

SUAN SEMA: AN ILLUSTRATION OF CHANGES AND TRENDS IN THAI VEGETABLE PRODUCTION¹

by

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Suan Sema², the first intensive vegetable farming operation of its kind in Thailand—a project using modern methods and scientific techniques as well as introducing middle-latitude types of crops—originated under the leadership of a Thai prince who had a genuine interest, not only in experimenting with new crops and procedures, but also in helping to improve the role of the average farmer to produce vegetables and fruits in addition to rice.

The late prince, H.S.H. Prince Subha Svasti (known by intimate friends as Tan Chin), chose the site of Suan Sema for personal reasons. Between the mountains and the sea, 210 kilometers (138 miles) southwest of Bangkok (Insert map in Fig. 1), the site happened to be the spot where he landed during World War II when leading the British section of the Free Thai Movement—and originally it was not planned as a large-scale vegetable and fruit farming enterprise. At first, in 1953, he bought 1.6 hectares of cactus-covered land and searched for water. In the years following, additions of land—up to 100 hectares (250 acres or 625 rai)—were made and a variety of new crops were introduced, such as lettuce and cantaloupe about ten years ago. The Prince himself wanted to try these experiments, the most recent ones being with various herbs.

Some of the problems arising in this enterprise are common to any experiment in the production and marketing of middle-latitude crops in a tropical environment while others are related to the site and situation of Suan Sema. The first problem was to supply water

1) This article is adapted from the paper presented by Dr. Smith in Calcutta at the symposium "Humid Tropics" during the 21st International Geographical Congress, November-December, 1968.

2) The name of the farm is derived from the natural vegetation which is thorny shrub, grasses, and cacti. "Sema" is the Thai word for cactus, in this case, *Opuntia Elatior* (Cactaceae), and "Suan" means garden in Thai.

