Handbook on

Good Agricultural Practices (GAP)

Guava

Overview

- Varieties
- Culture Practices
- Good Agricultural (Production) Practices
- Crop
- Quality
- Integrated Pest Management
- Harvesting
- Post Harvest Management
- Processing and Exports

Global Guava Production

- Guava is a hardy, long-lived tree and a prolific bearer.
- There are around 400 varieties of guava cultivated in the world, but only a few dozen varieties are commercially cultivated.
- Guava cultivation is very profitable and requires not much care.
- India is the world’s largest producer of Guava, producing 25M tons of guava every year.
- India contributes to 45% of the world’s guava production followed by Indonesia, China, and Mexico.

Indian Guava Production Scenario

Production (000 Tonnes) (2021-22)			
Rank	**State**	**Production**	**Share(%)**
1	Uttar Pradesh	983.59	21.78
2	Madhya Pradesh	776.75	17.20
3	Bihar	434.41	9.62
4	Andhra Pradesh	335.11	7.42
5	Haryana	271.18	6.00
6	Punjab	219.85	4.87
7	West Bengal	203.56	4.51
8	Chhattisgarh	187.04	4.14
9	Gujarat	175.33	3.88
10	Karnataka	167.48	3.71
11	Maharashtra	132.57	2.94
12	Assam	129.34	2.86
	Others	499.96	11.07
	All India Total	**4516.17**	**100**

Source: NHB/ Agriexchange.apeda.gov.in

Nutritional Value and Composition

- Guava contains pyridoxine (Vitamin B6) and niacin (Vitamin B9), which aid to increase mental capacity. It increases flow of blood in brain and improves cognitive performance.
- Guava is an anti-aging fruit. It improves the appearance of the skin. It has astringent properties.
- Guava leaves can be used to treat toothaches, mouth ulcers, and inflamed gums at home.
- Guava is a stress buster because of its magnesium content.

Constituents (per 100g pulp)	Guava
Moisture (%)	81.7
Protein (g)	0.9
Fat (g)	0.5
Carbohydrate (g)	13.4
Fibre (g)	5.2
Energy (k cal)	57
Ca (mg)	10
P (mg)	28
Fe (mg)	0.3
Thiamine (mg)	0.03
Riboflavin (g)	0.3
Niacin (g)	0.4
Vitamin C (mg)	200-300

Yield

- Yield varies by variety, cultivation tactics, location, and orchard management.
- Grafted trees can yield up to 350 kg per tree, whereas seedling plants can yield up to 90 kg per tree
- In ideal conditions, a 3-year-old Lucknow 49 tree may produce somewhere between 55 and 60 kg.

Guava Varieties & Characteristics

Some Popular Guava Varieties

- Lucknow 49*
- Allahabad Safeda
- Apple colour
- Pear Shaped
- Behat Coconut
- Safeda Jam**
- Kohir Safeda***
- Arka Mridula (soft-seeded)
- Arka Amulya (soft-seeded)
- Banarasi
- Chittidar
- Baruipur Local

* The most popular variety, also called ‘Sardar’ guava

** Hybrid: Allahabad Safeda X Kohir

*** Hybrid: Kohir X Allahabad Safeda

L-49 (Lucknow-49)

- A prolific bearer, greenish yellow with milky white sweet pulp and rough surface.
- Shell is thick, containing fairly less soft seeds in the inner portion of pulp.
- Medium keeping quality due to less no. of seeds.
- It is suitable for table purpose and yields about 25t/ha.
- Highly popular in Maharashtra and Andhra Pradesh.

Allahabad Safeda

- Tree is medium in height (5.8-6.5m) with vigorous branching and dense foliage.
- Fruits are medium in size (180g), round in shape with few seeds. Fruit is white fleshed with good keeping quality.
- This is the most famous variety grown in Uttar Pradesh for table purpose.

Guava Varieties & its Characteristics | agropedia (iitk.ac.in)

Banarasi

The variety attains a height of 4.0 to 5.5 m with a broad crown and fruits are round, light-yellow in colour. It is mainly cultivated for table purpose.

Chittidar

- The Chittidar is similar to the Safeda except that it has many pinkish red dots of the size of a pinhead on the surface of the fruit.

Harijha

- The variety attains a height of about 3.5 to 4.5 m and is sparsely branched. Fruits are round, greenish-yellow in colour with a sweet taste.

Red Fleshed

- Tree attains 3-5m height. The branches are spreading with roundish oval fruit, which has yellowish skin with pink colour flesh.

Guava Varieties & its Characteristics | agropedia (iitk.ac.in)

1	**Arka Poorna** The plants are semi- vigorous in growth habit with prolific bearing, hence suitable for medium to high density planting. The fruits are round, medium to big in size (200-230 g) with smooth, shiny  pericarp. The pulp is firm, white with thick outer rind, good flavour, TSS (10-120 B) , ascorbic acid (190-198 mg/100 g) , medium soft seeds (10 .0 to 12.0 kg /cm2) and keeping quality. It is a dual purpose variety suitable for both table and processing (osmotic dehydration of rind)
2	**Arka Rashmi** Semi-vigorous trees, dual purpose variety, red pulp with low oxalate content (28.3 mg/100 g FW), Medium in lycopene (5.0 mg/100 g) and medium seed hardiness (9.0 kg/cm^2), rich in ascorbic acid(235 mg/100 g), good TSS (12 to 14 ^{0}Brix) and flavor 

https://iihr.res.in/fruit-crops

3	**Arka Kiran** The plants are semi-vigorous, fruits are medium in size (230g) with dark red pulp, rich in lycopene (7.5mg/ 100g) and with medium soft seeds(9kg/cm^2) 
4	**Arka Mridul** Plants are medium in 200 g), white seeds, rich in TSS (12 to keeping  semi-vigorous, size (180 to pulp with soft pectin, good 13 o B) and quality.

https://iihr.res.in/fruit-crops

Culture Practices

Good Agricultural Practices (GAP)

Using disease free and quality plant material of improved cultivars.	Adoption of high planting density.	Proper canopy management.
Integrated nutrient and water management.	Keeping proper load of fruits on the tree.	Timely control of pests and diseases by adopting IPM/ IDIPM practices.

