Vegetable Soybeans on Guam

by

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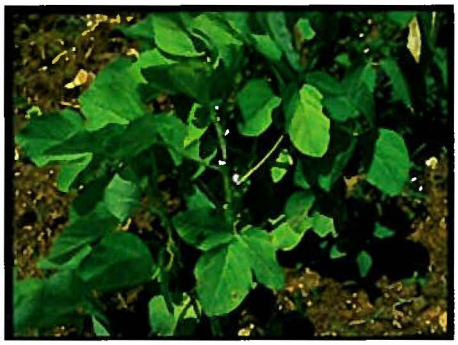

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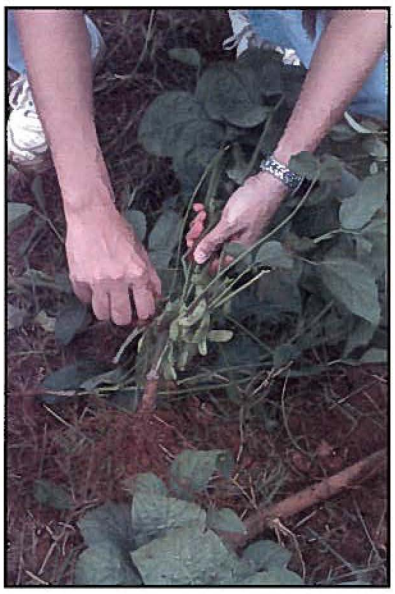
THE VEGETABLE SOYBEAN PLANT

What is a vegetable soybean?

- **Green vegetable soybean (*Glycine max* L.), also called "Edamame," is a leguminous plant.**

There are two types of soybeans; grain soybeans and green vegetable soybeans. Vegetable soybeans have larger pods and seeds, which turn bright green after blanching.



Which part is edible?

- **Vegetable soybean pods are boiled in salt water and then the seeds are eaten.**

Vegetable soybeans are harvested when the seeds have reached full size and the pod is still green. It tastes slightly sweet and is a favorite snack like peanuts. Many oriental people eat vegetable soybeans as a snack and a vegetable dish. They also consume them as an appetizer with beer and sake.

Soybean pods

Edible seeds

Nutritional value

- **Vegetable soybean is rich in protein and vitamins A, C, and E.** Vegetable soybean with its 40% protein, 20% fat (without cholesterol), 30% carbohydrate, 5% crude fiber, and 5% ash (on dry weight basis) is nutritionally comparable or better than peas. It is also fairly rich in calcium, iron, phosphate, potassium, ascorbic acid, and vitamin E.

How to grow vegetable soybeans?

- **Vegetable soybeans are harvested about 50-90 days from planting, depending on the cultivar and planting season.**

  Vegetable soybean can be grown any time of a year including the rainy season in most areas of Guam. For more details, refer to the section on **"Suggested Cultural Practices."**

How to market?

- **Vegetable soybean pods are marketed as a fresh vegetable or a frozen food.**

  Vegetable soybean production can be supported by the local market or export. Locally, some Japanese and Korean restaurants include "Edamame" on their menu. After harvest, vegetable soybean can be sold to a processor for freezing or it can also be shelled and sold to the local market as a vegetable.

  Many Asian consumers prefer the fresh vegetable soybean with pods attached to the stem, which brings a premium price. In Japan, domestic production cannot meet the demand, and currently Japan imports about 50,000 tons of frozen and fresh vegetable soybean from Taiwan, China, Thailand, Vietnam, and Indonesia.

SUGGESTED CULTURAL PRACTICES

Choice of Land

- Select a well-drained field. Vegetable soybeans grow in a pH range of 6.0 to 7.5.

Planting Date

- Vegetable soybeans can be planted any time of the year on Guam.

Land Preparation

- If dry, irrigate the field to plow a day prior to sowing, apply complete pre-plant fertilizer, and incorporate in soil.

Seed Selection

- Select good quality seed with a high germination percentage. Avoid damaged, weathered, or discolored seeds. Before planting a field, it is recommended to perform a germination test to determine the quality of the seed.

Root Inoculant

- To stimulate growth and increase yields, seeds can be treated with bacterial root inoculants (*Bradyrhizobium japonicum*), or the bacterial inoculum is applied as a granular to each row at the time of planting.

Fertilizers

- If the soil is fertile with good organic matter content (2.5% or greater) and with effective and sufficient rhizobia, then vegetable soybeans should produce a good crop without side-dressing. The use of fertilizers is, however, recommended on soils in which the available N, P and K are low. Remember: to produce 1.0 tons/acre of green beans, the plants must absorb 176 lbs of N.

a. If availability, cost, and practicality permit, the application of 4 tons/acre of well-decomposed compost, preferably animal wastes is recommended.

b. Chemical fertilizers: Fertilizer application should be based on soil tests.