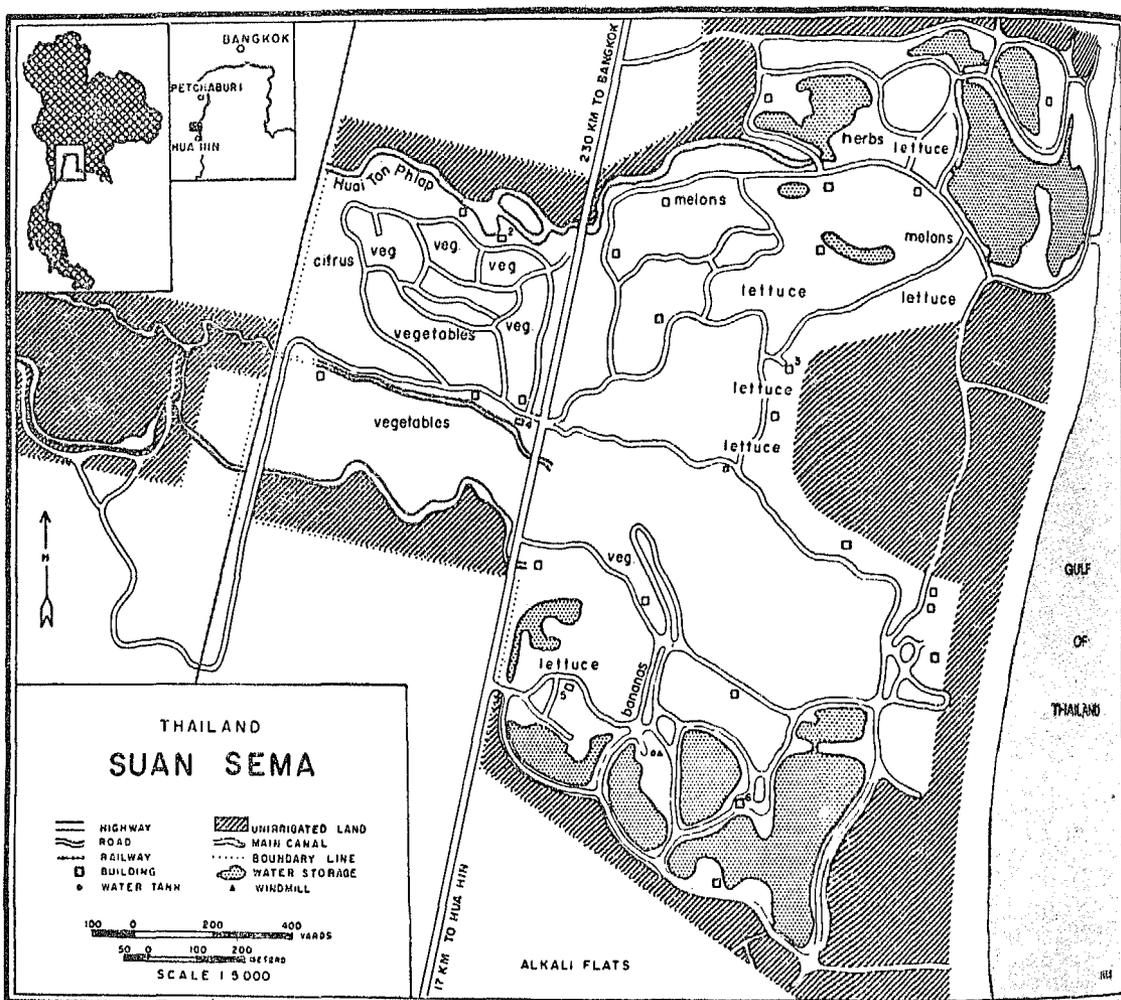


Fig. 1 Site and Layout of Suan Sema.

Identification of buildings on the map: (2) sugar mill; (3) lettuce-drying shed; (4) office and roadside retail-sales shop; (5) lettuce nursery and lettuce-drying shed; (6) owner's residence. Other buildings are homes of workers and guest houses.

adequate for plant growth the year around—the usual problem in any savanna-type climate (see chart, fig. 2). Rainwater is stored in dammed lakes and streams descending from the 1,000-meter mountain range to the west are tapped. In addition, the Petchaburi Dam, completed in 1958, furnishes a year-round supply of water. Only the main storage ponds and the main water-ways are shown on the map in Fig. 1. All land except that indicated as “unirrigated land” on the map has a dense and intricate network of water-ways, or, as in the case of the lettuce beds, has a network of pipes for overhead sprinkling. In the areas where cantaloupe and asparagus are raised, hand watering is often done.

Two problems associated with irrigation at Suan Sema are concerned with alkali accumulation on the lower lands and with the occasional inundation of the cultivated land by salty tidal waters. The solution for the first is achieved by proper drainage through “Alkali Flats”, a small estuary opening on the Gulf of Thailand and for the latter by a sea wall with a gateway at the mouth of the main stream, Huai Ton Phlap.

No adequate solution has been found for losses due to flash floods during heavy downpours of rain. In November, 1963, flood water destroyed about 80 per cent of the vegetable crop and in October, 1965, the sea gateway was washed out.³

For the mid-latitude crops, the coconut palm provides protection from the sun's rays in two ways. Tomatoes, asparagus, and herbs grow under the trees in natural shade and lettuce, one of the main crops at Suan Sema, grows under thatched shelters made of dry coconut fronds. While the site of Suan Sema near the sea is an asset in reducing extremely high mid-day temperatures, this site poses a problem of fog and high humidity which results in mildew attacking the cantaloupe plants. The Prince has found that in combating mildew, the use of fungicide is effective and less expensive than covering the plants with plastic sheeting.

3) According to the Soil Survey Division, Report SSR-33-1965, “Report on the Hup Kapong Development Project Area (Phet Buri Province),” Bangkok, pp. 4-5, a series of “seepage dams” is recommended. Such low-cost dams would temporarily hold water until it goes underground, increasing ground reserves of water to be pumped up later for irrigation purposes.

The problem of infertile soils, as might be expected under the climatic and vegetative conditions at Suan Sema, requires the application of much fertilizer. As shown in Table I, the sandy clay loam has little or no humus, is low in phosphate, but high in potassium, and is slightly acid. Cow manure, gathered from the surrounding cattle farmers, is the chief source of humus. For example, to raise lettuce, good soil is "made" or developed with proper amounts of blended commercial inorganic fertilizer and manure plus pesticides by carefully building up the beds to a height of 30 centimeters in four different layers. For cantaloupe-production, certain other minerals are added to the soil for improving the taste of the melons.