Climate

- Guava farming is possible in both subtropical and tropical climes, up to a height of 1500 metres above mean sea level.
- Guava is tolerant to high temperatures. However, plants are more susceptible to cold and dry environments, hence they require more care.
- Guava can tolerate drought conditions better than other tropical fruits, but an even distribution of 100 – 200 cm of rainfall per annum is beneficial for good growth.
- Rainfall during the harvesting period deteriorates the quality of fruits.
- Waterlogging adversely affects the growth.

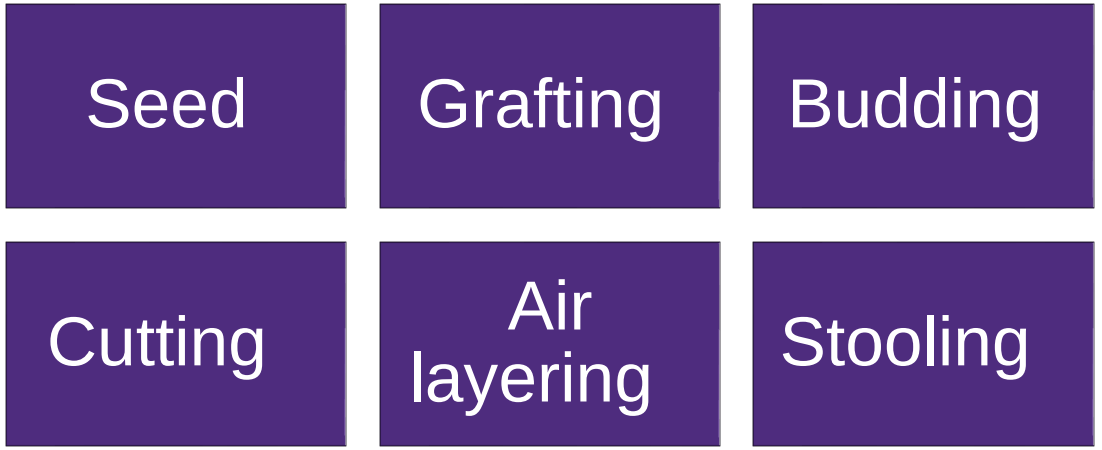
Soil

- Guava is a hardy plant that thrives in a variety of soil conditions.
- Heavy clay to very light sandy soils are suitable for cultivation of guava.
- Guava is grown in a wide range of soils of pH from 4.5 – 8.2.
- Guavas cannot be grown on alkaline or saline soils.
- Because guava is surface-rooted, the best soil is well-drained loamy, deep, fertile, friable soil with rich topsoil.
- It is, nevertheless, susceptible to waterlogging.

Soil & Land Preparation

- The ideal planting distance is 15′ x 15′ (about 193 trees/acre) or 6 m x 6 m (with 112 plants per acre).
- Prior to planting, the land should be treated with lime.
- The planting holes should be at least 1.0 cu. ft. in size, depending on the firmness of the soil.
- Where the earth is extremely firm, to break up the subsoil, deep cultivation using tractor tines is recommended.
- Where the water table is high, drains have to be planned.

Ways of Propagation



- For commercial guava growing, **air layering** has proven to be the most successful method of propagation.
- **Stooling**, or mound piling on nursery beds, is the most cost-effective method of rapid multiplication.

Irrigation

- The guava tree does not require much watering.
- Dry locations and light soils may require hand watering during the summer.
- Winter watering helps reduce fruit drop and increases fruit size.
- In their early stages they require 8-10 irrigations per year and between May and July, full-grown and fruit-bearing trees require weekly watering.

Good Practices

Drip irrigation saves up to 60% of water and benefits by significant increase in the number and size of fruits.

Make a saucer-shaped, half-moon, or V-shaped basins for keeping moisture in the soil following pre-monsoon showers.

Fertilizer Application

Both inorganic fertilizers and organic manure are beneficial in guava cultivation.

- For one year old plants 100g nitrogen, 100g potash and 40g phosphorus is applied doses in two splits (June and September) except for phosphorus.
- The doses are increased by 100g nitrogen, 100g potash and 40g phosphorus every year until the plants are 5 years old. Half of the nitrogen is given in the form of organic manures
- Thereafter a dose of 500g nitrogen, 500g potash and 200g phosphorus is applied yearly.
- If the trees are deficient in zinc, the trees are sprayed with 0.34 kg slaked lime and 0.45 kg $ZnSO_4$ (Zinc Sulphate) dissolved in 16 gallons (72.74 l) water. The number of sprays is based on the level of the deficit.
- Pre-flowering sprays of 0.3% $ZnSO_4$ and 0.4% Boric Acid to guava crop boosts fruit size and yield.

