

# PINEAPPLE TECHNOLOGY

## Introduction

Pineapple is one of the prominent fruit crops in the horticulture sector. Thailand is the largest producer of pineapple in the world. India ranked fifth with a share of 8.2 % of the world production of pineapples (FAO- 1999). The total area under pineapple cultivation in India is 75,500 hectares (CMIE, 2001) with a production of about 1,108,793 mt. 'Kew' and 'Mauritius' are the two varieties of pineapple grown in India. The major pineapple producing states in India are Assam, Karnataka, Kerala, Meghalaya and West Bengal. Assam has the largest area under pineapple and it is also the largest producer. Nagaland, West engal and Bihar are the three states reporting high productivity. Overall, Indian productivity at an average of 14686 kg /ha compares well with the world average of 18207 kg/ha.

In Kerala, pineapple is cultivated in an area of 9080 hectares with a production of 85837 tonnes (Directorate of Economics and Statistics 1999). The congenial humid climate has favoured the cultivation of pineapple. The finest quality 'Mauritius Pineapple' comes from Kerala. The produce of Kerala is very much in demand as a fresh fruit throughout India and also in foreign countries because it is considered the best in quality, sweetness and has good flavour. Although pineapple cultivation is practised in almost all districts, the extend and trends of cultivation differ widely among Kerala's districts. The major pineapple producing district of Kerala, Ernakulam accounts for more than 54 percent of the area under pineapple cultivation (Agricultural Statistics of Kerala). In Ernakulam district pineapple cultivation is more concentrated in certain areas of Vazhakkulam. From 1989-90 to 1999- 2000 Ernakulam district was ranked first having a share of 54.93 per cent of the total production in 1999- 2000 (Directorate of Economics and Statistics 2000).

## Varieties

Mainly, there are two varieties viz., Kew and Mauritius .

### 1. MAURITIUS

Mauritius is recommended for commercial cultivation for table purposes and distant marketing, due to its shorter duration, better fruit quality, keeping quality and transportability.

### *Season*



Main season of planting is April-May and August-September, but can also be planted in all months except during heavy rain of June-July. The best time for planting is August. For getting maximum price and better keeping quality, the best planting time is April-May. During summer months, if there are no summer showers after planting, irrigation should be given three weeks after planting for proper establishment.

### ***Cropping system***

Mauritius can be grown as a pure crop in garden land, reclaimed lowlands and wetlands and as an intercrop in coconut and newly planted rubber plantations. In rubber plantation, it can be grown for the first 3-4 years only.

### ***Forms of cultivation***

The pineapple is grown both as a pure crop on converted paddy fields and on upland and as an intercrop on young rubber plantations, Distribution of pineapple cultivators based on the form - The majority of the small scale cultivators-Less than 5 Ha- (63%) grow the pineapple as monocrop while the majority of the medium-5 to 10Ha (74%) and large – more than 10Ha-(77%) scale cultivators grow the pineapple as an inter crop on new or young rubber plantations. High productivity of pineapple cultivation in converted paddy fields is the most influential factor that led to the conversion of paddy fields into pineapple fields. Non- profitability of paddy cultivation and high cost of paddy workers are the other reasons reported in this regard.

### ***Land preparation***

**Pure crop:** Prepare the land by digging the area to be planted at 90 cm width in rows / strips, leaving the interspaces undisturbed. However, ploughing can be adopted in level land. Planting is done in paired rows of 45 cm distance between rows and 30 cm between suckers. Suckers may be planted in triangular method in the paired rows. Interspace between the paired rows is kept at 150 cm. Contour planting may be adopted in sloppy areas.

**Intercropping in coconut garden:** Land preparation, spacing and planting are the same as described above. There can be three-paired rows in between two rows of coconut.

**Intercropping in rubber plantations:** System of planting is in paired rows at 45 x 30 cm. There will be only one paired row of pineapple in between two rows of rubber.

**Wetlands / lowlands:** Pineapple is highly sensitive to water stagnation and high moisture regimes. Hence it is important to provide good drainage, if grown in wetlands. In paddy lands, pineapple is planted in paired rows at 45 x 30 cm spacing on ridges taken at 60-90



cm height, depending on the water table and drainage requirement. The ridges are separated by drainage channels having 60 cm width. The width of the ridges varies from 120-150 cm. Wherever water stagnation and poor drainage are expected, a wider and deeper channel is given in between ridges.