Since there is no rotation of crops such as is customary in humid mid-latitude farming, the soil at Suan Sema is rotated each time new beds are built up. By pushing the top half of a bed to the right and the lower half to the left, the bed or mound is then re-built by reversing the layers. This shifting of the soil may be done by tractors or shoveled by hand. Furthermore, the use of insecticides in the soil makes it unnecessary to rotate crops in order to prevent disease.

In addition, there is a relative change in the seasonal site of plant raising. During the dry season asparagus plants grow between earthen ridges so as to have the best access to moisture. When the rainy season begins, the roots are covered with a ridge of earth through which the new shoots come up. Thus adequate drainage and air in the soil is maintained during the rainy season.

TABLE I
SOIL AT SUAN SEMA

Soil Group — Solodized solonetz soils, the Nong Khae Series.

Soil Analysis —

Soil Sample	Organic Matter %	Phosphorus (P) ppm.	Potassium (K) ppm.	pH	Texture
Surface Soil (depth of 10 cm)	1.26	5.2	332	6.1	Sandy Clay Loam
Lower Soil (depth of 30 cm)	0.91	2.8	123	6.7	Sandy Clay Loam

Source: Soil analysis was made at the Ministry of Agriculture and the classification at Kasetsart University, Agronomy Department, February, 1966.

The Prince learned much about disease control and the special techniques necessary for cantaloupe and lettuce production from the literature and from conversations with friends and agricultural experts from California and also from representatives of foreign organizations and commercial companies, such as Esso, that deal in pesticides. He did not seek the help of Thai government agricultural personnel because he lacked faith in their competence; though, when the Prince got into some difficulty, then agricultural people sought to help him. However, these Thai experts are handicapped, as are agricultural specialists throughout the tropics, by the dearth of scientific research on plant diseases. As might be expected, research into vegetable and fruit production in Thailand lags far behind that in export crops such as rice, corn, rubber, and kenaf. The prevalence of disease is especially severe in the raising of the normally extra-tropical crops because of the change in environment. For instance, melon plants which are always raised from imported seed are susceptible to red spider attack but the red spider disease is not troublesome in California.

Labor specialization, a characteristic of the modern plantation—the “factory farm” as it exists in California and around many metropolitan centers today⁴—is highly developed at Suan Sema where teams of workers are responsible for a certain crop. Lettuce production illustrates the complexity of the programmed activities involved. Huge bulletin boards record activities such as fertilizing, spraying, and weeding which are scheduled for each of the 1,400 numbered beds of various types of lettuce. Since five weeks are necessary for the maturing of transplanted lettuce, the beds are grouped into five plots, with each worker harvesting one plot and transplanting one plot each week in a five-week cycle.

The labor supply at Suan Sema is entirely local and Thai in nationality. This situation is in contrast to that in the peripheral areas in Thailand’s municipality where the also-indigenous Chinese are the traditional market gardeners.⁵ These specialized workers live

4) See, for example, Gregor, Howard F., “The Changing Plantation,” *Annals of the Association of American Geographers*, LV (June, 1965), p. 236.

5) This labor situation at Suam Sema is also in contrast to that on the three major vegetable farms in the Pak Chong area along the Friendship Highway

either on the premises or commute from surrounding villages and Ban Cha-am, the district headquarters. The rest of the 150 laborers—those hired hands that clean up weeds and repair roads—are usually farmers available only during the months when they are not busy in their own rice padis.