Weed Management and Intercropping

- Manual weeding is better.
- Mulching twice a year discourages weeds and conserves moisture.
- Spray of Gramoxone is effective in weed management.
- Plow soil twice a year (once in October, next in January) for effective management of guava orchards.
- Intercropping can be done with a combo of vegetables, legumes, and plantation crops.
- Cabbage, cucumber, cauliflower, pineapple, papaya, beans, cowpea, and peas are good choices.

Training and Pruning

- **Training**
  - Fruit quality and yield are improved by training.
  - Training provides a productive foundation for the tree, with robust branches capable of bearing a high-yielding crop.
  - 30 cm or less shoots from the ground are cut off, and the centre is allowed to be clear.
  - Allow for the growth of four scaffold branches.
  - Maintain a wide enough angle between the stem and the branches to allow sufficient sunshine to reach the centre.
- Light pruning is done once a year to keep the tree's framework in good shape and encourage the emergence of new branches.

Growing Seasons in India

Area	Growing Seasons
Northern India	April-May and August-September
Western India	February-March, June-July, and October-November
Eastern India	April-May and September-October
Southern India	April-May and August-September

Flowering Seasons

Flowering pattern	Flowering period	Fruit ripening period	Preference
Ambe Bahar	February – March (spring)	July – September (monsoon)	Not preferred much due to poor quality fruits
Mrig Bahar	June – July (monsoon)	November – January (winter)	Most preferred due to excellent quality fruits
Hasth Bahar	October (autumn)	February – April (spring)	Usually practiced in South and West India. Fetches good prices.

Crop Stage-wise IPM (Integrated Pest Management)

Pests

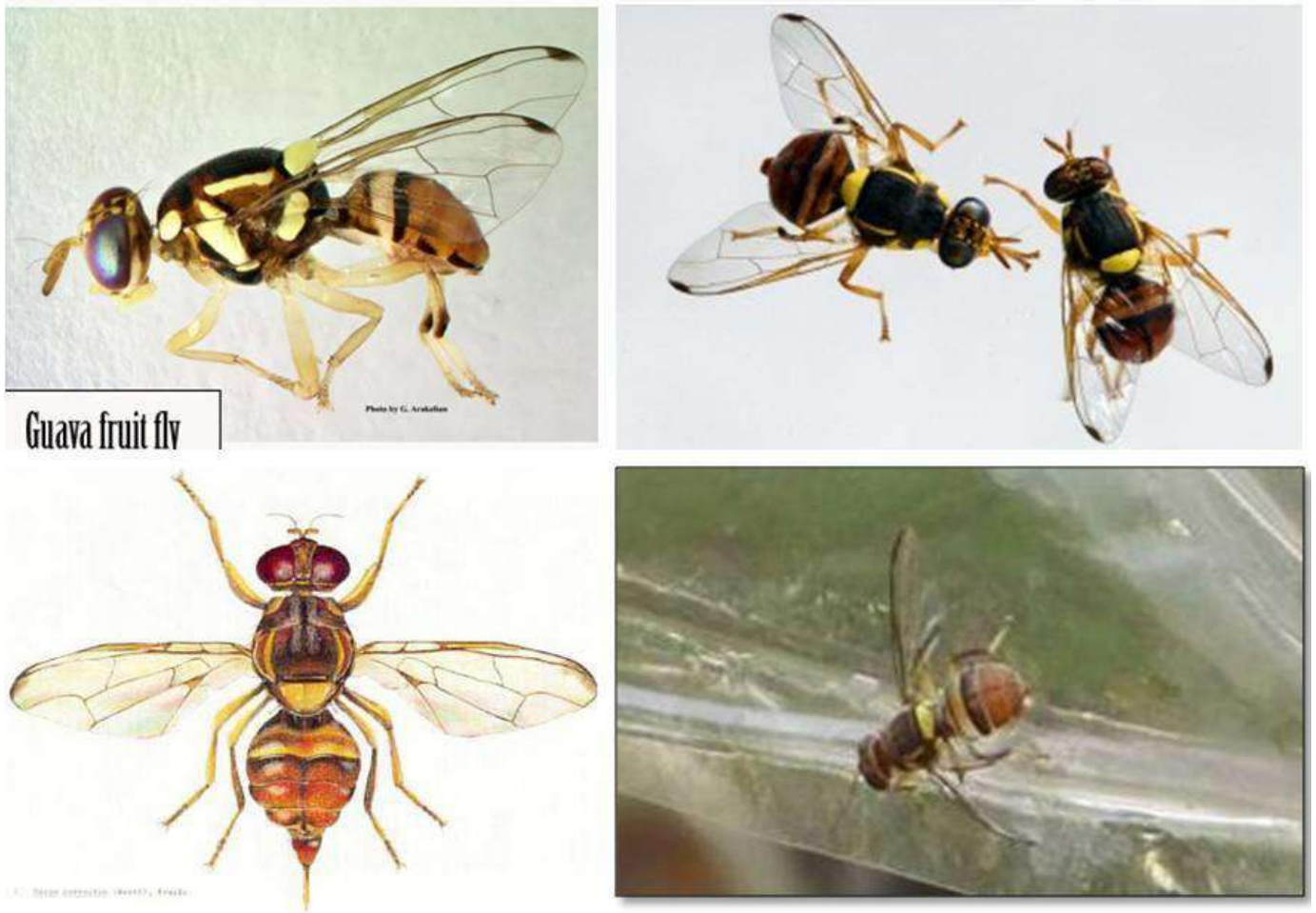
Scale insect

- A serious problem caused by flat, green insects that seem like scales cling to plants, stems, and fruits.
- **Remedy:**
  - Spray a mixture of fish oil rosin soap, methyl demeton, and dimethoate in a crude oil emulsion or water.

