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Agriculture Intensive dans les Iles de la Caraïbe : enjeux, contraintes et perspectives
Intensive Agriculture in the Caribbean Islands : stakes, constraints and prospects
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PINEAPPLE CULTIVATION IN GUYANA A REVIEW AND PROSPECTS FOR THE FUTURE

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ABSTRACT

A critical review of the agronomic practices performed in pineapple cultivation is conducted. These practices include selection of varieties, propagation, treating of planting materials, land preparation, planting and spacing, fertiliser uses, weed control, pest and disease control, forcing, pruning and harvesting. The practices are closely examined and include how they are conducted, their advantages and setbacks, if any.

Post-harvest handling includes preparation for market, packaging, storage and transportation. A new and exciting technique that has a lot of promise for the future of pineapple is also discussed. The technique, known as waxing, is gaining tremendous popularity among pineapple exporters.

The export market is dominated by two (2) countries within the Caricom region and extra regional trade accounts for a little more than 0.10 percent of total exports. The major source of transportation is via air-freight. Constraints to the export trade are also stated.

Discussion then surrounds several reasons why, though promising, pineapple production has declined in Guyana in recent years. Prospects for the future are then mentioned.

INTRODUCTION

The pineapple, Ananas comosus (L) Merr., belongs to the family Bromeliaceae and is an erect perennial herb reaching a height of up to one (1) metre. It is shallow rooting from leaves at the base of the stem. Leaves are swordshaped, long, trough-like, serrate, glaucous and succulent.

Flowers are in spike with red bracts and purple corolla. The fruit is parthenocarpic, multiple solitary, terminal ovoid, green turning yellow with whitish bloom when ripe. The fruit stalk runs through the fruit (core) and terminates in a crown of leaves.

In Guyana, this native of Tropical America, is grown on the lighter soils, rich in organic matter with a pH of approximately 5.5 and low in salt content.

Pineapples are well accepted by the populace. The flesh of the ripe fruit is mainly eaten fresh. Other forms of use include juices, pineapple chunks, fruit cocktails, jams and the skin and core may be used for making a cold drink.

Experiments carried out on the waste of the pineapple showed that it can be used as an additive to silage, and can be combined with dry ground rinds, through the process of steam sterilising to produce a rich cattle feed.

VARIETIES

The variety recommended is Montserrat. Other varieties include Smooth Cayenne, Antigua Black, Sugar-loaf and Tiger-head which are more delicate varieties.

PROPAGATION

High quality planting materials are selected and grouped according to size. It is recommended that only plants of the same size, type and variety should be planted in the same field.

Basal suckers and side shoots are preferred for planting materials, but ratoons and crowns are also used.

- (i) Ratoons - Suckers that arise below ground level. These bear in 12-14 months.
- (ii) Basal Suckers (Slips)- Plants from the base of the fruit. These bear in 14-16 months.
- (iii) Side Shoots (Happas)- From the mother plant. These bear in 18-20 months.
- (iv) Crowns - From the crown of the fruit. These bear in 2 years.

In all cases bigger planting materials produce larger plants, earlier fruiting and heavier fruits.

PREPARATION OF PLANTING MATERIALS BEFORE PLANTING

A high yielding field with at least 80% healthy plants bearing high quality fruits must first be identified. Suitable plants are then tagged for selecting planting materials. Criteria for selection include uniformity in ripeness and colour, vigour, health and shape of the fruit according to variety. Fruit quality includes small core, flesh with a minimum of fibres, good texture, juiciness and flavour.

It is recommended that two (2) or three (3) of the lower leaves of the selected slips and shoots be removed and the base trimmed with a sharp knife. The entire plant should then be dipped in an insecticide eg. Malathion. With a sticker (eg. citawett) added, the cut ends are dipped in a fungicide, eg. cerasan. However, few farmers follow these recommendations.

The planting materials are then graded according to size and packed loosely under shade for 4_5 days before planting.

LAND PREPARATION

The aim is to produce a solid bed of a very good structure and a fine tilth. A six (6) feet bed formation is recommended. Land preparation is done in the dry season when trees and undergrowths can easily be removed.

