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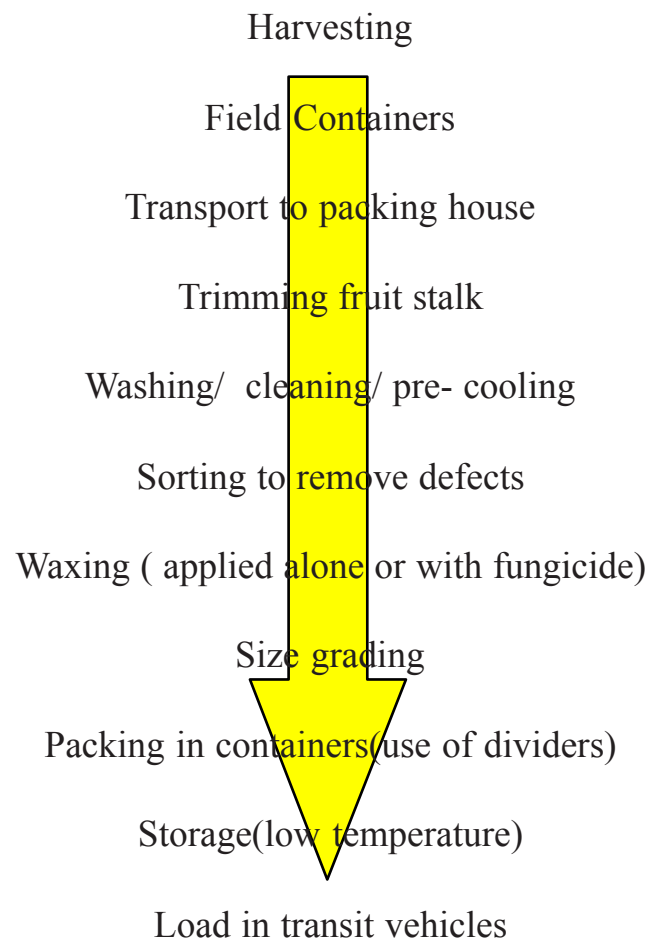
10. RECORD KEEPING

Record keeping is of vital importance at all stages in the production of pineapples.

Whether it is an estimate of the market demands, the average number of slips needed to plant a bed, the amount and date of the fertilizer application, the number and weight of fruits obtained, a system of records is necessary.

Various recording systems could be developed and maintained. However, if record keeping is considered a burden, just a record of daily operations would be extremely helpful.

9. FLOW DIAGRAM OF A POST HARVEST HANDLING SYSTEM OF PINEAPPLES



PINEAPPLE PRODUCTION PRACTICES

With Special Reference to the
Montserrat Variety

1. INTRODUCTION

This publication is a Revised Version of the 1994 edition published by the National Agricultural Research Institute and pertains mainly to the production practices of the Montserrat Variety of Pineapple.

2. ORIGIN AND DISTRIBUTION

The centre of origin of the Pineapples (*Ananas spp.*) is believed to be in the Parana-Paraguay River drainage basin area in South America where the original seed species still occur wild. Another centre of origin is said to be along the river banks of the most southern areas in Guyana.

It is reported that the Tupi-Guarani Indians were the first people to select and cultivate the pineapple in that area and later took it with them on their subsequent migrations. The records of the early explorers show that the pineapple was widely distributed throughout most of tropical America and later taken to other tropical areas of the world e.g. Africa, Asia, the South Pacific and Australia.

The pineapple is one of the most important fruit crops in Guyana for the domestic and export markets. There are lucrative markets for pineapples in the Caribbean Region. There are also good prospects for extra-Regional exports. The major producing areas are in Administrative Regions 3 and 4 where yields range between 15.0 - 18.0 tons/ha. With improved technology, yields can go as high as 30 tons/ha.

3. USES

The pineapple fruit itself is made up of 100-200 berry-like fruitlets or “eyes” fused together on a central axis or core and is borne on a stem or stalk which is an elongation of the apical meristem.

The pineapple was originally consumed only as a fresh fruit. With the development of the processing industry, the fruit is now prepared and consumed in various forms such as pineapple chunks, slices, juices, syrups, jams, crushed pineapple, diced pineapple etc. also the wastes from processing the fruit are now further processed into sugar, wines, vinegar, animal feed, etc.

