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Organic Cultivation of Guava

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INTRODUCTION

Guava (*Psidium guajava* L.) serves as a key tropical and subtropical fruit crop which Indian farmers cultivate throughout the country. The Myrtaceae family includes this plant which people cultivate for its ability to grow in different environments and its ability to produce high yields and its high nutritional value. The fruit provides nutritional benefits because people eat it both in its natural state and after it undergoes processing.

The organic cultivation of guava has become increasingly popular during recent years because people now understand its benefits for environmental protection and human health. Organic farming uses sustainable methods which protect the environment by not using synthetic fertilizers and pesticides and growth regulators. The system uses natural agricultural inputs such as farmyard manure and compost and green manures and biofertilizers to sustain soil health and agricultural productivity. The practice of organic guava cultivation enables farmers to produce chemical-free safe fruits while also protecting the environment through improved soil health and biodiversity and sustainable agricultural practices.



2. Climate and Soil Requirements

Guava grows well in various climatic regions but tropical and subtropical areas provide its ideal growing conditions. The crop grows best when the temperature ranges between 20°C and 30°C, but it can survive extreme heat conditions up to 45°C and cold temperatures which last only for brief periods. Extreme temperature fluctuations, however, may adversely affect flowering, fruit setting, and fruit quality. Guava needs moderate rainfall which occurs between 1000 and 2000 mm each year, but the plant suffers when excessive rain falls during its flowering period. Although guava is relatively drought-tolerant due to its deep root system, proper irrigation during critical growth stages significantly improves yield and fruit quality.

Soil plays a crucial role in the successful cultivation of guava, particularly under organic farming systems where soil health is a primary concern. Guava grows well in a variety of soil types; however, well-drained loamy soil is considered ideal for optimum growth and productivity. The crop can also tolerate sandy loam to clay loam soils provided proper management practices are followed. The optimum soil pH for guava cultivation ranges from 5.0 to 7.5, as this range ensures better availability of essential nutrients. Soils with poor drainage should be avoided because waterlogging conditions can lead to root rot and poor plant growth. Similarly, saline and sodic soils are not suitable for guava cultivation as they adversely affect plant health and productivity.

In organic guava cultivation, maintaining soil fertility is achieved through the application of organic inputs such as farmyard manure, compost, and green manures. The use of biofertilizers such as Azotobacter, Azospirillum, and phosphate-solubilizing bacteria helps in enhancing nutrient availability and improving soil microbial activity. Additionally, practices like mulching help conserve soil moisture, regulate soil temperature, and improve overall soil structure. Proper soil management ensures healthy plant growth, better nutrient uptake, and sustainable production in organic guava orchards.

3. Selection of varieties

The selection of particular plant varieties constitutes an essential process which drives organic guava farming because it determines both the amount of produce and the characteristics of the fruit and the plants' defense against insects and illnesses. The organic farming system needs to use high-yielding and disease-resistant plant varieties which grow well in local conditions for its farming operations. The Allahabad Safeda variety stands out among the most common Indian guava varieties because it produces high-quality fruits which look attractive and deliver substantial crop output. The Lucknow-49 Sardar variety produces high-quality fruits and it develops abundant fruit quantities while showing resilience to unfavorable environmental conditions.

The farmers show increased interest in improved varieties which include Lalit Arka Amulya and Shweta because these new varieties produce better fruit quality while maintaining consistent fruit

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size and showing improved protection against major agricultural pests and common diseases. Harvestable plant varieties for organic production systems require assessment of three factors which include their ability to grow in specific areas and their potential to meet market needs. The selection of suitable plant varieties results in improved crop yields and decreased pest problems and infectious disease outbreaks and increased financial profits.

4. Propagation Methods

The genetic preservation of guava plants requires propagation as the main method to achieve genetic purity and plant uniformity. The organic farming system relies on vegetative propagation methods because they produce plants with true-to-type genetic characteristics. Air layering (gootee) represents the most popular propagation method because it offers simple implementation and high success rates, while enabling growers to cultivate early-fruited plants. Farmers use this method to generate large quantities of guava plants for their farming operations.

Other important methods include budding and grafting, which are used to produce uniform and high-quality planting material. These methods ensure the transfer of desirable traits such as high yield, fruit quality, and disease resistance from the mother plant to the new plants. For successful organic cultivation, it is essential to use certified organic planting material obtained from reliable and authorized nurseries. This helps in maintaining the authenticity of organic production systems and reduces the risk of introducing pests, diseases, or

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chemically treated plants into the orchard. Overall, the adoption of appropriate propagation techniques and the use of quality planting material are key factors in establishing a healthy and productive organic guava orchard.

