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Pineapple: A Tropical Jewel with Economic and Nutritional Value

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Pineapple (*Ananas comosus*), a tropical fruit of economic and nutritional significance, is widely cultivated across tropical and subtropical regions. Belonging to the family *Bromeliaceae*, it is propagated vegetatively using crowns, slips, or suckers, with slips and suckers preferred for commercial cultivation due to faster fruiting. India ranks among the top global producers, with major cultivation in Assam, West Bengal, Tripura, Kerala, and Karnataka. Pineapple thrives in mild tropical climates with well-drained, slightly acidic soils, and requires moderate rainfall and irrigation. Rich in vitamins, especially Vitamin C, and bromelain an anti-inflammatory enzyme pineapple offers notable health benefits such as aiding digestion, boosting immunity, and reducing inflammation. Cultivation involves precise practices like trench planting, flower induction using ethylene compounds, and integrated pest and weed management. Fruits are typically harvested 18–24 months after planting and are suitable for storage and processing into products such as juice, jam, candy, and wine. With increasing demand for processed and organic produce, pineapple holds significant promise in agri-business, exports, and rural income generation. Scientific cultivation, value addition, and government support further enhance its future prospects as a sustainable and profitable horticultural crop.

Introduction

Pineapple (*Ananas comosus*), a luscious tropical fruit with a characteristic flavor and strong scent, is enjoyed worldwide for its cool taste and nutritional content. A member of the family Bromeliaceae, pineapple is a perennial, herbaceous fruit crop native to South America, thought to have originated in the area between southern Brazil and Paraguay. The Portuguese brought pineapple to India in the 16th century, and it is now grown extensively in tropical and sub-tropical regions.

India is among the leading producers of pineapple globally, with prominent production in Assam, West Bengal, Tripura, Kerala, and Karnataka. Pineapple's versatility, market value, and processing quality make it a commercially valuable fruit crop.

Botanical Description

- Botanical name: *Ananas comosus*
- Family: Bromeliaceae
- Chromosome number: 2n = 50

Growth Habit: Short-stemmed herbaceous perennial

Inflorescence: Terminal spike with numerous florets developing a composite fruit

Fruit Type: Sorosis (fruit formed by many in an inflorescence)

Nutritional and Medicinal Value

Pineapple is a low-calorie fruit with high content of essential vitamins, enzymes, and antioxidants. It is rich in bromelain, a proteolytic enzyme that has anti-inflammatory and digestive functions.

Nutritional Value per 100g (approx):

- Energy: 50 kcal
- Carbohydrates: 13 g
- Vitamin C: 47.8 mg
- Manganese: 0.9 mg
- Fiber: 1.4 g

Health Benefits:

- Aids in digestion
- Boosts immunity
- Supports weight loss
- Reduces inflammation
- Promotes skin and eye health
- Agro-Climatic Requirements

Climate and Soil Preferences

Pineapple performs optimally in mild tropical weather with a temperature of 15°C to 30°C. The crop tolerates an average annual rainfall of 600 to 2500 mm, but with no excess water or waterlogging. For healthy growth, well-drained slightly acidic soils with a pH of 5.5 to 7.0 are favored. Sandy and loamy soils are most desirable because they offer good drainage.

Planting Material

Pineapples are vegetatively propagated by crowns, slips, or suckers, which are pieces of a mature plant. Of these, slips and suckers are used in commercial farming because they grow faster and produce fruit earlier. Crown propagation will take 24–26 months to fruit, whereas slips and suckers will fruit in 20–22 months and 15–18 months, respectively.

Planting Method

For cultivation for sale, suckers are planted in double rows with rows spaced 70 cm apart and plants 30 cm apart. In hilly or arid regions, trench planting is 90 cm wide, 15–22 cm deep, and 90 cm apart. For coastal regions where the soil is sandy, wider trenches of around 45 cm are preferred for better anchorage and water holding capacity.

Water Management

While pineapple is a drought-resistant crop, regular and moderate watering is necessary to maintain the soil in a moist but not waterlogged condition. Irrigation is usually supplementary, particularly during dry periods or in hot weather, to ensure maximum soil moisture levels.

Fertilization

Pineapple plants need frequent and balanced fertilizing to facilitate vigorous growth and fruiting. Fertilizer application should be determined by soil analysis, and fertilizers must contain sufficient levels of nitrogen, phosphorus, potassium, and micronutrients in order to keep the soil fertile throughout the growing season.

Weed Control

Weeds compete with the pineapple plant for nutrients, water, and sunlight, thus influencing yield and plant health. Constant weeding is required, especially during the initial phases of crop growth. Mulching and the application of herbicides can also be employed as part of integrated weed management.

Flower Induction and Fruit Maturity

Natural flowering may be irregular. To ensure uniform flowering, ethylene-releasing compounds (e.g., ethephon or calcium carbide) are used 8–10 months after planting.

Pest and Disease Management

Pineapples are prone to a variety of pests and diseases such as mealybugs, scales, nematodes, and fungal rots. Ongoing monitoring and early detection are crucial for successful control. Cultural controls like field sanitation, crop rotation, and uprooting of infected plants should be supplemented with chemical controls wherever necessary to manage pest populations.

Flowering Time: 10–12 months after planting

Fruit Maturity: 4–5 months after flowering

Yield: 50–70 tons/ha depending on variety and management

Harvesting and Post-Harvest Management

The fruits are harvested when they attain full size and partial yellowing at the base. The overripe fruits are susceptible to bruising and spoilage.

The principal crop of pineapple is typically mature for harvest in 18–24 months from planting, depending on the planting material used and climatic conditions. Fruits are picked when they turn a uniform golden-yellow color and give off a sweet smell. Early picking of the main crop can also induce the formation of a second, minor crop, which increases the productive life of the plantation.

Harvest Index: Color change at base, firm texture, sweet aroma

Post-Harvest Handling

- Size and ripeness grading
- Ventilated crate packing
- Storage at 10–13°C for up to 3 weeks shelf life

Value Addition and Processing

Pineapple finds widespread application in food processing. It can be transformed into:

- Canned slices and cubes
- Juice and squash
- Jam and jelly
- Candy and dried slices
- Vinegar and wine

Processing helps minimize post-harvest losses and improve farmer revenues.

Economic Importance and Export Potential

Pineapple is a major cash crop for marginal and small farmers. India exports processed and fresh pineapple to nations such as the UAE, Nepal, Saudi Arabia, and the Netherlands.

Top Exporting States: West Bengal, Assam, Tripura, Kerala

Government Support: FPOs, cluster development initiatives, and food processing schemes are promoting the pineapple industry

Future Prospects

With growing demand for healthy, ready-to-consume fruits and drinks, pineapple has vast potential for:

- Organic farming in northeastern and tribal regions
- High-density plant systems
- Export-bound cultivation of MD-2 and Mauritius varieties
- Agri-tourism and pineapple festivals to support local varieties

Conclusion

Pineapple is a tropical symbol of abundance, both nutritious and economically valuable. Because of its ability to thrive in varied climates, with easy cultivation and processing opportunities, pineapple is a preferred fruit crop for environmentally friendly and remunerative agriculture. Through scientific cultivation, post-harvest management, and

market access, pineapple can be a major contributor to farmers' livelihoods and rural poverty alleviation.

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