Pests

Guava fruit fly

- A dangerous pest that induces fruit dropping.
- **Remedy:**
  - Pluck and burn the infested fruits.
  - Spray 0.5 ml phosphamidon and 2 ml malathion per litre of water.



Guava Fruit Fly

Pests

Mealybug

- Tiny oval-shaped insects having a white waxy surface.
- These establish underneath leaves and in branches, sucking sap from young plants. This has a significant impact on yield.
- **Remedy:**
  - Dimethoate, methyl parathion, or monocroptophos can be sprayed.
  - Thimet, malation, or aldrin can be used to treat soil.
  - Block the upward movement of nymphs on plants by covering the plant base with polythene fabric.

Mealy Bug

Diseases

Guava wilt

- A serious fungal disease that causes yellowing of leaves, followed by drying, wilting, and dying.
- More serious in alkaline soils and during monsoon.
- **Remedy:**
  - Remove dry and wilted parts.
  - Drench with Brasicol at trunk base.
  - Spray Bavistin at earliest infection stage.
  - Injections of 8-Quinolonol Sulphate is effective.

Diseases

Anthracnose

- Causes spots on leaves and fruits.
- **Remedy:**
  - Remove affected parts.
  - Spray Dithane, Oxychloride, or Difolatan.
  - To control this disease in post-harvest fruits, dip them in Aureofungin and Thiabendazole solutions.

Symptoms of Anthracnose on Guava Fruit

Diseases

Fruit canker

- It decreases market value of fruits, as the disease disfigures them.
- **Remedy:**
  - Dip harvested fruits in *Ocimum sanctum* (tulsi) leaf extract.
  - Or wash them with 1200 ppm Aureofungin.
  - Spray 0.2% Dithane Z-78, 0.3% Difolatan, and 1% Bordeaux mixture.

Diseases

Stem canker

- Infected stems crack and produce lesions. Stem tissues collapse and the twigs wilt.

Cercospora leaf spot

- The affected leaves develop water-soaked brown patches.
- **Remedy:**
  - Spray 0.3% Copper Oxychloride or lime sulphur at 1:30 ratio.

Nutritional disorder

Bronzing

- It is a nutritional disorder that happens due to deficiencies of phosphorus, potassium, and zinc.
- It occurs because of poor soils or poor cultivation and management practices.
- **Remedy:**
  - Apply NPK, Zinc, and Boron in recommended doses.

Pre-Planting

Common cultural practices

- Timely sowing should be done.
- Field sanitation, rogueing
- Destroy the alternate host plants
- Square system of planting with a spacing of 6m x 6m and pits of 1x1x1m size dug during summer season and kept open for controlling soil born pests.

Nutrients

- Apply manures and fertilizers as per soil test recommendations
- Pit should be filled with mixture of top soil and FYM in the ratio of 1:1.
- 15-20kg of well rotten FYM + 1.5kg single super phosphate per pit

Pre-Planting (contd.)

Weeding

- Plough the field before planting to destroy existing weeds in the field.
- Summer ploughing is helpful in destroying weed seeds and rhizomes in the soil.
- Adopt stale seed bed technique

Pests and Diseases

- Ploughing the field before digging the pits.

Planting

Common cultural practices

- Use healthy, certified and weed free seeds.

Nutrients

- Application and thorough mixing of 500g SSP, and 1 kg Neem cake per pit.

Weeds

- Remove existing weeds in and around the pits at the time of planting.
- Mulching with organic or biodegradable material
- Apply *Trichoderma viride/ harzianum* and *Pseudomonas fluorescens* for treatment of seed/seedling/planting materials in the nurseries and field application (if commercial products are used, check for label claim. However, biopesticides produced by farmers for own consumption in their fields, registration is not required).

Planting (contd.)

Pest & Diseases

Cultural control:

- **Clean cultivation:** Keep basin clean.
- **Soil health:**
  - Maintain proper moisture and aeration in soil.
  - Avoid water logging.
- Moderate to heavy **pruning** to remove disease affected, broken, crisscross branches, water sprouts, suckers and opening canopy to improve light penetration.

Mechanical control:

- Infested/ infected young plants should be uprooted, burnt and replaced with healthy saplings

Vegetative stages

Common cultural practices

- Destroy crop debris
- Avoid water logging
- Avoid water stress
- Enhance parasitic activity by avoiding chemical spray, when 1-2 larval parasitoids are observed

Common mechanical practices

- Use light trap @ 1/acre and operate between 6 pm and 10 pm
- Erecting of bird perches @ 20/acre for encouraging predatory birds such as King crow, common mynah etc.

Common biological practices

- Conserve natural enemies through ecological engineering
- Augmentative release of natural enemies

Vegetative stages (contd.)

Nutrients

- Green manuring during rainy season.
- Grow leguminous crops or vegetables as intercrops during the first three years of planting, provided irrigation facility is available.
- Fertilizers should be applied based on soil test values and recommendation for the agro-ecological regions.
- Apply fertilizers after first pre-monsoon shower (June) for rainy season crop and in first week of September for winter season crop.