5. Land Preparation and Planting

The establishment of an organic guava orchard requires proper land preparation because it creates soil conditions which support optimal soil structure and air movement and root growth. The field needs complete preparation through deep ploughing which will both eliminate weeds and destroy hard pans while improving soil tilth. The next step requires harrowing and leveling work to produce a planting area which has a smooth and consistent surface throughout.

Pits with dimensions of 1 m × 1 m × 1 m should be dug before planting begins at least during summer because sunlight will help solarize the soil and kill soil-borne pathogens. The pits need filling with an organic input mixture which contains 20 to 25 kilograms of well-decomposed farmyard manure (FYM) and 1 to 2 kilograms of neem cake and approximately 5 kilograms of vermicompost. The organic amendments enhance soil fertility while boosting microbial activity and supplying necessary nutrients which support plant growth during their early development.

Spacing determines plant growth and canopy development and yield. The normal planting system requires a 6 × 6 meter spacing distance which provides adequate room for both canopy growth and intercultural farming activities. High-

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density planting systems enable closer plant spacing of 3 × 3 meters because this method allows more plants to grow in each area while increasing total output through proper canopy management. The rainy season or irrigated conditions serve as the main times for planting because these conditions help plants achieve better establishment and higher survival rates.

6. Organic Nutrient Management

Organic guava farming depends on soil fertility because its degradation results in decreased crop production and lower fruit quality. Natural and biological sources of nutrients serve as the foundation for organic nutrient management because these sources deliver essential nutrients while they enhance soil health and microbial life.

Organic farms obtain their nutrients primarily through three sources: farmyard manure (FYM) and vermicompost and green manure crops which include dhaincha (*Sesbania aculeata*) and sunhemp (*Crotalaria juncea*). The materials work to increase soil organic matter content while they create better soil structure and better soil bacteria activity. The process of nutrient management depends heavily on biofertilizers which serve as essential elements for this purpose. *Azotobacter* enables bacteria to fix nitrogen through biological means while PSB bacteria systems make phosphorus accessible for plant usage.

Farmers need to establish an accurate nutrient application timetable because it serves as the foundation for continuous agricultural output. The maintenance of soil fertility requires farmers to apply 20 to 30 kilograms of FYM for every tree

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annually. During critical growth phases which include flowering and fruiting, farmers should apply vermicompost to enhance fruit production and crop output. Organic mulching materials which include crop residues and dry leaves and straw, provide multiple benefits for soil preservation because they maintain soil moisture levels and control soil temperature while fighting weed growth and enhancing soil quality all through time. The process of organic nutrient management provides essential nutrients to plants while it helps maintain soil health and decreases environmental pollution and increases the sustainable productivity of guava orchards.

7. Irrigation Management

Organic guava farms need effective irrigation management systems because these systems help the plants achieve their best growth and flowering and fruit production. The establishment period requires young guava plants to receive water multiple times because their roots remain incomplete and their roots need water for proper growth. The plants need fewer waterings as they grow because their water needs decrease to 10-15 day intervals which depend on the type of soil and weather and seasonal changes. The growth periods of flowering and fruit setting need special attention because these periods require proper moisture levels to achieve better fruit size and fruit quality and fruit retention. The development of flowers and fruit during these stages shows that plants experience moisture stress, which leads to reduced productivity.

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Drip irrigation serves as the most effective irrigation method for organic farming operations among all available irrigation techniques. The system delivers water directly to plant root zones, which results in efficient water usage while minimizing evaporation losses and maintaining ideal soil moisture content. Farmers can use drip irrigation systems to apply organic liquid fertilizers because the system works well with jeevamrit and vermiwash organic fertilizers.

The application of organic mulching materials which include straw and dry leaves and crop residues serves multiple purposes by preserving soil moisture while decreasing evaporation rates and controlling soil temperature and enhancing soil structure. Mulching increases microbial activity, which improves soil health, thereby serving as an essential strategy for managing irrigation systems in organic guava farms.

8. Weed Management

Weed management stands as a vital component in organic guava farming because weeds compete with the crop for essential resources which include nutrients and water and light and spatial territory. Organic systems depend on mechanical and cultural and biological methods for weed control because they prohibit the use of chemical herbicides.