PLANTING AND SPACING

Generally planting is done late in the dry season since the plant is tolerant to drought due to the presence of special water storage cells. However, some farmers do planting at any time of the year. A depth of 3 inches is best for suckers of average size, but for longer suckers the depth may be 4 - 5 inches. Care has to be taken to ensure that the heart of the plant is above the ground, otherwise rotting may take place when it rains.

Spacing depends on soil fertility and a single or double row system may be used.

Single Row: Rows are five (5) feet apart and plants are placed one and one-half (1.5) feet within rows. This gives a plant population of 6000 plants/acre.

Double Row: Beds are six (6) feet wide and two (2) rows are planted 18" - 24" apart on either side of the middle of the bed. Plants are then placed 18" 20" within the rows. Planting arrangement may be the square (opposite) or triangular (alternate) system. This gives a plant population of approximately 10,000 plants/acre.

Although the single row system has the advantage of facilitating easier weeding and other cultural operations, the double row system is recommended because it provides better support for the plants and gives a good soil coverage. In the double row system, harvesting is also facilitated since it can be done on each side of the path.

FERTILISER APPLICATION

The plant does not respond well to large amounts of fertiliser, especially phosphorus. Therefore small and frequent applications are recommended.

For the coastal plains, riverain areas and the Barima/Waini Region the recommendations are:

PLANT CROP:

Urea : total of 350 Ib/ac

Triple Super Phosphate (T.S.P) : total of 100 Ibtac.

Muriate of Potash : total of 300 Ib/ac.

RATOON CROP:

Urea : total of 200 Ib/ac.

T.S.P.: total of 75 Ib/ac.

Muriate of Potash .: total of 200 Ib/ac.

Final applications should be done about 2 - 3 months before 'forcing' or floral induction. For the Soesdyke/Linden Highway where the soil has a greater proportion of sand, limestone is applied at a rate of 1000 Ib/ac. Kieserite (50 Ib/ac) must also be applied.

WEED CONTROL

Pineapple plants have relatively short roots and cannot tolerate root competition, therefore good weed control is a necessity.

Due to the high cost of labour in Guyana, manual weed control, eg. hoeing, is very expensive; so chemical control is mostly used for these surface feeders. Gesaprim or Karmex (Diuron) applied at a rate of 2.1/2 lb/ac accomplishes satisfactory results. Other chemicals which may be used include gesapax combi, bromacil and atrazine (ámetryne). Lower rates should be used on the lighter soils and a spray shield should be used to avoid chemicals entering the hean of the plant.

Cut-grass or other organic matter may be used as a mulch. This is beneficial in that it controls weeds, lowers soil temperature, conserves soil moisture and reduces downward movement of fertilisers.

PEST AND DISEASE CONTROL

1) GUMMOSIS is the most important disease of this crop in Guyana. Although this disease is prevalent on the Soesdyke/Linden Highway it is attracting greater attention in the other pineapple growing areas eg. Canals Polder, due to increasing incidences in fruits. Losses vary from 20% (June crop) to 50% (December crop).

The disease is associated with a yeast (Saccharomyces sp) which enters through cracks in the fruits. The symptoms are :

- (i) Exudation of a brown gummy substance from any infected part of the fruit but more commonly from the base and crown of the fruit.
- (ii) Loss of flavour and texture in infected fruits. The yeast converts sugar into alcohol and acetaldehyde during the fermentation process which is responsible for the gum formation. Pectin in the presence of alcohol forms a gel.

2) SOFT ROT is caused by a fungus, Ceratocystis paradoxa, and may affect any part of the fruit before or after harvest. The symptom is :

Dark brown to black legions develop in mature and blemish-free fruits. Affected tissues of the Montserrat variety are canary in colour in contrast with the light straw colour of unaffected tissues.

CONTROL

Both the fungus and the yeast can be controlled by (i) efficient handling and packing during harvesting and intransit., (ii) Good storage with efficient ventilation and (iii) dipping in sodium hypochlorite at 0.5 -1.0% concentration immediately after harvesting. More investigative work on Gummosis is presently being conducted.