In the Philippines and Taiwan, high quality fibres, ideal for the manufacture of luxury clothing, are produced from the leaves of their pineapple varieties. In Brazil, fibres of the wild species are used for making rope and fishing nets. The fibre is also used for making pulp in the paper industry.

It should be noted that if low temperature storage is used this will have to be maintained throughout the postharvest and marketing chain so as to avoid condensation of the produce which may later cause fungal diseases such as black rot etc. to develop.

8.3 Grading Standards

Pineapple should have the following minimum quality standards to stimulate consumers appeal and increase profits.

- (i) Fruit needs to be mature, firm and well formed.
- (ii) Fruit should be free of surface debris and stains.
- (iii) Fruit should have no wounds, scratches, punctures or bruises.
- (iv) Fruit should have no scars or residues from insects or spray chemicals.
- (v) Fruit should be free of soft rots or surface moulds.
- (vi) The size of the crown and ratio of crown to fruit length should be guided by market requirement.

After treatment, size grading and separation according to stage of ripeness should be carried out. Large is considered to be greater than 1.6kg medium 1.2 to 1.6kg and small less than 1.2kg. The fruit is then packed in special cartons with good ventilation. The preferred method of packing is by placing the fruit vertically or in a standing position in the carton. Dividers or separators are placed between fruits in the carton to prevent the fruit from rubbing together and minimize abrasion and damage.

Fruits are normally packed to a net weight of 10- 15kg but this depends, however, on the carton and the market. Fruits in individual cartons should be the same size which would determine the counts that can be accommodated. Accepted counts are as follows:

- (i) 6 count - over 1.6kg
- (ii) 12 count - 1.2kg
- (iii) 12 count - 1.0kg
- (iv) 20 count – 0.75kg

8.2 Storage

Mature green pineapple should be stored at a temperature of 8-10°C and at relative humidity of 85-90%. Under these conditions it should have a storage life of 2-3 weeks.

Sensitivity to chilling injury is, however, related to the level of ripeness of the fruit. Storage of green fruit (CS1) below 8°C will result in chilling injury symptoms such as incomplete colour development, wilting and darkening of the flesh, crown and peel.

4. SOILS AND CLIMATIC REQUIREMENTS

Pineapple grow well in Guyana on a wide range of soils. Some pineapple are grown on the upland sandy soils, but most of the commercially grown pineapple are on riverain silt loams, clay loams and clay high in organic matter, locally called (Pegasse soils) that have benefitted from improved drainage and water control systems. Soils prone to water logging are unsuitable since they hasten the development of root rot. Best growth is achieved on well-drained, fertile, sandy loam soils with a pH range of 4.5-5.5.

Although the pineapple plant is fairly resistant to drought, it requires a medium to high evenly distributed rainfall for good growth and the production of healthy fruits. It will grow with an annual rainfall as high as 2,500 mm once adequate drainage is provided.

5. VARIETIES

In Guyana, Montserrat is the main variety grown. Other varieties cultivated in small quantities are Sugar Loaf, Smooth Cayenne, and Tiger Head.

5.1 Montserrat

This is the principal variety cultivated in Guyana. It has long leaves with stiff serrated edges. The fruit is mainly conical in shape, hardy and delicious. It is pale-fleshed with small pointed ‘‘ eyes ‘‘ and weighs between 1.5-3 .0 kg.

5.2 *Sugar Loaf*

This is a delicate variety with a very short shelf life. The leaves have serrated spiny margins. The fruit is oblong in shape, dark green when mature but acquires a bright yellow colour and a strong aroma when fully ripe. It is yellow-fleshed and averages about 2 kg in weight.

5.3 *Smooth Cayenne*

As the name implies the leaves, unlike those of the Sugar Loaf and Montserrat, have smooth margins. The fruit is almost cylindrical in shape with flat, broad eyes and averages about 2 kg in weight. It is pale fleshed and fine flavoured. It is principally a canning variety.

5.4 *Tiger Head*

This variety is found scattered in the Amerindian Settlements in the Hinterlands areas. It has long, narrow leaves with spiny serrated margins. It bears a long rounded fruit that has a sweet taste and coarse-textured and weighs about 2-3kg.

