of farm work permit or occasionally for certain religious, family, or national holidays rather than on a periodic basis. This was a year-round schedule not just seasonal. The industrious farmer doesn't have time to observe many holidays, considering the pressures of planting and harvesting plus other field operations spread over a number of different crops grown simultaneously as well as sequentially.

Another reason for the farmers' heavy work schedule was the decreasing amount of time the farm children actually spend working in the field. Higher education is considered more important and their studies require most of the children's time. Likewise preparation for very competitive entrance examinations demands much study time. Their infrequent work also adversely affects the quality of their labor during vacations since they tire more easily and are less able to endure the heat. Thus, the burden of increased field work is placed on the farmer and his wife. This intensive work aspect will continue to be investigated because such work schedules could be a serious human cost related to multiple cropping and intensive vegetable cultivation. Would others be willing to use such intensive cultivation practices? Will today's youth be willing to continue that life style?

Several farmers stated that they worked over 10 hours per day and seven days per week during the summer. Those who worked longer hours tended to be younger than the average (i.e., 49 years old) and better educated. This was not expected, because of the general movement of Taiwan's youth from agriculture to other occupations. However, the small sample size and the select nature of the elected team chiefs may account for this.

The more expensive farm resources such as power tiller, water buffalo, hogs (ten or more), and yellow cattle, were usually found on the larger farms. The younger team chiefs tended to own power tillers (10) whereas water buffalo owners (7) were generally the older team chiefs. Ownership of a power tiller usually required that several family members be able to operate it in order to offset part of its high initial cost by renting out its services. The water buffalo as a power source was more common in the past whereas the power tiller (mechanization) is becoming a part of the present trend in Taiwan agriculture.

When considering farm size relative to various socioeconomic characteristics and farm resources (Table 1), we found that as the farm size increased, the average number of resources increased. If the four ranges are condensed into

Table 1. Socioeconomic characteristics and farm resources of team chiefs according to farm size, SVPAs; 1974.

Socioeconomic characteristics & farm resources	0.5 ha or less	0.51 ha to 1.00 ha	1.01 ha to 1.50 ha	1.51 ha or more	All team chiefs
	(N=4)	(N=10)	(N=10)	(N=7)	(N=31)
	-----Average-----				
Age (yr)	39.5	51.4	51.3	46.3	48.7
Education (yr)	7.3	4.9	5.0	5.4	5.4
Family members	7.8	6.9	10.1	7.6	8.2
Family labor (hr/wk)	166.0	156.0	251.0	163.0	189.0
Power tiller	0	0.2	0.5	0.6	0.4
Water buffalo	0	0	0.7	1.0	0.4
Hogs	1.5	1.3	5.2	5.7	3.6

those with 1 ha or less and those with more than 1 ha, the latter had more family members who consequently spent more total hours of work in their fields and owned more farm animals such as hogs, water buffalo, chickens, and ducks. But from an intensive labor input per land area perspective; those families with 1 ha or less averaged 213.5 hours of work per week per ha, while those with 1 ha or more worked only 123.2 hours per week per ha.

As a group, the average number of farm work hours per week of the team chiefs' families during the summer (207 ha) was more than during the winter (172 ha). The farmers stated that although the longer summer days allowed for more field work, the heat impeded the work pace. The longer hours spent in the field during the summer would also indicate that there is more leisure time in the winter in which the farmers could attend special agricultural extension courses or engage in home handicraft types of enterprises, thereby increasing either their agricultural knowledge or their incomes.

Among the various crops, rice ranked first in both production area and number of growers. Twenty (65 percent) of the team chiefs grew rice. All the southern and central Taiwan team chiefs grew rice compared to only 35 percent of those in the north. However, all the team chiefs had some land in vegetable production throughout the year.

The five vegetables grown by the largest number of farmers were Chinese cabbage,* pai tsai,** common cabbage, spinach and leafy mustard, respectively. Pai tsai was the most commonly grown summer vegetable.

We found that team chiefs farming in the lowland SVPAs near Taipei City grow a wider range of leafy vegetables (averaging 6 types per year). The central, southern, and highland areas averaged three types of vegetables per year. The major exception, Hsilo in central Taiwan (averaging 7 types per year), had daily shipments to the Hwa Chiang Wholesale Market.

Ten (33 percent) of the team chiefs grew vegetables in screen houses,

* In this paper, the heading type of Chinese cabbage (Brassica pekinensis) is referred to as "Chinese cabbage".

** A non-heading type of Chinese cabbage (Brassica chinensis). The common name, pai tsai, is used.

especially during the summer typhoon season. Seven of these of farmers were in the northern SVPAs. The screen houses ranged in size from 0.1 ha to 0.35 ha with an average size of 0.19 ha.

