# PRODUCTION GUIDE FOR GUAVA

## General Description and Economic Value

Guava (*Psidium guajava* Linn.) locally known as "Bayabas", is a popular fruit in the Philippines and found indigenous to the American tropics. It is one of the most gregarious fruit tree species of the Myrtaceae family which has a great potential for extensive commercial production because of its ease of culture, high nutritional value and popularity of processed products. It is usually grown in open areas, second-growth forests, and backyard or as part of a mixed orchard.

Botanically, guava is a small tree that reaches a height of up to 33 feet; with spreading branches; smooth, thin, copper-colored bark that flakes off showing greenish layer beneath; trunk reaches a diameter of 25 cm. Leaves are evergreen, borne opposite, short-petioled, oval to oblong-elliptic, somewhat irregular in outline, 7-15 cm long and 3-5 cm wide, leathery, with conspicuous parallel veins, downy on the underside, and aromatic when crushed. Flowers are white, faintly fragrant, borne singly or in small clusters in the leaf axis, 2.5 cm wide, with 4 to 5 white petals which quickly shed-off, and about 250 white stamens tipped with pale-yellow anthers. The tree excels better than some other fruit trees in productivity, hardness and adaptability.

Its fruit exudes strong, sweet, musky odor when ripe; round, ovoid or pear-shaped, 5-10 cm long with 4 or 5 protruding floral remnants (sepals) at the apex; an excellent source of vitamin C, which is substantially higher than what is found in citrus. It is also a good source of vitamin A and other important elements. The fruit contains large amount of citric, lactic, malic, oxalic and acetic acids and trace amount of formic acid. The green mature guavas can be utilized as a source of pectin, which yield somewhat higher and better quality pectin than when ripe. The ripe fruit is usually eaten as dessert; processed into jellies, jam, paste, juice, baby foods, puree, beverage base, syrup, wine, dehydrated guava powder, marmalade, catsup, ice cream

and other products. It can be eaten sliced with cream and sugar and as ingredient in cakes and pies. The sour guava fruits are used in local dishes like “sinigang”.

Moreover, many parts of guava tree have medicinal and commercial uses. The bark and leaves are rich in tannin (10% in the leaves on a dry weight basis, and 11-30% in the bark), and also used in childbirth to expel the placenta. Leaves can be made into tea and astringent decoction to cure stomach ache; also act as vermifuge; treat toothache when chewed; pounded leaves may be used to relieve rheumatism; can also be used for dyeing and tanning. Its wood is moderately strong and durable indoor and useful for carpentry and turnery. It is also a good fuel wood, and as source of charcoal.

In spite its potentials, no existing record for big planting and production of guava in the Philippines has been reported.

Table 1. Food Value Per 100 g of Edible Portion of Guava Fruit.

| Nutrient Content | Value |
|---|---|
| Calories | 36 to 50 |
| Moisture | 77 to 86 g |
| Crude Fiber | 2.8 to 5.5 g |
| Protein | 0.9 to 1.0 g |
| Fat | 0.1 to 0.5 g |
| Ash | 0.43 to 0.70 g |
| Carbohydrates | 9.1 to 10 g |
| Calcium | 9.1 to 17 mg |
| Phosphorus | 17.8 to 30 mg |
| Iron | 0.30 to 0.70 mg |
| Carotene (Vitamin A) | 200-400 I.U. |
| Thiamine | 0.046 mg |
| Riboflavin | 0.03 to 0.04 mg |
| Niacin | 0.6 to 1.068 mg |
| Vitamin B3 | 40 I.U. |
| Vitamin G4 | 35 I.U. |
| Ascorbic Acid | 56 to 600 mg (ripe fruit) |

**Soil and Climatic Requirements of Guava**

Guava can be grown in almost all types of soil but thrives best on well-drained clay loam to sandy loam soil rich in organic matter with pH ranging from 5.0 to 7.0; elevation from sea level to 1,600 feet above sea level. Field observations indicate that

heavier fruits are produced in lower elevations. Guava can be economically grown at elevations where pineapple, macadamia, coffee, papaya, mango, and banana are profitably grown. However, areas of 1,800 feet above sea level are not suitable for growing guava.

It prefers dry climate with well-distributed rainfall throughout the year, although it is somewhat drought tolerant. For fruit production, it is recommended that guava trees are not planted in areas with high wind velocity. It is advisable to plant windbreaks that do not have much lateral growth along the border areas where the prevailing wind velocity ranges from 15 to 24 km per hour.

**Guava Varieties and Strains**

1. **'Supreme'** – a guava variety from Florida; generally high yielding and produces a thick white flesh fruit of good quality when eaten as fresh fruit or used for processing. Fruit shape is ovate with distinct corrugation, 6.3 cm long, 5.5 cm in diameter and weighing 65 g. The tree is moderately prolific and regular bearing. When fully ripe, the fruit is bright yellow in color. The flavor of the inner pulp is sweet but the outer skin is slightly bitter and possesses a distinct strawberry wine odor, which is slightly astringent. It is moderately resistant to anthracnose and fruit fly but susceptible to leaf folder and aphids.