### ***Selection of suckers***

Suckers are selected from disease and pest free healthy plants. Suckers are to be graded into those having 500-750 g and 750-1000 g. The graded suckers are planted in different blocks or plots, to get uniformity in growth and flowering. Bigger suckers give early yield. Dipping of suckers in 1% Bordeaux mixture and 0.05% quinalphos will protect the suckers against diseases and pests.

### ***Planting***

After preliminary land preparations, planting is done in small pits of 10-15 cm depth at a spacing of 45 cm between rows and 30 cm between plants in the rows. There is no need to plant the suckers in trenches.

### ***Flower induction***

The pineapple crop is very responsive to the induction of flowering by plant growth regulators. Pineapple cultivation in Vazhakkulam area and commercially viable after the induction of the flower inducing chemical Ethephon in this area by the beginning of the 1980s. This had made it possible for farmers to schedule the flowering of the plant and harvest to synchronise with the season of high demand and price.

For inducing uniform flowering, 25 ppm ethephon is applied on physiologically mature plants having 39-42 leaves (7-8 months after planting). The solution for application in 1000 plants is prepared by adding 1.25 ml of ethephon (3.2 ml of 39% ethrel or 12.5 ml of 10% ethrel), 1 kg urea and 20 g calcium carbonate to 50 litres of water. Pour 50 ml of the prepared solution to the heart of the plant during dry weather conditions (when there is no rain during the time of application).

Flowering starts by 30 days and completes within 40 days of growth regulator application. Fruits will be ready for harvest by 130-135 days after the application of growth regulator. Harvest over different months / seasons could be obtained by carefully phasing / planning the planting and growth regulator application.

### ***Ratoon Cropping***

The plant crop after harvest can be retained as ratoon crop for two more years. After the harvest of the plant crop, chopping the side leaves of the mother plant should be done for



easy cultural operations. The suckers retained should be limited to one or two per mother plant. Excess suckers if any should be removed. Earthing up should be done. Other management practices are same as for the plant crop.

## **2. KEW**

Kew is a variety recommended for large-scale commercial cultivation in Kerala. The package of recommendations for its cultivation is detailed below.

### ***Preparation of the land***

Prepare the land for planting by ploughing or digging followed by levelling. Depending on the nature of land, prepare trenches of convenient length and about 90 cm width and 15-30 cm depth. The trenches are to be aligned at a distance of 165 cm from centre to centre.

### ***Selection and treatment of suckers***

Select healthy suckers of uniform size weighing 500-1000 g. Keep suckers in open space under shade in a single layer for about 7 days for drying. Strip off a few lower old dried leaves. Allow the suckers to dry and cure for another 7 days. Dip the cured suckers in 1% Bordeaux mixture at the time of planting.

### ***Planting***

Rake the soil and plant the suckers in double rows at spacing of 70 cm between rows and 30 cm between plants. Limit the depth of planting to 7.5 to 10 cm. Adopt triangular method of planting in each trench so that the plants in two adjacent rows are not opposite to each other (plant population 40400 / ha).

### ***Induction of flowering***

For inducement of uniform flowering, apply 25 ppm ethephon (2-chloro ethyl phosphonic acid) in aqueous solution containing 2% urea and 0.04% calcium carbonate as follows: The mixture (50 ml/plant) is to be applied pouring into the heart of 16-17 month old plants (39-42 leaf stage) during dry weather. For treating 1000 plants, 50 litres of the solution would be required. (The ingredients for preparing 50 litres of the aqueous solution are ethephon 1.25 ml, urea 1 kg and calcium carbonate 20 g, made up to 50 litres with water. The dosage has to be fixed depending on the availability of commercial



formulation and the active ingredient contents). Flowering will commence from 40th day after application and complete on the 70th day.

## **Water Management for Kew and Mauritius**

During summer months, pineapple variety Kew should be irrigated wherever possible at 0.6 IW/ CPE ratio (50 mm depth of water). It requires five or six irrigations during dry months at an interval of 22 days. Mulching the crop with dry leaves at 6 t/ha will help to conserve moisture.

Wherever irrigation facilities are available, providing irrigation in summer months at two weeks intervals results in good fruit size and high yield. If there is no irrigation facility, the crop should be scheduled for harvest before summer months (before March).