Problems from the Team Chiefs' Perspective

Major problems in growing vegetables tend to vary widely from place to place. Through our interviews, we sought to identify those that the team chiefs felt were most prevalent.

Twenty-seven team chiefs* were asked, "What are your major problems in growing vegetables?" A shortage of fertilizer was considered to be the most important and immediate problem (78 percent), while fluctuating prices, a more persistent problem, was mentioned by 56 percent. When asked what their fellow members would consider to be problems, they felt that their responses would be about the same.

After this initial question the interviewer used a prepared list and asked each team chief about 'additional problems' that they had not mentioned. From that list, labor shortage, seasonal factors, and weeds received from 48 to 41 percent of the interviewees' response, respectively.

Whether the 'additional' problems referred to by the interviewer were simply not remembered, of less importance, considered to be beyond anyone's control, or perhaps just part of being a farmer cannot be determined by this approach. However, we were able to identify the 'problems' that definitely are not considered important to these vegetable producers such as inexperience, rice production, and the particular rotation system. Problems such as limited land, poor soil, and insufficient capital also were of less concern to the team chiefs.

The environmental problem of summer typhoons was a major reason for the SVPA program. In fact, typhoon damage during the summer months (May through September) directly affected 27 of the team chiefs' crops. Of the vegetables affected, pai tsai was most frequently and seriously damaged during the 1973 typhoon season. The extent of reported damage ranged from 20 percent to 100 percent of the vegetable crops of those farms affected. Further research on techniques to reduce the heavy rainfall damage to vegetables would definitely benefit the farmers. Reduction in damage would

* As the answers of four interviewees were not clear, the responses of only 27 team chiefs are considered for this question.

help stabilize the prices of those vegetables in the wholesale markets by making a consistent supply available.

Fifty percent of the team chiefs said labor limitations and twenty percent stated that their crops rotation system were the main reasons for not expanding the area under vegetable cultivation. If the expansion of the vegetable production area is a major criteria for the success of this program, the very real problem of labor shortage must be resolved first.

Farmers Association Responsibilities and Problems

The persons in charge of the local promotion of the SVPA program were usually from the TFA staff. Apparently their numbers and roles differed from place to place. The extension chief was generally responsible for the system's operation, and one or more extension agents supervised the daily assembly station transactions.

The PDAF has recently assigned young promotion-technical agents to several of the more important SVPAs near Taipei. This position seems to reinforce the technical input of the TFA related to the marketing component of this program, however, their actual role and responsibilities could be more clearly defined. Also a motorcycle should be provided to these technicians because it is an essential extension tool for today's active agricultural agent who is responsible for widely dispersed areas.

Several extension heads and managers of the TFAs that are directly responsible for a particular SVPA were asked what further incentives could stimulate an increase in vegetable production. They stressed guaranteed prices (such as that used by Taiwan's mushroom industry) and a larger fertilizer allotment.

In the two southern SVPAs, the TFA personnel cited high transportation costs and the seasonal unavailability of trucks as particular problems, whereas in the northern SVPAs, they mentioned price fluctuation and collective-marketing management difficulties. Other problems mentioned were the overflow of sea water into many fields in Shihlin and the lack of essential phosphorous and potassium fertilizers in Peitou.

Beneficial programs suggested by the TFA personnel included improving storage facilities, studying consumer demand in order to develop better farm production plans, and increasing the capacity of the target wholesale

market. The latter point entails selling consistent amounts and more types of vegetables, maintaining a competitive price, and increasing the number of buyers.

OBSERVATIONS and CONCLUSIONS

The overall "Specialized Vegetable Production Areas" concept has merit as a comprehensive approach to the inherent problems of vegetable production and marketing. These problems include: many widely dispersed farmers producing limited amounts of vegetables, mainly on a seasonal basis; high input cost requirements coupled with consistently high labor demands; crop susceptibility to excessive rain, wind, and heat with related insect, diseases, and weed problems; produce with a limited storage life, bulky in size and easily damaged during transport; and marketing systems with numerous types of middlemen and unpredictable, fluctuating prices. In summary, perishable vegetables are a very risky cash-crop.

The production component of this system appears to function well in terms of organization, continuous availability of technical support, supply of most production inputs, and the selection of areas favorable for vegetable production. In other words land, labor, and capital were available to some degree, although labor shortages must be given more attention.

While there is a feedback mechanism (communication linkages upwards from the farmer in the field to the program administrators) from production team members through their team chief to the TFA and then to the various organizing agencies, a lack of communications or an inability to act upon 'what is known' at the administrative level seemed evident at the time of the survey. A few simple examples of farmers' recommendations that had gone unanswered are: the continued over-supply of nitrogenous fertilizers to the mountain areas where the soil requires more phosphorus and potassium for vegetable production; the need for someone to be regularly assigned to each assembly station to record arrivals and be responsible for their security, enabling the farmer to return to his work after repacking his produce; and the need to either build a storage room for heavy-duty baskets adjacent to the assembly station or to have a large number of baskets brought to the station a few hours before the scheduled shipment time, instead of requiring each farmer to get them from the distant TFA's warehouse.