Processing activities at Suan Sema are very simple and consist mainly of preparing and packing vegetables and fruits. For instance, freshly-cut heads of lettuce are laid out to cool and dry at least six hours before being packed into baskets ready for trucking because mildew is likely to occur if this is not done. A bamboo-thatch shed with wide shelves for this purpose stands close at hand in each of the two main areas of lettuce production. (See # 3 and # 5 on map)

Distance and travel time to reach market are problems of location that appear to have no further solution at the present time. Trucks leave Suan Sema daily at about 5:00 p.m. to travel on Thanon Phet Kasem, a section of the Asian Highway, and arrive five hours later at the Distribution Center in Bangkok, having consumed much of the time in passing through the congested municipal area. Railway transportation is even less satisfactory because it lacks a suitable schedule and because even express passenger trains take six hours to reach Bangkok. Transportation-wise, a choice of a garden site closer to the Bangkok market would have been more economical. And yet Bangkok has no cool, moist uplands suitable for the production of crops like lettuce, radishes, and carrots, which are close at hand, such as other large cities of Southeast Asia have.⁶ Because of this unfavorable location of the large Bangkok market, the Prince's experiments with cool-weather crops is especially significant for Thailand.

northeast of Bangkok where most laborers are northeasterners from as far away as Nakhon Phanom (on the Mekong River), tend to be temporary, and are hired under contract to remain at least 18 months in order that on-the-job training is worthwhile.

Furthermore, it is in contrast to workers in mid-latitude vegetable gardens where work is seasonal and migrant labor is depended upon for the harvesting of crops.

- 6) For example, Saigon has the plateau of the Dalat area, 125 miles away, and Manila has Baguio at 240 miles but in Thailand the Chiang Mai Valley is 400 miles to the north and it is only 300 meters in elevation. The valley supplies the Bangkok market with potatoes and dry onions.

The problem of cost production is revealed in Table II where one crop of lettuce is used as an example. Obviously, large inputs of capital—especially for fertilizer and insecticide—and labor per unit of area are required for the production of sanitary vegetables.

Market prices are also a problem because first-class hotels and the procurement office for military and commissary personnel purchase vegetables under a system of contract bidding. The result is that the producer of sanitary vegetables receives only slightly higher prices and occasionally even a lower price than on the open market. Since vegetables can become contaminated during transportation and handling if they are sprayed with impure water, a new regulation provides that produce procured by the U.S. Armed Forces be washed and packed in an approved establishment. The effect of such regulations upon production costs and market prices remains to be seen.

In facing these many problems, the Prince was not only a leader in experimenting with new methods of production and marketing on his own personally supervised farm but he was involved in experiments in raising crops in other parts of the Kingdom, e.g. strawberries in the Chiang Mai Valley where the cool season is slightly cooler than at Suan Sema. He was also involved in the shipping of fresh pineapple (waxed and unrefrigerated) to Japan from the Chon Buri area southeast of Bangkok.

The influence of the Suan Sema enterprise was extended to the immediate vicinity when the Prince helped a group of farmers to diversify. Under his encouragement and supervision, they added quick-growing vegetable crops to their one-crop rice program and thus extended their work period and their cash income base over the whole year. In 1966, the Thai-Israel Agricultural Development Project took over the Prince's cooperative project and is expanding the program so that it will eventually benefit many more farmers in the Ban Cha-am area.

But more wide-reaching has been the Prince's contribution in inspiring young Thai nationals, mainly Kasetsart University graduates, to initiate their own vegetable farms. This is happening mainly in two areas—along the Friendship Highway between Saraburi and Khorat and on the rice lands of the Bangkok Plain. Several aspects of

the natural environment of both these areas differ from that of Suan Sema. Along the Highway near Pak Chong, about 175 kilometers from Bangkok, the rolling uplands averaging about 330 meters in elevation are well drained and the limestone-derived soils are much richer than at Suan Sema; this is principally a corn-cotton cash-crop area. Three farmers producing only vegetables intensively cooperate in the marketing of their produce, sometimes filling out their orders with vegetables from the neighboring field-crop farmers.

But nearer to Bangkok markets, and more recently established, are several farms situated on the lowlands where annual flooding requires the growing of plants on high mounds of earth for good drainage. Here, one couple, both Kasetsart graduates, are seeking to help their neighbors in an enclave of Muslim farmers to diversify in much the same manner as the Prince helped the farmers of Ban Cha-am. These graduates all knew the Prince personally and some had conducted visitors from abroad on tours to Suan Sema.

Also, some of the Chinese-Thai operators of gardens on the outskirts of Bangkok, in an attempt to produce safe vegetables, are switching to the application of commercial inorganic fertilizers during the last 18 days before harvest. Thus, the production of sanitary tropical and mid-latitude vegetables in Thailand, first conceived in the mind of the Prince, has led to an increasing participation of nationals in these special agricultural activities.