## **Nutrient Management**

### *Manuring for Kew*

Apply compost / cattle manure at 25 t/ha as basal dressing. Apply fertilizers at the following dosage:

### *Dose N:P2O5:K2O*

Per plant per year (g) - 8:4:8

Per hectare per year (kg) - 320:160:320

Apply full dose of P2O5 at the time of planting. Nitrogen and K2O may be applied in four splits, during May-June (at planting), August-September, November and May-June (2nd year)

Note: In places where rains are scanty during November, N and K2O may be applied in three equal splits - two doses in 1st year (May-June and August-September) and the third in May-June of the second year. After application of fertilizers, cover with soil by scraping the sides of trenches.

### *Manuring for mauritius*

Apply compost / FYM at the rate of 25 t/ha at the time of planting. Apply fertilizers at the rate of 8:4:8 g N:P2O5:K2O per plant per year. Full dose of P2O5 is applied as basal at the time of planting. Nitrogen and K2O are applied as four equal split doses after planting. First dose may be applied at 40-50 days after planting and thereafter at 60-70 days intervals.



## Weed Management

### *Weed control for Kew variety*

For effective and economic weed control, use weedicides. Pre-emergent spray with diuron 3 kg or bromacil 2.5 kg in 600 litres of water per hectare completely controls all types of weeds in pineapple plantation. If there is subsequent growth of weeds, herbicide application may be repeated at half the above dose. Spraying should be done when there is adequate moisture in the soil. Avoid periods of heavy rainfall for spraying.

### *Weed control for Mauritius variety*

Pre-emergence (within a few weeks after planting) spray of diuron @ 1 kg/ha in 600 litres of water can keep the field free of weeds for about four months. For subsequent weed control, herbicide application is repeated. For controlling *Mikania micrantha* (vayara valli or American valli), spot-application of diuron can be adopted. Spraying should be done in moist soil, but avoiding rainy periods. Weeds in interspaces can be controlled by spraying glyphosate 0.8 kg/ha or a mixture of 2,4-D 0.5 kg/ha and paraquat 0.4 kg/ha. While spraying in interspaces, care should be taken that the weedicide shall not fall on pineapple plant.

## Pest Management

For control of mealy bugs, adopt the following measures: Apply quinalphos at 0.025%, fenitrothion 0.05% or fenthion 0.05%. Destroy grasses and other monocot weeds, which serve as alternate hosts for the pest.

Mealy bugs (*Dysmicoccus brevipes* / *Pseudococcus bromeliae*): Spray quinalphos 0.025-0.05% or fenitrothion 0.05% or fenthion 0.05% or chlorpyrifos 0.05% or dimethoate 0.05% or monocrotophos 0.05%. Care should be taken that the spray shall reach the base and also the sides of the plant. The plot should be kept weed free. For the control of mealy bugs, control of ants is a must. Hence apply carbaryl to control ants in its colonies in the farm.

Scale insects (*Diaspus bromeliae*): The spraying of chemicals for the control of mealy bugs, mentioned above, will be sufficient for the control of scale insects.

## Disease Management

No serious pests or diseases are noticed in the crop except for light incidence of leaf spot disease and of the mealy bugs.



For control of leaf spot, spray with any one of the following fungicides when symptoms of the disease are noticed:

Bordeaux mixture 1%, 225 litre / ha  
 Zineb 1 kg in 225 litre water / ha  
 Mancozeb 1 kg in 225 litre water / ha  
 Ziram 1 kg in 225 litre water / ha

Root rot / heart rot / fruit rot caused by *Phytophthora* sp. is common in poor drainage conditions. Providing drainage is most essential. The water table should be at least 60 cm below the soil surface. Badly affected plants should be destroyed and the remaining plants should be drenched with 1% Bordeaux mixture in the soil. Leaf spot can be controlled by spraying 1% Bordeaux mixture or 0.2% zineb / mancozeb / ziram.

### ***Plant protection***

Sun burn: During summer months it is necessary to protect the fruits from scorching sun by putting dried grasses, coconut or arecanut leaves.