Vegetative Stages (contd.)

Nutrients

Fertilizers should be applied based on soil test values and recommendation for the agro-ecological regions.

For one-year old plants apply 100g nitrogen, 40g phosphorus 100g potash in two splits (June and September) except phosphorus.

Increase the dose by 100g nitrogen, 100g potash and 40g phosphorus every year until the plants are 5 years old.

Thereafter a dose of 500g nitrogen, 200g phosphorus and 500g potash should be applied yearly. Half of the nitrogen should be given in the form of organic manures.

Vegetative Stages (contd.)

Weeds

- Green manuring during rainy season.
- Grow leguminous crops or vegetables as intercrops during the first three years of planting, provided irrigation facility is available.
- Remove weeds by using tools before flowering.

Mulching and Intercropping

- Mulching helps in conserving moisture, controlling weeds and improving the fruit quality.
- Mulching can be done either with black polyethylene sheet or with organic materials like dry leaves, paddy straw, etc.
- Timely inter-culture should be done.
- In the initial years of planting regional recommended intercrops should be grown.

Vegetative Stages (contd.)

Pest & Diseases

Aphid infestation

- **Cultural control:**
  - Collect and destroy the infested plant parts
  - Maintain adequate aeration by proper training and pruning

- **Biological control:**
  - Conserve predators such as ladybird beetles i.e. *Scymnus, Chilomenus sexmaculatus,* preying mantids, green lacewings, etc.
  - Release first instar larva of *Chrysoperla carnea* @ 15 /flowering branch (four times) at 10 days interval from the time of flower initiation

Mealybug infestation

- **Cultural control**
  - Collect and destroy the infested plant parts.
  - Remove other hosts.
  - Deep ploughing of the field.
  - Overlapping and overcrowding branches should be pruned

- **Biological control**
  - Conserve parasitoids such as *Aenasius advena, Blepyrus suturalis, Spalgis epius* etc.
  - Release *Cryptolaemous montrouzieri* beetles @ 10/tree.

Flowering and Fruiting

Nutrients

In bearing orchards, green manure crops like sunn hemp, green gram, cowpea etc., are raised and incorporated into the soil during the monsoon period.

Avoid fertilizer application during flowering time.

For bearing trees apply 500g nitrogen, 200g phosphorus and 500g potash every year. 600 g N, 300g P and 400 g K

If required, apply micronutrients in case any deficiency is observed.

Spraying of 4g Zinc Sulphate + 2g Boric acid per litre of water and urea 2% during fruit develop.

Flowering and Fruiting

Fruit Drop

- In guava production, fruit drop can be a source of concern. Due to a variety of environmental and physiological conditions, the decline can be as high as 45-65 percent.
- Fruit drop reduction using **Gibberlic Acid (GA)** spray is successful.

Flowering and Fruiting

Weeds

- Remove weeds from basins around the trees by hand weeding before manure and fertilizer application followed by mulching with organic materials.
- Control weeds between rows by shallow cultivation and grow the regional recommended intercrop/ cover crop.
- Inter row space should kept weed free by light cultivation and using green manuring or inter cropping with leguminous crops.

Flowering and Fruiting

Pests

Fruit Fly

- **Cultural control**
  - Collect and destroy fallen and infested fruits
  - Tillage of tree basin helps in checking the pest population as the pupae and hibernating larvae are destroyed by natural enemies.
- **Biological control**
  - Conserve parasitoids such as *Opius compensates, Spalangia philippinensis, Diachasmimorpha kraussi* etc.

Bark Eating Caterpillar

- **Cultural control**
  - Detect early infestation by periodic monitoring.
  - Keep the orchard clean and healthy to prevent infestation.
  - Remove and destroy alternate host, silk cotton, other hosts and severely affected branches of the tree.
- **Mechanical control**
  - Scraping the loose bark to prevent oviposition by adult beetles.
  - Hook out the caterpillar from the bore hole and kill them.
  - Insert cotton plug soaked in kerosene or petrol into the holes and close them with mud.

Flowering and Fruiting (contd.)

Pests

Castor capsule borer

- **Cultural control**
  - Detect early infestation by periodic monitoring.
  - Keeping basin clean.
  - Maintain adequate aeration by proper training and pruning
  - Pomegranate should not be cultivated close to guava as this is the most preferred host of this pest.
  - Collect and destroy the infested fruits regularly.

- **Mechanical control**
  - Prune the affected parts of the plant and destroy.
  - Use light trap @ 1/acre and operate between 6 pm and 10 pm

- **Biological control**
  - Conserve parasitoids such as *Trichogramma chilonis* (egg), *Tetrastichus* sp.(egg), *Telenomus sp.* (egg), *Chelonus blackburni* (egg-larval), *Carcelia* sp. (larval-pupal), *Campoleti chlorideae* (larval), *Goniophthalmus halli* (larval), Bracon sp. (larval) etc.
  - Conserve predators such as *Chrysoperlazastrowii sellimi*, coccinellids, King crow, common mynah, wasp, dragonfly, spider, robber fly, reduviid bug, preying mantid, fire ants, big eyed bugs (Geocoris sp), pentatomid bug (Eocanthecona furcellata), earwigs, ground beetles, rove beetles etc.

Flowering and Fruiting (contd.)

Pests

Pomegranate / Guava Butterfly

• **Cultural control**
  • Cover fruits with paper bags.
  • Remove and destroy the affected fruits.
  • Pomegranate should not be cultivated close to guava as this is the most preferred host of this pest
  • Collect and destroy the infested fruits regularly.
 	