6. CULTIVATION PRACTICES

6.1 *Land Preparation*

Where cultivation is to be done for the first time, on forested new lands, the “ slash and burn ” method of land clearing could be used. This method has the advantage of releasing nutrients to the soil, and destroys or reduces weeds and ants nests in the fields. Following this clearing, certain options are available in 6.1.3.

conducted. Undersize, oversize, overripe, under ripe, damaged, bruised, insect and fungal infested fruits should be rejected.

7.3 *Transport*

Fruit should be transported in such a way as to avoid unnecessary damage. The transporting vehicle should allow for good air circulation and protection of the produce from sunlight. Transport of fruit should be done in the cool periods of the day and on roads / dams that allow for smooth traveling.

8. PACK HOUSE OPERATIONS FOR EXPORT

8.1 *Fruit Preparation, Treatment and Packing*

At the pack house the fruit is prepared for the market. The fruits stalk should be trimmed to about 1-3cm in length. It should then be sorted by removing all those that are defected. It should then be washed in clean water to initiate cleaning and as a form of pre- cooling exercise.

The fruit should then be dried and a recommended wax solution or wax and fungicide solution applied by dipping or spraying. Care should be taken in the choice of the wax to be used and this should be guided by the importing country requirements. The selected waxes give a reduction in internal browning symptoms of chilling injury, reduce water loss and improve fruit appearance. If the wax injures the fruit crown, only the fruit should be waxed.

Observing the flesh condition can also assess fruit maturity. Random samples of fruit can be taken and sliced horizontally at the point of the largest diameter. Where more than half of the area is translucent, the fruit is considered beyond optimum maturity. If the facilities are available, the sugar content or Brix measured by a portable refractometer could be determined. The minimum Brix required is 10% at the top and 12 % at the bottom for the green mature pineapple. Also a brix; acid ratio measurement of 2.0 at the top and 2.75 at the bottom of the fruit may be used but this will also depend on market requirements.

It is clear therefore that the stage of maturity at harvest is, however, dependent on the storage life and distance to the particular market. Fully ripe fruits are unsuitable for transporting to distant markets and less mature fruits are selected in this case. Immature fruits are not shipped since they do not develop good flavour, have low brix and are more prone to chilling injury. Generally, for export CS1 and CS2 are used.

7.2.1 *Harvesting and Field Preparation*

The Pineapple is hand harvested with the pickers being directed as to the stage or stages of ripeness required. It is harvested by breaking or cutting the stalk a few centimeters below the fruit. The harvested fruit is packed either in the field or at a central packing shed. While in the field it should be placed in shaded conditions. From the collection in the field and from field to Pack house, polyethylene sacks or bags should not be used for packing and transport, as this will cause a high level of mechanical damage and eventual losses in quality. The fruit should be placed in field crates for transport to the packing shed. In the field, a preliminary grading exercise can be

6.1.1

On the upland sandy soils, little additional preparation is required before planting.

6.1.2

On the heavier riverain soils, when replanting old pineapple cultivation or using lands previously used for other crops, the area should be ploughed and left to weather for 3-4 weeks. The land is then harrowed and the crop can be planted.

6.1.3

On riverain and potential acid-sulphate soils where water control is critical, a system of raised beds and drains will be required. The width of the beds will depend on whether single or double rows of plants will be used. If single rows are to be used the beds should be made 240 cm (8 ft) wide and for double rows the beds should be 390 cm (13 ft) wide. Drains on either side of the bed should be made 60 cm (2 ft) deep. This will enhance the removal of excess water from the plants' rooting zone.

Control of weeds can be initiated at this land preparation stage. (Refer to section 6.6).

6.2 *Propagation and Planting Materials.*

The pineapple is propagated vegetatively. Planting materials are obtained from various parts of the plant and are identified according to the part of the plant on which they are found.

6.2.1

Ratoon Suckers are shoots produced from ground level and, when used, will produce fruit in twelve to fourteen months after planting.

6.2.2

Side Shoots or suckers are shoots produced above ground level and, when used, bear within eighteen to twenty months after planting.

6.2.3

Basal suckers known as “slips” (fig 1) are located at the base of the fruit. They produce fruit within fourteen to sixteen months after planting and are the preferred type of planting material.