2. **'Red Indian Rolfs and Ruby'** – fruit is ovate, 6.5 cm long, 5 cm in diameter with thin, smooth, medium green skin, weighing about 75 g. The fruit pulp is about 10 mm deep and red when fully ripe and has less pronounced corrugation. It is large seeded, sparsely populated but very sweet, juicy, crunchy and possesses a strong aroma. The tree is very prolific, regular bearing but easily attack by bats, though moderately resistant to anthracnose and oriental fruit fly.

3. **'Seedless variety'** – this variety has a fleshy layer, which is thick with almost no seed cavity.

4. **'Goyena Quezo de Bola' (NSIC 02 Gv-01)**-this is NSIC guava variety approved in 2002, a prolific yielder. It bears fruits with yellowish green skin color, finely smooth texture with pleasant aroma. Each fruit weighs about 575 g.

5. **Vietnam Guava** – bears medium to big size fruits of about 200 to 1,000 g, slightly oblong to ovate; greenish yellow skin with ripe, creamy-white flesh, moderate amount of seeds, very sweet flavor; heavy bearer; good keeping

quality; excellent when eaten fresh but could also be used for pies and other processed products.

6. **Hawaiian Strains -** these are usually sour type guavas which are excellent raw materials for processing .

## CULTURAL MANAGEMENT PRACTICES

### Nursery Practices

**Seed germination and care of seedlings** – guava seeds should be thoroughly cleaned and air-dried right after extraction from the fruits. It is necessary to treat the seeds with fungicides to prevent damping off.

Seeds should be planted as soon as possible to ensure high germination. Germinate seeds in beds or boxes using a mixture of fine sand and garden soil as growing medium. Sow them evenly in furrows 2-3 cm apart and lightly cover them with soil 0.5-1.0 cm deep. Water regularly preferably in the morning to keep the soil moist.

Protect seedlings against pests and diseases by spraying insecticides and/or fungicides. Organic pesticides are highly recommended. A month after emergence or when the first true leaves have formed, transplant seedlings in individual containers or polybags using clay loam soil mixed with compost as growing medium. Partial shading is necessary until the seedlings have established. Seedlings are ready for field transplanting or used as rootstocks when they are six months to one year old.

**Propagation** – guava is commonly multiplied by seeds. Howver, it can also be propagated asexually by root cuttings, marcotting, budding, grafting and inarching.

a. **Seed Propagation** – guava is usually propagated by seeds. Guava seeds remain viable for many months. They often germinate in 2 to 3 weeks but may take as long as 8 weeks. However, this method will not produce true-to-type plants. Variability in seedlings can be minimized by hand self-pollination. Honeybee (*Apis mellifera*) is one of the major pollinators of guava. The amount of cross pollination ranges from 25.7 to 41.3%.

b. **Root cuttings** – this is the oldest method of asexually propagating guava. Cut about 12-20 cm long roots and induce to sprout by placing flat on the bed and cover them with about 2 inches of fine soil, which must be kept moist to promote germination.

c. **Budding –** an efficient vegetative propagation for selected varieties of guava. Both the patch budding and forkert techniques are recommended. The diameter of seedling stock and budwood should be from 15-25 mm. Budwood should be mature, bark no longer green. Condition the budwood

by defoliating the leaves of selected branches 10-14 days before removing the branches for use as budwood. During this period the buds become more enlarged and grow more readily after budding.

d. **Marcotting or Air layering** –low branches of guava are bent down, with about 12-15 cm of the branch is covered with soil and kept damp to induce root formation.

e. **Stem cuttings** – stem cuttings are made from the young portion towards the end of the branches. These are rooted using sandy loam soil medium in a nursery house or shed. Guava stem cuttings treated with Indole Butyric Acid(IBA)or Napthalene Acetic Acid (NAA) proved to be successful for rooting and produce numerous and vigorous roots.

**Land preparation**

a) **Plowing and harrowing** - For backyard planting, land preparation may consist of primarily digging holes about 50 cm wide and 50 cm deep. Place kerosene can of compost before planting. For open areas, plow the field 1-2 times alternated by harrowing to completely pulverize and expose the soil, and eradicate weeds. It is best prior to the onset of wet season.

b) **Staking** – Staking is making at 5 to 7 m apart which will serves as guide where to dig holes. About 277 guava seedlings is needed to plant a hectare. The exact planting distance is decided according to variety, soil fertility, and availability of irrigation facilities.

**Planting**

The best time to plant is at the onset or during the rainy season. Prior to planting, place compost in holes. Also, harden the guava seedlings at least a week before planting by exposing them gradually to sunlight. During planting, carefully remove the potting containers or plastic bags, seeing to it that roots are not disturbed; carefully place guava seedling on dug hole, cover it with fine soil until to the base of the seedlings. Water the seedlings right away if soil moisture is not sufficient.

**Weeding and Cultivation**

Shallow cultivation around the base of the plant is recommended to prevent root injury. Ring weed plant to eradicate competing weeds.