• **Mechanical control**
  • Remove weeds of *compositae* family
  • Prune the affected parts of the plant and destroy them.
  • Detect early infestation by periodic monitoring Install light trap @ 1/ acre to monitor and mechanical collection of insects
 	
• **Biological control**
  • Same as castor capsule borer

Flowering and Fruiting (contd.)

Pests

Tea mosquito bug

- **Cultural methods**
  - Maintain proper sunlight in the plant canopy by adequate pruning.
  - Collect and destroy the damaged plant parts.
  - Do not interplant guava with crops that are host for *Helopeltis* bugs, such as cotton, tea, sweet potato, cashew and mango.

- **Biological control**
  - Conserve predators such as *Mallada sp., Oxyopes sp., Reduviid* bug

Flowering and Fruiting (contd.)

Pests

Guava Wilt

- **Cultural control**
  - Follow clean cultivation and strict sanitation in orchard
  - Wilted trees should be uprooted, burnt and trench should be dug around the tree trunk.
  - Roots of plants should not be damaged while transplanting.
  - Maintain proper tree vigour by timely and adequately manuring
  - Inter-culture and irrigation enable them to withstand infection.
  - The pits may be treated with formalin and kept covered for about 3 days and transplanting should be done after two weeks.
  - Apply organic manures, oil cakes and lime

- **Biological Control**
  - Use rootstocks resistant to wilt i.e. Cross of *Psidium molle x P. guajava*.
  - Eco-friendly approach of guava wilt control is suggested where biological control (Trichoderma sp., Aspergillus niger AN27), soil amendment (lime, neem cakes, gypsum) and intercropping (marigold, turmeric) are effective.

Flowering and Fruiting (contd.)

Pests

Fruit rot/ fruit canker/ algal leaf and fruit spot

- **Cultural control**
  - Plant spacing and fertilizer regimes should be managed to avoid unnecessarily dense plant canopy.
  - Prune and destroy dead twigs and fruits.
  - Prune old and non-productive branches which may be potential source of infection
  - For managing fruit rot disease, maintain good field sanitation by keeping it free of infected dry or semi-dry twigs and mummified fruits of previous harvest which may serve as primary inoculum.
  - Algal leaf spot can be reduced by maintaining tree vigour with cultural techniques such as proper fertilization and irrigation, proper pruning to enhance air circulation within the canopy and sunlight penetration, managing weeds and wider tree spacing.
  - Managing insect, mite and other foliar diseases increases tree vigour and lessens susceptibility to algal disease

- **Chemical control:**
  - Apply Zineb 75% WP @600 -800 g in 300-400 l of water/ acre or Mancozeb 75% WP 20g in 10 l of water/tree.

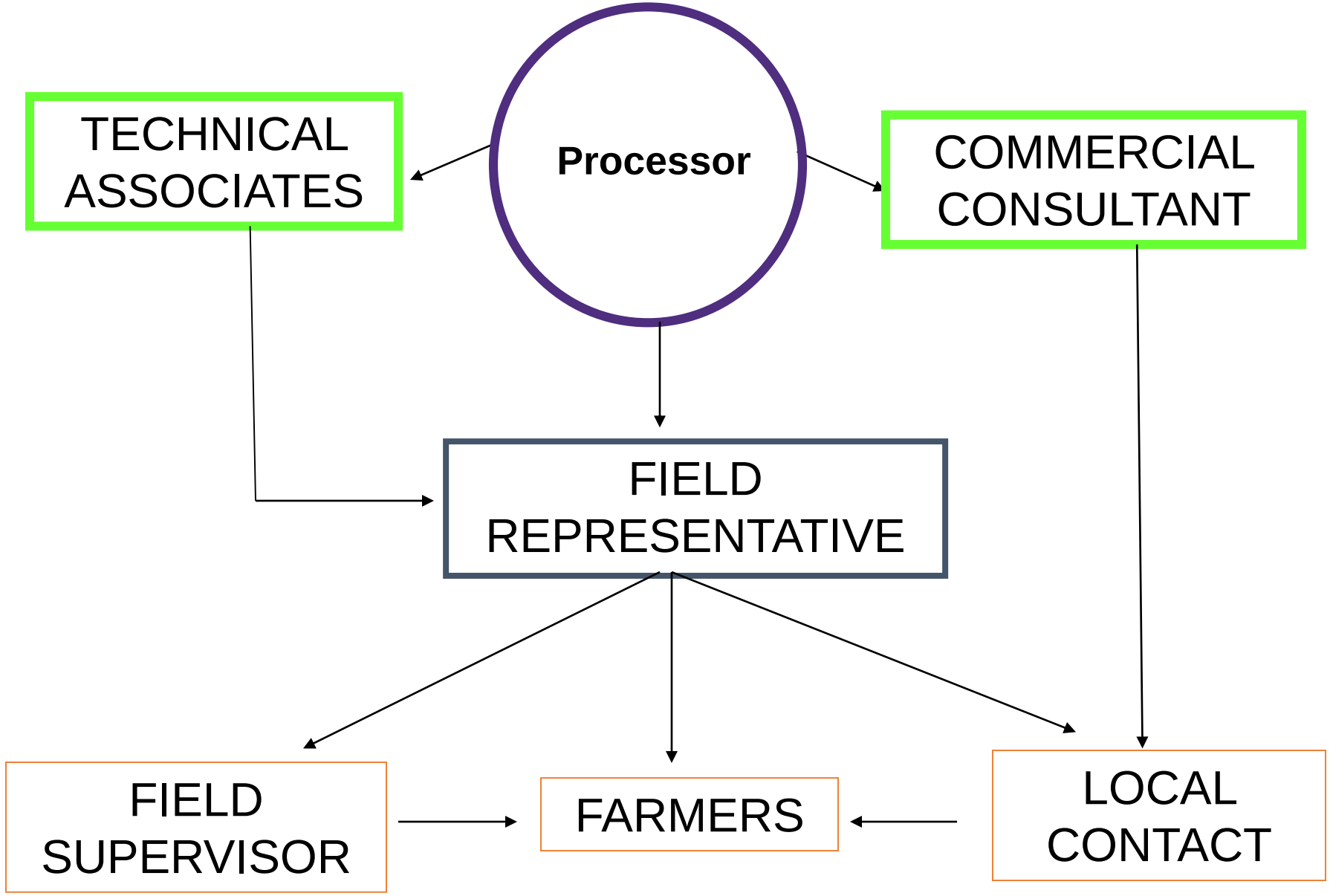
Flowering and Fruiting (contd.)