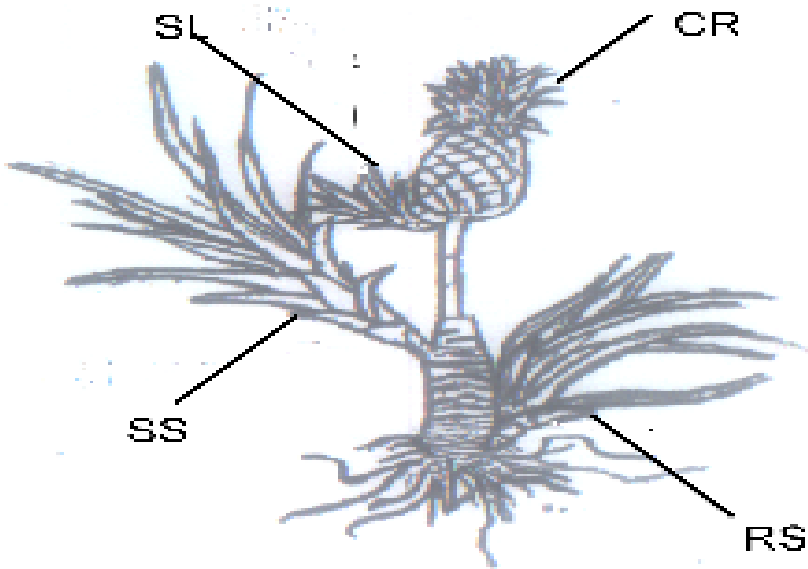


Fig. 1

Plant shoots used for planting material

CR = crown; SL = slip; SS = side shoots or suckers; RS = ratoon suckers



Code:
CS5

Eye Colour:
90% Eyes Yellow
5-20% Reddish Brown

Code:
CS6

Eye Colour:
20-100% Eyes Reddish Brown

Description:
Fully Mature

Average Brix:
14-15



Code:
CS3

Eye Colour:
20-40% Eyes Yellow

Description:
Intermediate Green
Green Mature/Fully Ripe

Code:
CS4

Eye Colour:
40-80% Eyes Yellow

6.2.4

Crowns are situated at the apex of the fruit (fig 1). This type of planting material is not commonly used by farmers, and even when used, they take as long as twenty-four months after planting to produce fruit.

6.3 Preparation of Planting Materials

6.3.1 Treatment

Remove dried leaflets found at the base of the suckers and trim the ends with a sharp knife. The slips with leaflets pointing upwards, should be packed in a container, layer after layer. When the container is filled, add a solution of Malathion or Diazinon 0.1 % - 5 ml in 4.5 L water (1tsp/1 gal water) until the slips are fully covered, in order to ensure all pests are killed. Submerge slips for twenty minutes then drain off the solution into another container and store for reuse. Using gloves, remove suckers from the container and pack on ground under shade in an up-right position for seven days.

This treatment is essential for the control and spread of pineapple mealy bug.

6.3.2 Grading

Prior to planting, suckers should be graded according to size. Large and small ones are to be planted separately:

Large suckers (slips) - 15 cm (6 ins) and over

Small suckers (slips) - below 15 cm (6 ins).

For better and faster growth, large suckers are preferred.

6.4 Planting

When planting, ensure that the “heart” of the plant is above soil level otherwise rotting will occur, particularly if the soil is wet. Either the single or double-row system can be used. However, for a more cost-effective land use, the philosophy is to have the largest number of plants per unit area as is practical. This is better achieved by the double row system which accommodates more plants while still permitting some room to manoeuvre between the plants. This double-row system is therefore the recommended system of planting.

6.4.1 Single Row

The rows are spaced 150 cm (five feet) apart and plants spaced 60 cm (two feet) within the row. This allows for a population of 11,000 plants/ha (4,400 plants/ac).



Fig. 2: Single Row Planting

7.1 Assessing Maturity

Fruit maturity is evaluated on the extent of fruit eye flatness and skin yellowing. Generally, the colour stages are categorized as follows:



Code:
CS1

Eye Colour:
All Green Eyes

Average Brix:
Top - 10

Code:
CS2

Eye Colour:
5-20% Eyes Yellow

Description:
Green Mature

Average Brix:
Bottom - 12

In practice this is 20-40 mls of Ethrel + 400 gms of Urea per 20 L Sprayer or approximately 1.5-3 Tablespoons of Ethrel + 1 lb. Urea per 5 gal. Sprayer. The application is made to the centre of the whorl delivering about 30 mls (2 tablespoons) of the mixture per plant.