	N	P_2O_5	K_2O
		— lb/acre —	
I. Pre-plant application	20 - 30	60	80
II. Side-dressing			
i) At flower stage (50% flowered)	20	-	25
ii) At fruit initiation stage	20	-	-
Contribution of 4 tons/acre compost	50	100	200

Note: After the pre-plant application of fertilizer, it should be incorporated and mixed well with the soil by harrowing. Irrigation should be applied following side-dressing of fertilizer. A rain of 2 inches or more within one or two days following fertilizer application is sufficient to replace irrigation. Avoid applying fertilizer directly on the plant or very close to the roots since they will damage the plant.

Planting Methods

- **Example of planting layout**

	Example 1	Example 2
a. Spacing between rows	1.5-2 ft	3-4 ft
b. Spacing within row	2 inches	1.5 inches
c. Planting method	Dibbling*	Dibbling
d. Planting depth	1-2 inches	1-2 inches
e. Amount of seeds per 100 ft	6 oz	8 oz

* Dibbling=Making a hole in soil

Irrigation

- Proper soil moisture is essential for good, uniform germination. Heavy rain and irrigation soon after planting and before germination, may result in seed rot and poor plant stand. Irrigation is essential, especially (if there is insufficient moisture) at flowering and pod-filling stages. Soil cracking and plant wilting should be, as much as possible, avoided. Irrigation is necessary after fertilizing.

Diseases and Pests

- Based on soybean trials in 1996-97, vegetable soybeans do not appear to have any major disease problems on Guam. Losses caused by the most virulent pathogen, *Corynespora* spp. was not greater than 10%.

There are several insect and other pests of soybeans on Guam. Slugs are the major pest when plants are young if the field is infested. Pod borer is also a serious insect problem. Other arthropod pests include whitefly, leafminer, aphids, mites, and stink bugs. Apply the recommended pesticides to control these pests. Discontinue use of pesticides after the seeds begin to fill the pod, at least two weeks prior to harvest.

Harvest

- Vegetable soybeans are ready for harvest when the pods are green and the seeds have completely filled the seed cavity in the pod. By removing a pod at random and viewing it against the sun, it is possible to see if the pod is filled out. Plants are either pulled or cut at ground level so that the pods at the lower nodes are recovered. Harvesting is done preferably in cool hours of the early morning or late evening. Harvested plants are gathered and placed in the shade. They are then stripped of pods. The stripped pods are kept moist by frequently misting with water. They are then sorted into damaged and unqualified pods. Exposure to sun will result in change in the quality of the beans.

Storage of Harvested plants before shipping

- If possible, store the soybean plants in a refrigerated container after harvest. Pods and leaves are left attached to the stem.

Processing

- Sorted pods are cleaned by spraying water. The pods are then blanched for 1.5 min. at 98°C then passed through ice-cold water. The pods are sorted again to remove all unqualified pods. Then they are taken through a quick freezer and quick frozen at -40°C. The pods freeze without forming any large ice particles and, thus, suffer only minimal damage to the bean tissue. The frozen pods are stored in freezers until shipped in refrigerated containers. The seeds can also be shelled from the pods and seeds can be sold just like peas or they can be frozen, packed, and sold. Seed-shelling machinery is available.

Saving Seeds and Seed Storage

- To collect seeds, harvest between yellow stage and full maturity and then dry them in the shade. Avoid allowing seeds to remain in the field until full maturity since the pods may shatter. Store the seeds in a cool, dry place. Seed viability rapidly decreases over time. It is not advisable to store them at room temperature for more than a month. Store them in a refrigerator. Some plant diseases can be carried in or on seeds; therefore, save seeds only from healthy plants.

Soybean plant in crop rotation

- **Vegetable soybeans can be planted in the field as a nitrogen-fixing crop in a crop rotation. They can play an important role in sustaining agricultural productivity on Guam.**

Crop residues left in the field after harvest can be plowed under like a green manure crop to add nitrogen and organic matter to the soils. The residue left after the seeds are removed can be used as feed for cattle and other animals.

Example: Soybean-Cucumber-Soybean-Tomato

MARKET SURVEY

Objectives

The survey was conducted by phone to restaurant and bar owners in June, 1997. The objective of the survey was to find out if people are familiar with vegetable soybeans ("Edamame") and to assess market demand.

Findings

1. There were a total of 41 responses in this survey.

2. 73% of the people surveyed were familiar with "Edamame."

3. 34% of the restaurants and bars offer "Edamame" on their menu.

4. The 90% of those who offer "Edamame" in their menu would buy locally grown fresh vegetable soybeans.

5. Their current sources of the vegetable soybeans come from
    a. wholesalers
    b. local retail outlets
    c. self-import

6. They would like to purchase the products as
    a. Freshly picked
    b. Frozen
    c. Boiled (brine solution)
    d. Boiled (plain)

7. They would like to buy from wholesalers but some will buy from farmers.

8. The 66% of those who knew "Edamame," but didn't offer it to their customers had reasons such as

    a. Not popular to customers
    b. Too expensive to buy
    c. Inconsistency in supply
    d. Do not know enough about the product
    e. Poor quality of supply

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