## **Harvesting**

Pineapple is a perennial fruit crop and the returns continue, usually, for a period of 3 years in case of variety 'Mauritius' and 4 years in case of variety 'Kew'. With the application of Ethephon and fertilizers the first yield is obtained within 10-12 months. Observing the colour change is the most common method of determining the maturity of fruits. When at least two or three rows of eyes at the base turn yellow, pineapple is ready for harvest. Harvesting is done by cutting the fruit stalk and placing the fruits in piles or on to the vehicles. Fruits for fresh fruit market are often marketed with crowns.

## **Processing**

A number of pineapple processing units are coming up in the State apart from the ones currently in operation, targeting overseas markets. Agreeco is setting up a pineapple processing unit in Kannur at an investment of Rs 26 crore for exporting canned slices to the US. To be operational by February next year, this unit will export 15,500 tonnes of packaged pineapple a year. The project is being set up in collaboration with Ashco Inc of the US.

Nirmal Agro Industries is setting up another processing unit in Kochi, which plans to export 130 tonnes of canned pineapple a day to the US. This unit will be operational in the next 3-4 months.



Nadukkara Agro Processing Co Ltd (NAPCL), maker of the 'Jive' brand of packaged fruit juice is also there in the scene. Jive fights with brands such as Tropicana from Pepsi and Real from Dabur for its survival. Jive, which comes in two flavours - Splash, a mango-pineapple nectar, and Punch, a pineapple drink. NAPCL launches a mango flavour under the 'Jive Mango Joozy' brand. NAPCL also makes candies from pineapple. The other stream of business is making pineapple and mango juice concentrates, which the company sells to other packaged drink makers in the national and international markets.

## Marketing

In Kerala, major share of the produce reaches the market during the months of February to April and the arrivals are very low during the rainy months of June and July. In Ernakulam District a specialized local pineapple market has been functioning for the past 10-12 years at Vazhakulam. Pineapple trading is there in the market more or less throughout the year, even in lean seasons. It is estimated that only 30% of the total produce is reaching the market, whereas the rest is being traded at the farm gate itself. During the last five years, the lowest price received by the producer was Rs 2.5 per Kg and the maximum price was Rs 9 per Kg.

Apart from internal trade in other local markets, fresh fruits are being transported to other areas like Mumbai, Ahammedabad, Hyderabad, Bangalore, Delhi, Mysore, Surat etc and also to Middle East countries. During February – April months, on an average 100 Mt of fresh pineapple is getting transported daily to distant places like Mumbai, Banglore and sometimes it may go upto 500 mt. Experience has shown that during this long journey, through torturous roads which were constructed very badly and virtually not maintained at all, as much as 30 per cent of the fruit could be damaged.

## Export

The export of pineapple products from India have been almost negligible. Because of the perishability, from Kerala, pineapple in the fresh form is traded only on a limited scale and mostly in the neighbouring regions like Middle East. Exporters from have found it extremely difficult to compete in the global market due to substantial price difference. One of the reasons may be the very high incidence of air freight .Same is the case with pineapple products because India is a high cost producer of relatively poor quality which fetches the lowest prices. The raw material and processing costs are high comparing the international norms.

## Can Kerala be competitive?

Kerala has the right agro-climate, pineapple producing clusters of areas, access to the state of the art technologies, and not too bad a cost economics in production and



processing with potential for substantial improvements. Well thought out commercial strategies linking production, processing and marketing have to be evolved keeping in mind that world markets for pineapple products are already quite crowded.

Kerala is extremely well suited for growing pineapple under natural conditions without fertilizers, irrigation and pesticides. By default, the product could be even labelled as organically grown.

## **The Vision**

According to FAO projections, the world market for fresh pineapples is expected to expand over the next decade. The global imports of fresh pineapples are projected to reach 922 000 tonnes by the year 2005. The developed countries are expected to increase their global share from 89 per cent to 90 per cent and that would absorb most of the expected increase.. Europe is expected to remain the largest import market with 484 000 tonnes exported to be imported by the year 2005. Imports into the EC would amount to 461 000 tonnes, or 50 per cent of global pineapple imports. France would account for a large proportion of EC imports. By 2005, the French are expected to import 133 000 tonnes, or 29 per cent of total EC imports. Ample opportunities are available for us to move to the forefront. From 1986 onwards, Central America and the Caribbean countries also started exporting pineapple to Europe since ships carrying their bananas could also carry pineapple. In the same way we should build future strategies on restructuring of export trade so as to attain a leading position.