It must be remembered that the use of the herbicides Karmex and Krovar are to be avoided during this blooming period. If these herbicides are being used around this time, then the application should be so scheduled to conclude before floral induction commences.

7. HARVESTING AND POST HARVEST HANDLING

The time of harvesting the Pineapple depends on whether the fruits are for the domestic or overseas market. Fully ripe fruits are suited more for local markets while unripe but mature fruits can be shipped overseas.

The Montserrat pineapple has excellent quality when optimum ripeness is reached. As a fresh fruit, however, it has two (2) undesirable features:

- 1) After picking, it does not ripen or improve in eating quality and consequently the fruit must be harvested at the optimum ripeness to suit the particular market.
- 2) In some cases, there may be a difficulty in estimating the internal quality of the fruit based on external or skin colour and other means will have to be employed.

6.4.2 Double Row Planting

Two rows are spaced 70-80 cm (28 -32 ins) apart. The suckers should then be planted staggered 45 - 60 cm (18 - 24 ins) within the rows. The distance between the double rows or every two rows should be 150 cm (5 ft.). This arrangement will give 25,000 - 29,000 plants/ha (10,000 to 12,000 plants/ac).



Fig. 3 Double Row Planting

6.5 Fertilizers

The fertilizer recommendations are based on a plant density in the double-row system of 25,000 - 29,000 plants/ha (10,000 - 12,000 plants/ac).

It is important to have the soil analyzed to obtain recommended levels of fertilizers, but on the whole, the pineapple plant requires high levels of fertilizers for satisfactory production.

In the absence of a precise soil analysis, the following general recommendations will suffice.

6.5.1 Sandy Soils

The upland sandy soils are infertile and require a complete fertilizer with added trace or minor nutrients. A general recommendation will be to apply on a per annum basis:

600 kg/ha (532 lb./ac) of 12:12: 17:2

24 kg/ha (20 lb./ac) of 3:9:30 +FTE (trace elements)

The total amount of nutrients should be applied on equal split applications at two months intervals, i.e. 104 kg/ha of the total mixture is to be applied every 2 months. If 12:12:17:2 is unavailable then it may be substituted by:

Urea -	200 kg/ha (90 lb./ac)
TSP. -	150 kg/ha (80 lb./ac)
M of P -	112 kg/ha (95 lb./ac)
Magnesium Sulfate-	23 kg/ha (5lb./ac)

6.5.2 Riverain Soils

Apply half the amounts as recommended for sandy soils but maintain the same times of application.

Control of the disease is directed at controlling the *Thecla* butterfly previously described.

6.9 Artificial Flower-Induction



Artificial flower-induction is a procedure that utilizes synthetic hormones to induce plants to flower. It permits better scheduling of the harvest as it takes five months from the time of induction to full maturity of the fruits. The process works best when the following criteria are fulfilled:

The plants in the block to be treated should be homogeneous in size and not less than 12 months old or possess less than 25 leaves. Young and unhealthy plants should not be induced to flower

since they will produce small fruits, (unless small fruits are specifically required for a particular market).

Treatment should take place in the cool of the day, early morning or late afternoon, with preference for the latter. The main products used to induce flowering are Naphthalene Acetic Acid (NAA) and Ethrel. The NAA is available in tablet form (0.5 mg active ingredient per tablet) and treatment is achieved by placing one or one-half a tablet into the whorl of each suitable plant. Ethrel is a liquid and is used as a 0.1-0.2 % spray solution. To enhance its performance, it is recommended that Urea be added to the solution to the level of 2 %.

6.8 Disease Control

6.8.1 Wilt Disease:

The most common Wilt Disease is caused by a virus/toxin associated with the Mealybug. This disease occurs throughout the world and is present in Guyana.

The most visible symptom is a bright bronze to red coloration of the leaves of the young plant or a pinkish and/or yellowish coloration of the older plants. If the plants continue to grow, the leaves lose turgidity and curl outwards. Any fruit produced by these plants is usually small and/or distorted.