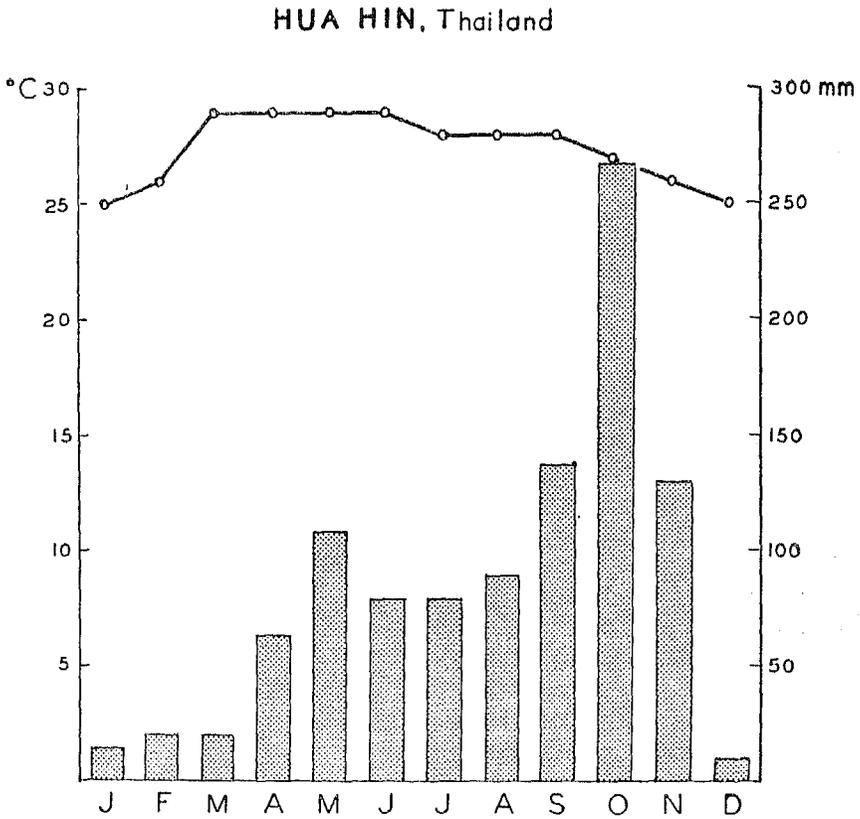
Editor's Note :

M.R. Pimsai Amranand, Tan Chin's daughter, points out that most of the information in this article is now historical since, after Tan Chin's death, these experiments stopped because they proved to be too costly.

TABLE II
COST OF PRODUCTION for One Crop of Lettuce (Five Weeks)

	Baht Per Rai* Per Month	U.S. \$ Per Rai* Per Month
Non-cash Payment (Price of land; taxes; capital; depreciation of tractors, tilling & plowing machines, trucks; depreciation of buildings, water pumps, sprayers, pipes; unhired labor; packing damage; damage to vegetables while hauling.)	2,261.00	\$ 113.00
Cash Payment Items	3,568.00	\$ 178.00
Direct Labor (Making lettuce beds; roofing; planting; production of seedlings; weeding; fertilizer application.)	970.00	\$ 48.50
Direct Material (Cow manure; duck & chicken dung; dried grass; pesticide; fertilizer & lime; bamboo for roofing.)	11,163.00	\$ 63.42
General Overheads	230.00	\$ 11.50
Harvesting Costs & Transportation Costs (Picking & packing; hauling to packing shed; hauling to market; bamboo baskets)		
Indirect Labor and Materials (Ditch maintenance; cutting grass; making fence; repairing bridges, pumps, pipes, spray heads.)	130.00	\$ 6.50
Distribution Costs (Drivers, headmen, laborers, vegetable cases)	650.00	\$ 32.50
Growing Cost and Maintenance, if machinery is used	3,568.00	\$ 178.00
Total Cost per Rai per Month	5,829.00	\$ 291.45
Total Receipts per Rai per Month, if the output is 1,125 kilograms and the price of lettuce is 6 baht per kilogram.	9,222.00	\$ 461.10
Net Profit per Rai per Month	3,393.00	\$ 169.65

* One rai equals .1578 of a hectare or .3945 of an acre.