Pests

Dieback/ anthracnose/ Stem canker and dry fruit rot

- **Cultural control:**
  - Maintain orchard hygiene
  - Monitor disease and use of micro irrigation systems
  - Follow clean cultivation and strict sanitation in orchard
  - Use disease free planting material
  - Implement a good weed control to reduce humidity
  - Adhere to recommended plant density to reduce competition for sunlight, water and nutrients

Backward Integration



Qualified agriculturists along with local partners co-ordinate all field activities

Harvesting and Quality Management

Harvesting Season

HARVESTING SEASON OF GUAVA

STATE/UT'S	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
ANDHRA PRADESH												
ARUNACHAL PRADESH												
ASSAM												
BIHAR												
CHHATTISGARH												
DELHI												
GOA												
GUJARAT												
HARYANA												
HIMACHAL PRADESH												
JAMMU & KASHMIR												
JHARKHAND												
KARNATAKA												
KERALA*												
MADHYA PRADESH												
MAHARASHTRA												
MANIPUR												
MEGHALAYA												
MIZORAM												
NAGALAND												
ORISSA												
PUNJAB												
RAJASTHAN												
SIKKIM												
TAMIL NADU												
TRIPURA												
UTTAR PRADESH												
UTTRANCHAL												
WEST BENGAL												
ANDAMAN & NICOBAR												
CHANDIGARH												
DADRA & NAGAR HAVELI												
DAMAN & DIU												
LAKSHADWEEP												
PONDICHERRY												

★ INFORMATION NOT AVAILABLE ROUND THE YEAR PEAK SEASON LEAN SEASON

Source : Directorate of Horticulture / Agriculture of respective State / UT's

Harvesting Practices

- Seedling trees take 4-5 years to reach the bearing stage, while layered, budded, and grafted trees take 2-3 years to bear.
- When immature and until a very short time before ripening, the fruit is green, hard, gummy within and very astringent
- The fruit is ready for harvest when its dark green colour changes to light and shows yellowish green patches.
- Guava fruits should be picked as soon as they mature. Hand picking is recommended.

Harvesting Indices

- Guava fruits are picked at the mature-green stage (colour change from dark- to light-green) where consumers eat them at that stage, like in India.
- In countries where consumers prefer ripe guava, the fruits are picked at the firm-yellow to half-ripe (softer) stage for long-distance transport or at the fully-ripe (yellow and soft) stage for local markets.

Grading Based on Weight and Size

Size Code/ Grade	Weight (g)	Diameter (mm)
A	>350	> 95
B	251 – 350	86-95
C	201 – 250	76-85
D	151 – 200	66-75
E	101 – 150	54-65
F	61 - 100	43-53

Source: DMI (Directorate of Marketing and Inspection, GoI

Quality Indices

Skin colour is a good indicator of ripeness stage

Flesh colour depends on cultivar and can be white, yellow, pink, or red

Size and shape of fruit may be important in some markets

Fruit should be free from defects, insects, and decay

Firmness and extent of gritty texture due to the presence of stone cells (sclereids)

The fewer the number of seeds in the flesh the better

Aroma intensity

Soluble solids and acidity

Packing for fresh marketing

Storage Conditions

- **8-12 °C**: depending on cultivar, stage of maturity/ ripening, duration of storage or shipping
- **Precooling**: in “room cooling” or “forced-air” to 10-12 °C
- **Lower than 8 °C**: Chilling injury
- **Higher than 12 °C**: fast ripening
- **At 16-20 °C**: ripen in 3-5 days
- **Optimum relative humidity:** 90-95%
- **Post-harvest life**: 1-4 weeks

Post-Harvest

Pests and Diseases

Mechanical control:

- Keeping of good quality of fruits and packing - bagging fruits
- Remove and destroy all the affected fruits to reduce the incidence of Anar butterfly.
- Cover the fruit with polythene bags when the fruits are up to 5 cm

Source: *NIPHM* and *Directorate of Plant Protection, Quarantine & Storage*

Fruit fly control

- Guavas are a preferred host for fruit flies and must be treated for disinfestation to be accepted in many countries.
- Insect control treatments:
  - Heat by immersion in 46 °C water for 35 minutes or
  - Expose to hot air at 48°C for 60 minutes.
  - Irradiation at 0.15-0.30 kGy.