Control is effected by taking the measures to control the mealybug previously described, starting with the selection and treatment of healthy suckers for planting. This is followed by the eradication of the ants associated with the mealybug and the routine treatment of the plants to control the pest.

Also, all infected plants should be removed from the plant site and destroyed by burning as these plants are a source of infection.

6.8.2 Gummosis Disease of the fruit:

This disease follows the attack of the fruit by the *Thecla* butterfly and is characterized by the exudation of an amber coloured resinous material or gum from the wound.

6.6 Weed Control

Pineapple plants are slow growing and do not cover the ground well enough to suppress weeds from developing. Weeds compete with the pineapple plant not only for nutrients, but also for water and sunlight and can cause considerable reduction in the growth of the pineapple, resulting in poor crop yields.

Weeds can be controlled manually by cutlassing, hoeing etc., mechanically with tractor drawn implements, or by use of chemicals. In practice, however, it is a combination of these operations that is usually conducted.

Where chemical control is preferred, they are usually applied at three different stages of the plant cycle. These are: -

- During land preparation
- At planting
- During the growing period

6.6.1 During Land Preparation

This is the best period to destroy weeds that are difficult to eliminate at the later stages.

Post-emergence herbicides such as Round Up that destroy weeds that are already growing, are recommended at this stage. Also recommended is a combination of Gramoxone and Karmex. If only grass weeds are present, it may be more cost effective to use Dalapon.

Since these products take some time to effectively kill the weeds, an interval of 3 -4 weeks after application and before the tilling of the soil should be allowed.

6.6.2 At Planting

At this stage, the aim is to destroy the weeds as soon as they germinate. Pre-emergent herbicides with long persistence should be used to prevent the development of the weeds over a long period of time. However, these chemicals must not have a detrimental effect on the growth of the pineapple plant.

Herbicides such as Gesaprim, Karmex and, Krovar are recommended for use immediately after planting.

6.6.3 During the Growing Period

The pineapple plant is most vulnerable to herbicides when it is three to five months old as this is the most active period of growth of the plant.

If chemical weed control cannot be avoided during this stage greatest care must be taken during application. To avoid all phytotoxicity risks therefore, the application of herbicides during the growing period, with few exceptions, should be restricted to the space between the rows.

Herbicides such as Gesapax, Karmex with a surfactant spreader such as Frigate, and Krovar are recommended. For certain hard to kill weeds, Gesapax Combi might be used. Also, if there are only grass weeds present, Fusilade could be used and this could be applied as an overall spray over the plants.

the pest under control. The frequency of these applications depends largely on the level of pest infestation, but are particularly important at the early plant growth stage and during the fruiting season.

It is also necessary to apply chemical treatment to the plant suckers before planting (refer to section 6.3.1).

Apply any of the following insecticides:

- i. Basudin 60% EC. Apply 0.2 spray. Mix 10 ml/4.5 L water. (2 tsp/1 gal water).
- ii. Malathion 50% EC. Apply 0.1% spray. Mix 10 ml in 4.5 water. (2 tsp/1 gal water).

When spraying, ensure that the nozzle is directed towards the lower parts of the plant where the mealybugs are found.

6.7.2 Fruit Pest

The fruits of the pineapple can be attacked by the larvae of the butterfly, *Thecla basilides*, which is widespread in Latin America but is unknown in the Caribbean Islands north of Trinidad. The attack on the fruit leads to gummosis disease of the fruit.

The control of this pest is achieved by the application, at the time of flowering and during the blooming period, of the same chemicals used to control the mealybug. As such, the timing of the applications could be so co-ordinated to control both pests simultaneously.

Place bait in any suitable container with the acoushi ant bait on the aluminium foil or plastic.

Cover the container of bait with another piece of aluminium foil. Weight the foil down with stones or pieces of wood. The second piece of aluminium foil protects the bait from rain and sunlight. Disturb the ant nest with a cutlass or any suitable object to arouse the ants for early uptake of the bait.

Finally, cover everything with trash to protect the bait, container and foil from vandals and intruders.

Using the milk bait:

Apply the milk bait by coating the inside pieces of split bamboo, pineapple, leaf or other suitable material. Remember not to touch the bait with your hands.