Farmers use manual weeding and hoeing as their main methods to control weeds during the initial growth period of plants. The process of regularly removing weeds from the field results in decreased competition for resources which helps the crop to receive better resource access. Organic

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mulching materials like straw and dry leaves and crop residues serve as effective weed control methods because they block sunlight and stop weed seeds from germinating. Cover cropping functions as an efficient weed management technique which growers use to cultivate suitable crops between their guava plant rows. Cover crops not only suppress weed growth but also improve soil fertility, enhance soil structure, and prevent soil erosion. The process of biological nitrogen fixation allows leguminous cover crops to enhance soil nitrogen content. The combination of manual weeding and mulching and cover cropping creates an effective and environmentally friendly method for managing weeds in organic guava orchards.

9. Training and Pruning

The combination of training and pruning functions as vital organic guava cultivation practices which establish proper plant development through their creation of sturdy plant structures and their enhancement of light distribution and their improvement of fruit production quality. The first two years require plants to undergo proper training which develops a strong central framework that supports their future growth into a complete canopy structure. The structure enables the plant to bear its maximum fruit weight while it grows at an equal rate throughout its development. Plants require regular pruning because it boosts their ability to produce crops while remaining healthy. The removal of dead and diseased and weak and crossing branches occurs at regular intervals to stop infection spread and enhance air flow through the canopy.

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The proper pruning process enables better sunlight access which serves as an essential element for both photosynthesis and fruit growth.

Annual pruning functions as a standard practice which helps plants grow back after the process ends while they develop new shoots because guava trees produce fruit from their growth during the current growing season. The practice improves air movement while decreasing pest and disease problems which leads to bigger and better quality fruit yields. The process of training and pruning establishes essential methods which farmers use to manage their organic guava orchards.

10. Organic Pest and Disease Management

Organic guava farms need to control pests and diseases because they do not use chemical pesticides. The farm uses an integrated pest control strategy that combines cultural practices with biological control methods and botanical pest control methods to keep pest populations below economic threshold levels. The fruit fly serves as one of the major agricultural insect threats because it destroys fruits through its egg-laying behavior which involves laying eggs directly inside the fruit. The bark-eating caterpillar affects the trunk and branches, weakening the plant, while aphids and scale insects are common sucking pests that reduce plant vigor by feeding on sap and transmitting diseases.

Organic systems implement control measures that use environmentally sustainable methods. Farmers commonly use neem oil with a 2–3% concentration as a botanical pesticide to protect

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against various agricultural pests. Pheromone traps enable effective monitoring and control of fruit fly populations, whereas sticky traps function to control sucking pests like aphids and whiteflies. The application of biological control agents which include *Trichogramma* egg parasitoids and ladybird beetles predators establishes essential ecological equilibrium which helps to decrease pest outbreaks. Guava is also affected by several diseases, among which wilt and anthracnose are the most important. The wilt disease causes plant death through its drying effect, while anthracnose leads to fruit rot and quality deterioration. Organic farming requires farmers to use both preventive and biological control methods for disease management. The first defense against disease occurs through the application of resistant or tolerant plant varieties. Soil application of beneficial fungi such as *Trichoderma* helps in suppressing soil-borne pathogens and improving plant health.

11. Flowering and Fruiting Management

The guava plant shows its capacity to produce flowers and fruits during various times of the year which depends on weather conditions and how people manage their cultivation. The best results in fruit production happen when people control the flowering process to produce flowers during one specific time frame. Guava growers commonly practice irrigation suspension for designated time intervals which causes stress to the plants and enables them to control their flowering patterns. The plant establishes a consistent flowering pattern

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through its watering schedule which starts after the stress period ends.

Natural growth-promoting substances become essential to organic farming systems because they support the development of flowers and fruits in plants. Farmers utilize panchagavya and jeevamrit as organic formulations which they apply through foliar sprays or soil applications to enhance plant strength and initiate flowering and boost fruit production. These inputs create a rise in microbial activity throughout the soil system which leads to better plant health and higher agricultural output and better quality of fruits.

12. Harvesting and Yield

The time from flowering to guava fruit maturity lasts between 4 and 5 months which varies according to different guava varieties and local weather patterns. Harvesting at the appropriate maturity level functions as the necessary step to obtain products with high quality and market worth. The fruit can be picked when it reaches mature green status to send to distant markets or at full ripeness for local markets and processing needs.

