

Weed Mat Technology for Quality Pineapple Production

Over the years pineapple plantations are facing problems due to the lack of replantation with quality suckers, dominance of weeds growth, inaccessibility due to overgrowth of old plants, soil fertility problems and poor fruit quality as per prescribed export standards. To produce large-size fruit with better taste scientific management is very much important. Moreover, under the changing climate conditions, the adoption of climate-resilient technology for pineapple cultivation is essential. Paper discusses the adoption of weed mat technology that can produce a quality pineapple.

PINEAPPLE (*Ananus comosus*), the State Fruit of Tripura, is commonly grown in the upper flat lands and hilly slopes in the state. In recognition of the premium quality of the variety 'Queen' grown in Tripura was awarded Geographical Indicator (GI) in 2015.

Agroclimatic and soil suitability for pineapple

Climate of Tripura is very much suitable for quality pineapple cultivation. Tropical climate with a temperature range of 5-22 °C during winter and 25-35 °C during summer and rainy season. It may thrive with annual rainfall of an average 2,000-25,000 mm. However, stagnation of water damages the plant and during planting time dry weather for at least 15-30 days is essential during September-October. Soil pH of pineapple areas in the State ranges from 4.5-5.5 (acidic). Red loam and sandy loam soil occupy 43.07%, reddish yellow brown sandy soils 33.06%, other three types are older alluvial soil (9.7%), younger alluvial soil 99.3%) and lateritic soil (5%).

Popular varieties

There are two commonly grown varieties Queen and Kew in Tripura. Most popular is var. Queen which is early in maturity and available during May-July in the local market. However, this variety is also available in other months as off-season fruit by using crop regulation technology. Another variety is Kew (Cayenne group) is available from July to September.

Planting materials

Root suckers (ratoon sucker) arise (2-4/plants) from the root zone of the plants and shoot suckers (2-5/plants) arise from the leaf's axil on the plant stump. Suckers weighing 400-600 g are selected. Healthy sucker (1-2/plant) are plucked from the 2-5 year plantations leaving another healthy sucker on the mother plant in the mother block for ratoon crop in the next season. All the

overgrown leaves of the plugged suckers are clipped to 20-25 cm length and treated by dipping in insecticide in a tank with chlorpyrifos/imidacloprid/quinalphos (1.0 ml/L water) for 10-15 min or spraying with these insecticides. Thereafter, all the treated suckers are spread on the ground under semi-shade conditions for curing for 7-8 days more, so that extra water from the sucker tissues is lost. Planting after proper curing is good for maximum plant survival and minimum rotting of the suckers.

PLANTING SYSTEM UNDER WEED MAT TECHNOLOGY

Field preparation: Field is thoroughly ploughed and is made friable by light ploughing after mixing organic manures. Raised beds of 1.8-2.0 m width, 15-25 cm height and length 100 m or as per land availability are prepared. One meter spacing is kept between each bed for ease of movement in the grown-up plantation. Inorganic fertilizers 180 kg urea, 80 kg SSP and 180 kg MOP are applied per hectare basis at the time of bed preparation along with organic manure (@ 15-20 t/ha). Under the organic culture system, 50-60 T/ha FYM and 10-15 T/ha vermicompost are required to meet the total nutrient requirement per year. Apart from these organic manures, FYM treated with *Trichoderma* formulations (@ 300g/100kg FYM) is beneficial for protection from diseases. Application of neem cake @ 50-60 t/ha, rock phosphate @ 400-450 kg/ha and bone meal 650-700 kg/ha at the time of final bed preparation. Biofertilizers such as *Azotobacter* (@ 200g/100 kg FYM) and PSB (@ 200 g/100 kg FYM) are mixed with FYM and incubated for 48 hrs or 4 days and incorporated in the soil at the time of planting.

Weed mat mulching on the beds: U.V stabilized high-density polyethylene (HDPE) weed mats with size 2.5 × 100-200 m and 90-100 gsm thickness are laid over the properly levelled beds covering the beds from all sides. So that soil on the beds is also protected from loosening

or draining out. Normal black-silver polyethene mulching films have not been found suitable for pineapple under Tripura conditions as these are fragile and are damaged in successive years especially due to cultural operations, harvesting, de-suckering and also by rats.

Planting of suckers: Under Tripura condition recommended system is $30 \times 60 \times 90$ cm (43,500 plants/ha or 7000 plants/kani) or $30 \times 60 \times 1.0$ m (43,050 plants/ha or 6,932 plants/kani). Holes on the mat are made as per the planting spacing plan. The best procedure is to fix a plastic string from one end to another end on the weed mat at 60 cm gap as per the planting layout and thereafter 15-20 cm long bamboo or plastic pegs are fixed at 30 cm spacing along the string. A fabricated fabric burning template is the best way to make holes of 10-12 cm diameter on the weed mat at the point of each peg. Otherwise, sharp knife or scissor may be used to make holes in the weed mat. Suckers are planted in holes by pressing the base of the suckers.

Aftercare

The suckers take around two-three months to establish after root initiation. New leaves from the central core start to appear.