Place the bait-coated material with the inner surface down, near the nest. As before, disturb the ant nest to excite the ants for early feeding on the bait.

Cover baited material with trash.

Both baits are available at the National Agricultural Research Institute (NARI).

6.7.1.2 Control of the Mealybug

Spraying the plants in the field after the ants have been eliminated can control the Mealybug. Insecticide application is recommended throughout the plant growing cycle to keep

Avoid the use of Karmex and Krovar between the flowering and harvesting of the Pineapple as it may cause some phytotoxicity that could affect both quality and yield.

6.6.4 Summary of Recommended Herbicides and Dose Rates

6.6.4.1 Used During Land Preparation

Trade Name	Chemical	Dose (Per Unit Area)	Dose (Per 20L Spray)
Dalapon 80%	Dalapon	12-18kg/ha 10-16 lb./ac	1-2 kg 2.5-4lb.
Gramoxone 24% Millquat 27%	Paraquat	3-12 L/ha 2-8 Pints/ac	0.250-1L 0.5-2 Pints
Karmex 80%	Diuron	5-7.5 kg/ha 4.5-6.5 lb./ac	0.5-0.75 kg 1-1.5 lb.
Krovar 80%	Bromacil/Diuron	5-7.5 kg/ha 4.5-6.5 lb./ac	0.5-0.75 kg 1-1.5 lb.
Round-Up 42%	Glyphosate	9.5-19 L/ha 6.5-13.5 Pints/ac	1-2 L 1.5-3 Pints

6.6.4.2 Used At Planting

Trade Name	Chemical	Dose (Per Unit Area)	Dose (Per 20L Spray)
Gesaprim 80%	Atrazine	5-7.5 kg/ha 4.5-6.5 lb./ac	0.5-0.75 kg 1-1.5 lb.
Karmex 80%	Diuron	5-7.5 kg/ha 4.5-6.5 lb./ac	0.5-0.75 kg 1-1.5 lb.
Krovar 80%	Bromacil/Diuron	5-7.5 kg/ha 4.5-6.5 lb./ac	0.5-0.75 kg 1-1.5 lb.

6.6.4.3 Used During Growing Period

Trade Name	Chemical	Dose (Per Unit Area)	Dose (Per 20L Spray)
Gesapax 80%	Ametryne	2.5-3.75 kg/ha 2.25-3.25 lb./ac	0.25-0.4 kg 0.5-0.75 lb.
Gesapax Combi 80%	Ametryne/Atrazine	2.5-3.75 kg/ha 2.25-3.25 lb./ac	0.25-0.4 kg 0.5-0.75 lb.
Fusilade Nabu 12.5%	Fluazifopbutyl Sethoxydim	200-250 mls/ha 80-100 mls/ac	20-25 mls
Karmex 80%	Diuron	2.5-3.75 kg/ha 2.25-3.25 lb./ac	0.25-0.4 kg 0.5-0.75 lb.
Krovar 80%	Bromacil/Diuron	2.5-3.75 kg/ha 2.25-3.25 lb./ac	0.25-0.4 kg 0.5-0.75 lb.
Frigate	Surfactant	5 ml/ L 4 teaspoons/gal	100 ml 0.25 pint

6.7 Pest Control

6.7.1 The Ant Mealybug Complex

Two insects pose a serious threat to pineapple cultivation. These are the Ant (*Solenopsis* sp or *Araucomyrmex* sp.) and the Mealybug (*Dysmicoccus* spp.). The combination is the Ant Mealybug Complex.

Mealybug colonies are tended by ants, which protect them by making shelters of soil around the mealybug. Initial control should be directed against the ants to ensure success. When the ants are controlled the shelters collapse and control measures can then be directed towards the mealybug.

6.7.1.1 Control of the ants

Ants can be controlled either by drenching their nests with insecticide or by applying baits.

Drenching- Apply a 0.2% Basudin spray to the nest 10 ml/4.5 L of water (2 tsp. in 1 gal water). Soak nest thoroughly.

Baiting - Use Acoushi ant bait or milk bait.

Using the acoushi ant bait:

To apply the acoushi ant bait, first place a piece of aluminum foil, or plastic near nest. The purpose of this foil is to prevent the bait from absorbing soil moisture. Moist bait is rejected by the ants.