SOURCE: THAI METEOROLOGICAL DEPT. 1940-1960

Fig. 2. Climatic Chart for Hua Hin, a coastal town 17 kilometers south of Suan Sema. The total annual precipitation is 1,018.4 mm. (41 inches).



Fig. 3 Natural vegetation at Suan Sema just beyond farm limit



Fig. 4 Seed bed with slat cover for lettuce to be transplanted

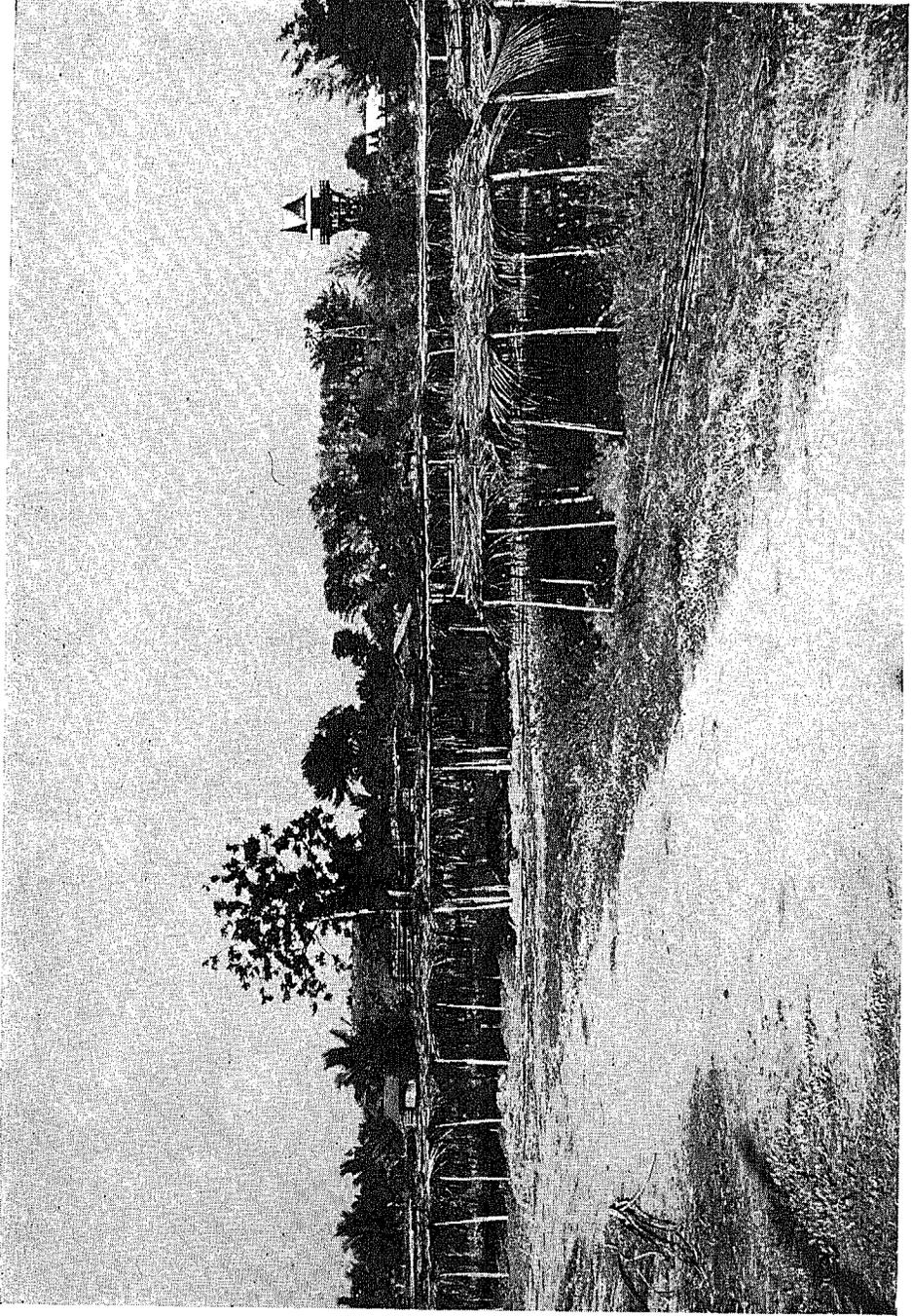