Farmers perform harvesting work through manual hand picking methods which they need to execute with great precision to protect the fruits from mechanical harm. The maturity indicators display different skin color changes which show the progression from dark green to light green or yellowish and the emergence of specific scent. Under well-managed organic cultivation systems, the average yield of guava ranges from 20 to 25 tons per hectare, although it may vary depending on the

variety, age of the orchard, climatic conditions, and management practices. While organic yields may initially be slightly lower than conventional systems, they improve over time with better soil health and sustainable practices.

13. Post-Harvest Management

The implementation of post-harvest management procedures enables organic guava growers to maintain their fruit quality while decreasing product waste and improving their marketability. The process of harvesting fruits requires their subsequent sorting and grading according to three criteria which include their size and color and their marketable quality. The system needs to remove damaged fruits which include diseased fruits and overripe fruits because these items will lead to spoilage.

Organic systems need eco-friendly packaging solutions which include corrugated fiberboard boxes and bamboo baskets and biodegradable packaging to achieve sustainable operations while reducing their environmental footprint. The system requires special measures for transportation handling which will protect products from mechanical damage and decrease post-harvest product loss.

The process of storing guava fruits at 8-10 degrees Celsius enables longer shelf life because this temperature reduces both fruit respiration and microbial production. The guava fruit serves both as a fresh food item and as a raw material which enables producers to create multiple value-added products including juice and jam and jelly and pulp

and nectar which help decrease post-harvest losses while increasing farmer earnings.

14. Certification and Standards

The process of certification functions as a fundamental element in organic guava agriculture because it establishes both the authenticity and market credibility of organic products. The National Programme for Organic Production (NPOP) establishes organic farming rules which Indian farmers must follow to achieve their certification goals.

The process of certification requires accredited agencies to conduct their work while organizations like APEDA (Agricultural and Processed Food Products Export Development Authority) supervise their activities. The system requires farmers to implement strict procedures which include complete avoidance of synthetic chemicals and establishment of buffer zones and usage of authorized organic materials.

An important requirement for certification is the maintenance of proper records of all farm activities, including input use, field operations, pest and disease management practices, and harvesting details. These records are regularly inspected by certification bodies to ensure compliance with organic standards. Overall, adherence to certification standards not only helps in gaining consumer trust but also opens up opportunities for premium pricing and export markets, thereby enhancing the profitability of organic guava cultivation.

15. Advantages of Organic Guava Cultivation

Organic guava cultivation offers numerous advantages in terms of environmental sustainability, soil health, and economic returns. One of the primary benefits is the production of safe and chemical-free fruits, which are highly preferred by health-conscious consumers. These fruits are free from harmful pesticide residues and contribute to better human health and nutrition.

Organic farming practices significantly improve soil fertility and structure by increasing organic matter content and enhancing beneficial microbial activity. The continuous application of organic manures, compost, and biofertilizers helps in maintaining long-term soil productivity. Additionally, organic cultivation reduces dependence on synthetic inputs, thereby minimizing environmental pollution and conserving natural resources such as soil and water.

Another important advantage is the higher market price and export potential of organically produced guava. With increasing global demand for organic produce, farmers can access premium markets and improve their income levels. Furthermore, organic farming systems promote biodiversity by supporting beneficial insects, microorganisms, and other organisms, which contribute to ecological balance and natural pest control.

16. Challenges

Despite its numerous benefits, organic guava cultivation also faces certain challenges that need to be addressed for wider adoption. One of the major

constraints is the initial reduction in yield during the conversion period from conventional to organic farming, as the soil system takes time to stabilize and regain fertility.

The limited availability of quality organic inputs, such as certified biofertilizers, organic manures, and biopesticides, is another challenge, particularly in rural areas. In addition, the certification process for organic farming can be complex, time-consuming, and costly, which may discourage small and marginal farmers.

Pest and disease management in organic systems is also relatively more complex, as it relies on preventive and biological approaches rather than quick chemical control measures. This requires greater knowledge, skill, and regular monitoring by farmers. Therefore, capacity building, technical support, and policy interventions are essential to overcome these challenges and promote organic guava cultivation.

CONCLUSION

Organic cultivation of guava represents a sustainable and eco-friendly approach to fruit production that aligns with the principles of environmental conservation and human health. By avoiding synthetic chemicals and adopting natural farming practices, it ensures long-term soil fertility, ecological balance, and safe food production.

Although there are certain challenges, such as initial yield reduction and certification constraints, these can be effectively managed through proper planning, training, and support

systems. With increasing consumer awareness and growing demand for organic fruits in both domestic and international markets, organic guava farming holds significant potential for enhancing farmers' income and ensuring sustainable agricultural development.