**Irrigation**

While guava can tolerate dry spell, supplementary irrigation during prolonged dry periods is desirable to provide adequate water supply for the growing guava tree.

Irrigation has been shown to increase fruit production by increasing fruit size when applied during fruit development.

**Mulching**

Cover the base of the growing guava plants with dried leaves or rice straws to minimize growth of weeds and to conserve moisture.

**Fertilization**

Guava trees should be kept healthy through application of fertilizers from the time they are planted until they continue to produce fruits. In the absence of definite information regarding the fertilizer requirements of guava in the Philippines, apply about 100 to 500 g ammonium sulphate around the base of tree twice a year. Be sure to cover the newly applied fertilizer with fine soil. Apply fertilizer one month after planting and 6 months thereafter or towards the end of the rainy season. Increase the amount of fertilizer applied as the trees grow bigger. At the start of fruiting, each tree should be given about 300-500 g complete fertilizer, preferably one containing more nitrogen and potassium per application. At the peak of fruit production (about 10-18 years, apply 2 kg or more of complete fertilizer per tree; split application may be required to sustain growth and development as well as fruit production.

**Pruning**

Pruning is a must in guava production. This is done to have the desired form or shape of the guava tree such as spreading or symmetrical or limited crown or to keep number of branches. However, when the trees have established a strong framework and started to bear fruit, little training is required. The root sprout; low-lying branches, disease infected and other dead branches, have to be eliminated. It should be pruned and trained within first 3 to 4 months after field planting to increase yield and to reduce the total cost of field operations.

**Intercropping**

While the guava trees are not yet fully productive, intercropping of cahs crops like vegetables, legumes, root crops and other annual crops are recommended. Aside from added income, it will also prevent the growth of weeds and loosen the soil in the orchard. However, this intercrop should be stopped once the main crop becomes too crowded.

**Pests of Guava**

a) **Oriental fruit fly** (*Daucus dorsalis* Hendel) is one of the major insect pests of guava. Its larvae burrow through the ripe fruits making them unfit for human consumption. To control this pest, bag the guava fruits, and harvest

as soon as fruits are ripe. Infested fruits must be collected and burned or buried to destroy the larvae and pupa of the insect pest.

b) **Aphids** (*Aphis gosypii* Glover) feeds on young growth causing the curling of leaves. Aphids are fed upon by lady beetles and by maggots of syrphid flies. They are also parasitized by minute parasitic hymenopterans.Spray with appropriate insecticides (like Malathion) to control the pest.

c) **Mealy Bugs and Scale Insects** - Common white mealy bug (*Lanococcus lilacinus* Ckll) attacks and draws plant sap from the young shoots and fruits of guava though its actual damage is economically insignificant, however, the ants that it attracts are nuisance when picking the fruits.

d) Green Scale Insect (*Coccus viridis* Green) is a soft scale insect that infests the young shoots, mostly the leaves. The use of entomogenous fungi is effective control during rainy season. Likewise the use of small wasp parasite, *Coccophagus tibialis* is also recommended.

e) Moth (*Zuezera coffeae* Nietn) of pink caterpillar bores into young upright growing stems tunnelling on its center where it feeds and develops; stem may suddenly die or break off. Infested stem may be saved by inserting leaf midrib into the tunnel and pushing it in as far as it would go to kill the caterpillar inside. If infested twigs have broken, spear or kill the larvae.

What about white fly? Many guava trees are infested with this insect

**Diseases of Guava**

a) **Anthracnose or Canker** caused by *Gloeosporium psidii* G Del. The fungus produces two kinds of symptoms: formation of cankerous spots throughout the fruit surface which are circular, dry and raised; in some areas, however, infected fruits become undersized misshapen, hard and dry.

Typical sunken soft lesions usually produced by anthracnose can be observed on ripe fruits. Under moist conditions; pinkish masses of spores can be seen on lesion surface. It also causes dieback of plants. On the leaves, the disease produces angular, rusty brown spots of varying sizes, usually 2-5 mm in diameter. During the rainy season, the blight on shoots is a common symptom.

No definite control measure is recommended although spraying of fungicide can be done.

b) **Spotting of Leaves and Fruits** caused by the parasitic alga, *Cepaleuros spp*, is rather severe on some types and varieties of guava in humid areas. Spray copper fungicide to control this disorder.

c) **Wilting** caused by *Glomremella psidii* Sheld is another disease known to attack guava. The disease causes mummification and blackening of immature fruits.

**HARVESTING**

Guava fruits mature in 90-150 days after flowering. Currently, guava fruit are handpicked. Harvesting guava requires care and usually handpicked. Harvesting of ripe guavas cannot go on for more than 2 to 3 days during the height of the season because of potential losses from insects and over ripening of fruits.

**Postharvest**

The picked fruit should be placed in a cool dry place away from the sun. To maintain quality, it is best to process the fruits soon after harvest. The puree can be chilled, frozen, or aseptically packaged. If the fruits need to be stored overnight, the fruit boxes should be places in a covered and well-ventilated area.

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