The marketing component of the system deserves further consideration.

Since this approach is in direct competition with other marketing agents such as the local merchants, the system must be more efficiently organized, have better economies of scale, and be more reliable in terms of competitive farm prices. Complications at the wholesale market level (e.g., insufficient demand) inhibit competitive or guaranteed prices. This collective marketing system cannot work without each SVPA's continual awareness of the Taipei market price per vegetable and some assurances that the farmers' vegetables will be purchased after being transported long distances. Again, the collective marketing idea is practical but without these and other prerequisites, it results in 'collective losses'. Likewise, restriction on the types and quantities of vegetables marketed may be necessary in the initial phases, but a strong market demand for a wide range of vegetables must soon evolve or the producers' risks will continue to be too great.

The SVPA strategy has a number of advantages over the existing vegetable marketing situation found in many countries. Avoiding the extremes of either total government control of the marketing system or of total control by a few powerful merchants, this approach can help create a healthy form of competition between the two. This should increase the supply for the consumer and the income for the producer as well as reduce the producer's risk. Another benefit is the accessibility of the national and international research institutes to the farmer. With problem-oriented research, they can identify current problems, conduct farm-level experiments in particular problem areas, and note the results of their suggested solutions. Likewise, new varieties and improved management techniques can be adapted quickly and assessed within these limited areas rather than on a whole country basis.

Two major developments have occurred since our visit to the SVPAs. Inaugurated in September 1974, the new "Market Communication System" organized by PDAF and based on a telecommunication network between key market and production areas, should significantly reduce the problems related to late or non-existent market information at the farm level. On December 1, 1974, the Hwa Chiang Wholesale Market (government operated), the Central Market (privately operated), and other smaller wholesale markets in Taipei City were

closed by the government, and all vegetables were then channelled through the Taiwan Area Fruit and Vegetable Transportation and Marketing Company operating at its large, modern facility in Taipei. This new marketing company will attempt to improve marketing efficiency, shorten the marketing channels, and form of transaction by managing the flow of vegetables into Taipei.

According to Dr. H. Y. Chen, Senior Marketing Specialist of JCRR, this change at the wholesale market level will help alleviate several of the marketing problems in the SVPA program. The collective marketing approach when extended to other TFAs has resulted in improved quality vegetables. The TFA's produce is usually among the first to be sold when the auctioning begins at 2:30 AM, whereas the produce from local shipments (approximately 75 percent of the total supply per day) takes considerably longer to sell. Disadvantages of the previous marketing system, i.e., underweighing, delinquent payment to shippers, and unknown prices, are eliminated. In addition, as the number of wholesalers increases, the influence of previously powerful merchants should be reduced.

An important question for an integrated approach, such as this SVPA program, which competes with the private marketing sector is: How and where should initial losses be absorbed so as to insure an efficient system for the long run "competitive" advantage? This question has no easy answer, yet it must be carefully considered. Similarly, questions of insured production plans or marketing quotas per participant are also critically relevant as are those concerning the enforcement and implementation of such measures. Without an assured price range and having no expectant price higher than the price in the local market, there is no realistic way to implement such production plans. For instance, we found that nearly two-thirds of the team chiefs still sold most of their vegetables outside the collective marketing system.

Another interrelated factor to consider in certain areas is the competition to the SVPA's collective marketing system from local cooperative marketing organizations or even various TFAs which already operate their own local vegetable markets.

Only a limited number of new varieties and cultural techniques have been introduced in the SVPA program. Improved varieties with higher yields and adaptability for summer season production (such as heat-tolerant varieties of

Chinese cabbage and tomato) can quickly be assessed for farmer acceptability within this framework. Progressive production team members would probably be willing to test innovative techniques and obtain the consensus of other farmers regarding the techniques and varieties.

A thorough assessment of the SVPA program's impact on vegetable production and marketing in Taiwan would require additional detailed studies such as that conducted by C. Y. Lin³. His evaluation, made after the program's first year of operation, was able to point out some of the initial problems and also suggested possible sources of action to resolve them. Our brief exposure can only raise more questions and help keep alive the interest in this very promising approach to an integrated system. Hopefully, further action-oriented experimentation with this system, complemented by research, can produce a viable example for other Asian countries, where serious vegetable production-marketing problems exist.

³C. Y. Lin, Economic Evaluation of Phase One of the Specialized Vegetable Production Area Program (in Chinese).