Fig. 5 Lettuce beds with dried coconut leaf cover

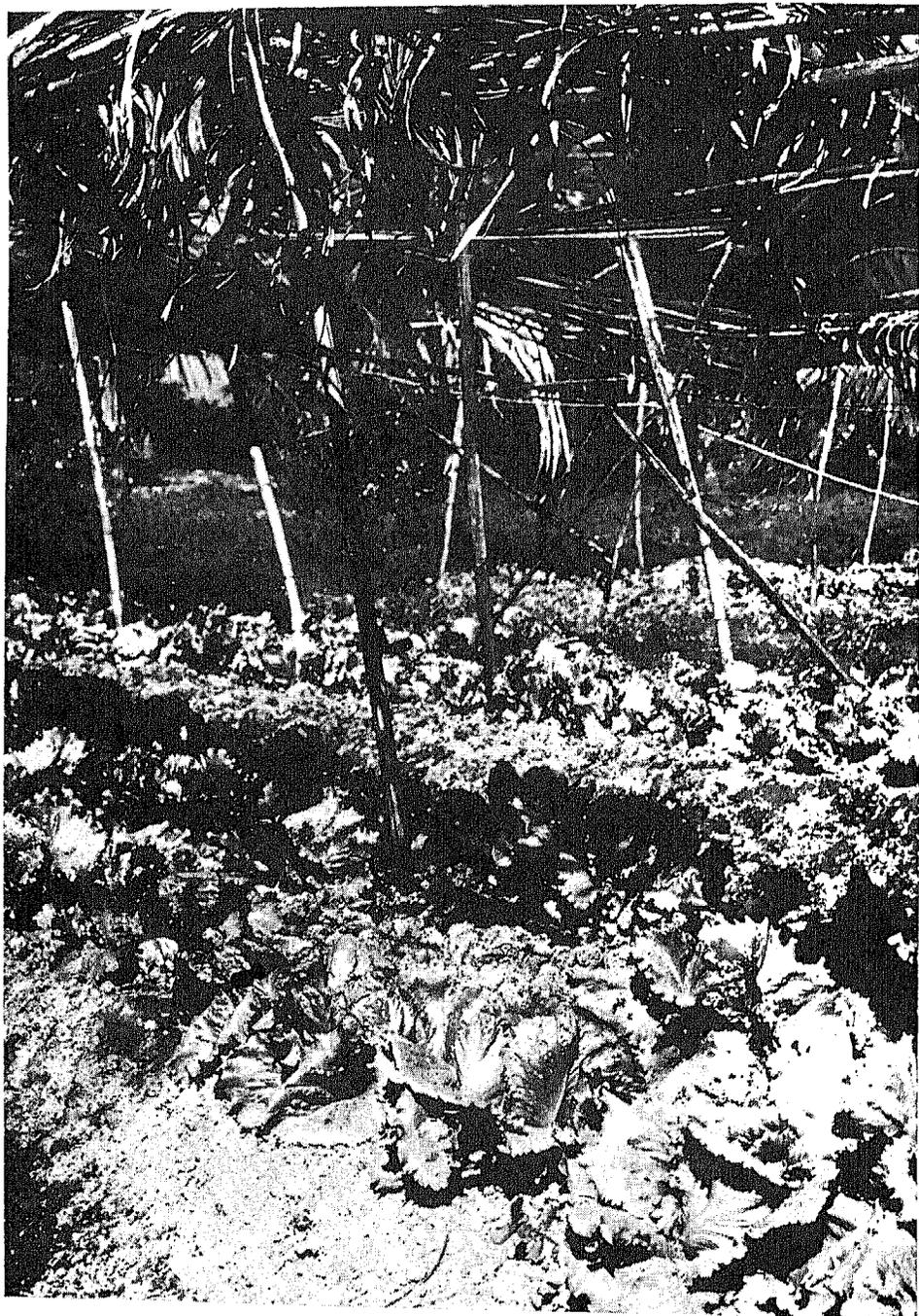


Fig. 6 Lettuce bed with thatch cover

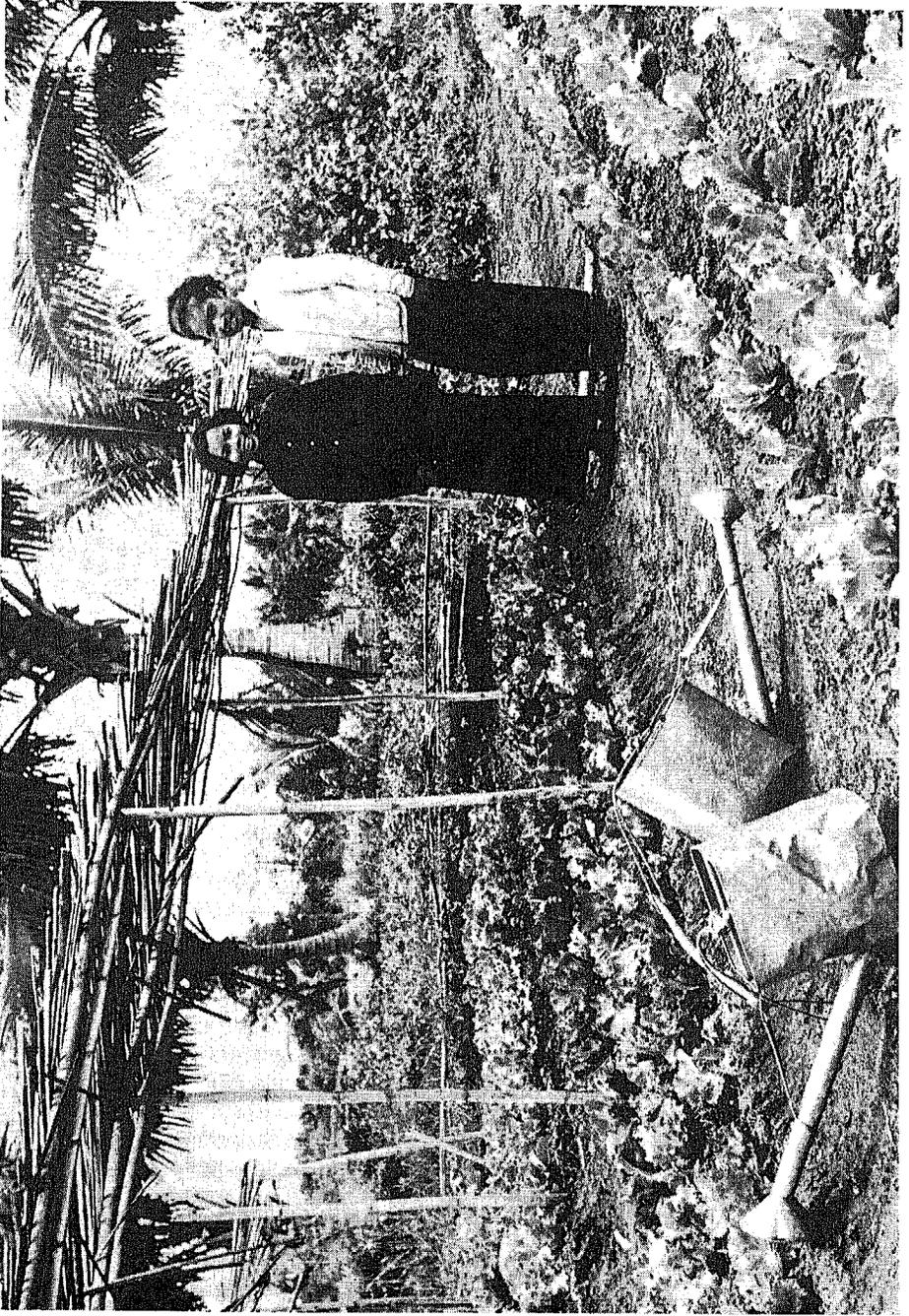


Fig. 7 Lettuce production