Guava Products and Processing and Exports

Global Status

- India is the largest producer and exporter of guava pulp.
- The tropical pink guava puree shares a market share of 55.3% and the white guava puree shares a market share of 40%.
- The remaining 5% is shared by the other varieties.
- Used mainly in the food and beverage processing industry.
- Furthermore, substantial advancements in the food processing industry is enhancing the worldwide guava puree market.

Processing varieties

- White guava and Pink guava are the most popular varieties of guava processed in India.
- Lucknow variety (White guava), and Desi Karnataka (Pink guava) are the popular varieties of guava processed in India.
- Other varieties are processed in small quantities and are mostly used as a table variety.
- Guava is the most popular flavouring agent in Europe and the United States.
- The beverage industries in these regions strongly emphasize guava puree, while actual guava fruit consumption remains modest.

Fresh fruit

Fresh Guava Juice

Secondary Processed products

- Major secondary guava processed products include jellies, jams, marmalade, filling of baked goods, sweets and drinks, and fruit-based cosmetics that contain fruit extracts.
- In addition to ready to drink beverages, guava processed products are used in powder mixes or squashes for preparing refreshment drinks.
- With the increase in the consumption of Guava processed products in the confectionery and dairy industry, the usage of puree in bakery fillings, puddings, ice-cream mixes, and fruit meals for children is expected to increase the market growth.
- The guava puree and concentrate in the beverage industry impart the guava’s unique taste and flavour in the final product.

Product Specifications

Puree / Pulp & Concentrate	Brix at 20°C	Acidity % as Citric Acid	Consistency (Cm/30 sec@20°C)	Packing	
				Aseptic	Cans
White Guava Puree / Pulp	Min 9°	0.40 - 0.70	Less than 12	210 Kg	3.1 Kg
Pink Guava Puree / Pulp	Min 8°	0.40 - 0.70	Less than 12	210 Kg	3.1 Kg
Concentrate					
White Guava Concentrate	Min 20°	0.70 - 1.00	Less than 6	200 Kg	-
Pink Guava Concentrate	Min 18°	0.70 - 1.00	Less than 8	220 Kg	-

Guava Jelly Bar & Syrup

Juice Concentrates

By-Products - Seeds

- Ingredient as human food and animal feed
- Protein fraction distribution is similar to Rice proteins
- Proteins: 86 – 90% is Glutelin fraction
- 14% are Globulins (10%) and Albumins and Prolamins (2% each

Protein	7.1%
Fat	12.4%
Ash	1.5%
Crude fibre	72.3%
Carbohydrates	6.7%

Do’s

- Ensure good drainage in the field.
- Prepare pits and fill it with the mixture as recommended.
- Select high yielding, disease and pest tolerant variety suitable for each location.
- Practice drip irrigation from the beginning of the orchard.
- Follow fertigation schedule as recommended.
- Compulsorily apply organic manure as per recommendation.
- Apply micronutrient as and when needed.
- Compulsorily weed/ intercultivate, timely operation helps in crop growth.
- Follow disease and pest control measures timely and effectively.
- Apply sprays in the evening or early morning only.
- Keep the farm machineries well-maintained and operative.
- Regular field visit and scouting of the farm should be done.
- Use protective clothing and gloves by field workers/farmers while handling chemicals and fertilizers.

Don’t’s

- Don’t over irrigate the crop at anytime.
- For fertigation don’t mix solid fertilizers and dissolve them together. Prepare individual solutions and mix them for application.
- Don’t use the fertigation unit for bulky organic manure and fertilizers that are not soluble in water
- Don’t add solid fertilizer from the gunny bag directly to the fertilizer tank. Prepare solution separately and pour the solution to the fertilizer tank. Prepare solution only in plastic buckets. Don’t use metal container.
- Don’t stir the solution with naked / unprotected hand. Use wooden spoon or stick.
- Don’t heat the fertilizer solution to increase solubility.
- Do not spray pesticide under hot sun.

Important Notice:

The information on performance of recommendations given in this handbook holds good only when used under optimum conditions. Their performance may either change in due course of time due to several factors or can vary under different systems of management. Mishandling/negligence of the user can also result in damage/loss/non reproducibility of results.
The user is advised to contact their nearest KVK and refer to the latest Ad-hoc list for information on banned chemicals and other nationally-issued directives.

महत्वाची सूचना:

या हँडबुकमध्ये दिलेल्या शिफारशींच्या कामगिरीची माहिती इष्टतम परिस्थितीत वापरली जाते तेव्हाच चांगली राहते. त्यांची कार्यक्षमता एकतर अनेक कारणांमुळे योग्य वेळी बदलू शकते किंवा व्यवस्थापनाच्या वेगवेगळ्या प्रणालींमध्ये बदलू शकते. वापरकर्त्याच्या चुकीच्या हाताळणी / निष्काळजीपणामुळे परिणामांचे नुकसान / पुनरुत्पादन न होणे देखील होऊ शकते. वापरकर्त्यास त्यांच्या जवळच्या केव्हीकेशी संपर्क साधण्याचा आणि प्रतिबंधित रसायने आणि इतर राष्ट्रीय-जारी निर्देशांच्या माहितीसाठी नवीनतम तदर्थ यादीचा संदर्भ घेण्याचा सल्ला देण्यात आला आहे.

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