Water Management: Pineapple requires comparatively less water due to its xerophytic nature. Plantations under rainfed conditions require proper drainage. Pineapple leaves have water storage tissues and maintain water requirements for plant growth and fruit development even under moisture-stress conditions. After extended periods of dry spells, these tissues decrease. Even some Aerial rudimentary roots in the leaf axil also absorb moisture and dissolve nutrients. Leaf shape and orientations and plant canopy is formed in such a symmetry that full sunshine is intercepted, sufficient rainwater is captured and even moisture on foggy days in winter is also captured to supply into the stem and roots. Lower leaves are not fully shaded by upper leaves due to long and tapering shapes and upper leaves are oriented



at such an angle that though they can intercept maximum sunlight, however, can maintain optimum leaf temperature during summer and winter and reduce moisture loss during dry period. Base of the leaf attachment also acts as reservoir of water and nutrients and basal white tissues of leaves absorb water and nutrients. Lesser numbers of small stomata present on the underside of the leaf in depressed channels and protected by waxy slivery leaf hairs (Trichomes) also reduce water loss due to the low rate of transpiration. Pineapple is a CAM (Crassulacean Acid Metabolism) which keeps the stomata close during the daytime and opens at night as a result water loss is much less during the photosynthesis process. Soil should be slightly moist at the time of planting. Just after planting water is not required for at least 15-20 days, but after this period, the application of light irrigation at 10-day interval by sprinkling on the plants is beneficial for early establishment, better root growth and survival of the plants. Grown-up mature plants and ratoon plants

require less water in comparison to newly planted crops. Grown-up plants require irrigation at 20-30 days intervals during dry period. Prolonged moisture stress is detrimental for plant growth and fruiting. Sprinkler irrigation system is better than drip irrigation as drip pipes are usually damaged by rats and otherwise, is difficult to manage on the grown up plantation.

Weed management: Weed management in traditional pineapple plantations involves a lot of manpower and cost. In many cases, these plantations are overpowered by excessive weed growth in tropical areas like North Eastern states. Weed mat technology has been found to be more efficient in suppressing weed growth. However, along the open interspaces and surrounding areas



Head	Numbers or Unit	Rate (Approx.) ₹/Unit	Amount (₹ Lacs)
Field preparation and pit digging	1 ha	50,000.00	0.50
Weed mat (1.5 × 100 m)	64 Nos.	25.00/m ²	2.50
Plants + transportation	45,000	5.00	2.25
Fertilizer and manures, irrigation, mulching etc.	1 ha	150,000.00	1.50
Cultural operations, foliar sprays and harvesting, etc./year	1 ha	1.25	1.25
Total			8.00



TSS ranged from 16.5-19.5 0B (var. Queen) to 14.5-17.5 0B (var. Kew). Harvesting at green eyes with no yellow colour (CS1) and 5-20% of eyes turn yellow (CS2) is suitable for long-distance marketing, whereas, 20-50% of eyes turn yellow. (CS3 & CS4) sui appropriate for medium distance marketing; and >50-80% of eyes turn yellow (CS4 & CS5) appropriate for local market. However, 90-100% of eyes turn reddish brown (CS6) and are consumed without storage.

Plant protection: Integrated pest management for insects such as mealy bug, termites, weevils and scale is done by spraying chlorpyrifos/imidacloprid/dimethoate/fenitrothion (1ml/L water). Followed by sprays of mancozeb (2-3g/L water) for heart rot and fruit rot. Heart rot is caused by *Phytophthora* spp. heart leaves base turn yellow and then brown water soaked

pre-emergence sprays of bromacil 2.5 kg or diuron 3 kg in 600 litre water per hectare or post-emergence sprays of glyphosate (0.8 kg/ha) have been found effective. Precautions are to be taken to avoid direct contact of these sprays with the pineapple plants.

Foliar feeding: Pineapple plants under weed mat mulching are fed by foliar sprays of nutrient mixtures from the second year as basal dressing by removing weed mat is difficult in dense plantations. Foliar feeding of NPK (19:19:19) as sprays at 7th or 8th months after planting, and again at 30 after fruit set facilitates better leaf and fruit growth. Micronutrient sprays especially Zn (0.4%) + B (0.1%) at 40 and 50 days after fruit set improve fruit weight and quality.

Flower regulation: Flower regulation is also possible under the weed mat technology. Solution of 6.5-10ml of ethrel+ 2kg urea+ 40g sodium carbonate in 100 L water is prepared for 2000 plants @ 50 ml/plant poured at the central core of the plant during evening time at 35-40 leaf stage of the plant. Flowering initiates within 30-40 days and fruits mature within 130-140 days.

Harvesting and Quality: Fruits are ready to harvest during mid May to mid July (var. Queen) and the last week of July to the first week of September (var. Kew). Fruit yield ranged from 55.0-60.0 T/ha (var. Queen) to 65.0-70.0 T/ha (var. Kew). Fruit weight ranged from 1.5-2.0 kg (var. queen) to 2.0-2.5 kg (var. Kew) and

which can be easily pooled out. *Phytophthora* root rot causes rotting of roots and leaf tip and margins to turn necrotic and drenching as well as a spray with ridomil/metalyxil is effective. Broad spectrum fungicide composition of Azoxystrobin 18.2% + Difenconazole 11.4% SC or Metiram 55 % + Pyraclostrobin 5 % WG is recommended for control of diseases.

Advantage of the system

1. Weed free cultivation system which saves 25-30% of the cost.
2. Conserves sufficient soil moisture and also allows water to penetrate the soil through the micro pores of the at sheet.
3. Protects soil erosion under heavy rainfall conditions and sloppy and hilly lands.
4. Better plant growth and a higher percentage of fruit set.
5. Premium quality fruit production with bigger export quality size and higher TSS.
6. Productivity increases by 45-50%.
7. Better shelf life.

For further information, please write to:

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