3) WILT DISEASE- The entire plant appears red. It is caused by a virus which is spread by a mealy bug Dysmicoccus brevipes Cockerell) that exists in a symbiotic relationship with several species of ants. The ants (eg. Solenopsis sp) benefit by feeding on the "Honey dew" or waste from the mealy bug, which in turn depends on the ants for transportation and to a lesser extent for protection from predators. It is advised that direct control measures for the mealy bug should only be attempted after the ants are destroyed.

CONTROL

- (i) Baits are used for the control of the ants.
- (ii) For the mealy bugs spray with phoxin (50%) at a rate of 1 fluid ounce per 4 gallons of water. About 125 - 150 gallons of spray solution will be required for a plant population of 10,000 plants.

The insecticide should be applied during the dry season and all sprays directed around the leaf base near to the ground and in the whorl.

NEMATODES

Prevalence is not widespread but trials are presently being done to control this using the nematicide Mocap. The genus of importance is Meloidogyne sp.

CONTROL OF FLOWERING (FORCING)

The crop is harvested in December or June providing that the necessary precautions are taken to induce early or late flowering.

Flowering is controlled by applying a flowering hormone eg. calcium carbide, ethrel or alpha-naphthyl acetic acid into the whorl of the plant.

The hormone is bought in a tablet form (NM) and the recommendation is one tablet per plant. Due to early flowering the harvest period is reduced and there is also the extra advantage of the entire fruit shell colour being homogenised.

Fruiting occurs 4 - 5 months after flowering. It is critical that forcing be done at the correct time or else there will be yellowing of unripe fruits which possess a low sugar content. Also of importance is the fact that the application of nitrogen fertiliser should be discontinued about 2 months before forcing since crops with high nitrogen content will be unsuitable.

Hormone treatment is also used for ratoon crop in order to bring most of the field to uniformity at the flowering stage. If applied to developing fruits the effect is to delay maturation and produce larger fruits.

REMOVAL OF SUCKERS

Basal suckers on the fruit should be removed early. When present they serve as a sink for food reserves which can be used by the developing fruit. Their removal therefore, results in a larger fruit and lessens the possibility of injury by insects to the base of the fruit and subsequent rotting.

RATOON CROP

To obtain a good ratoon crop, the plantation should be well maintained. This means that cultural operations such as weeding, fertilising, pest and disease control should continue to be done on a regular basis.

Where necessary pruning should be carried out and the soil around the plant earth up to form a more solid support. Yields from ratoon crops will range from 50% - 60% of the plant crop. It is advisable to cease operations after the second ratoon crop since it is uneconomical.

HARVESTING

As fruits mature, the slips, the eyes near the crown and the crown itself increase in size, the crown opens up, the eyes become larger, their

edges rounder and the spaces between the eyes become lighter in colour. In order to obtain top quality fruits, harvesting should be done after the entire fruit has changed colour. At this stage however, the fruit cannot be stored for any particular time. Montserrat is best harvested when quarter to half of the fruit has changed colour. For the fresh fruit market, harvesting should be done when the crop is half to three quarters ripe. This will allow for 3 - 4 days to full ripeness before it reaches the consumer.

YIELDS

This varies depending on the System of cropping and Crop

a) Single row:

Plant crop	10,000 lb/ac
1st ratoon (60%)	6,000 lb/ac
2nd ratoon (50%)	5,000 lb/ac
	<hr/>
	21,000 lb/ac

b) Double row:

Plant crop	25,000 lb/ac
1st ratoon (60%)	15,000 lb/ac
2nd ratoon (50%)	12,500 lb/ac
	<hr/>
	52,500 lb/ac

The above utilises an average fruit weight of 2.5 lb.

MAIN PRODUCTION AREAS

The major growing areas are found along the coastland of Guyana in four (4) administrative regions namely:

Region II: Mainstay/Redlock

Region III: Canals/Polder, Kamuni/Patosi, Boeraserie,
Parika Backlands.

Region IV: Soesdyke, Kuru Kururu, Yarrowkabra, Hararuni

Region VI: Orealla

In these areas the soil type varies from a sandy loam to an organically rich clay. Of the above major growing areas, Region III produces the greatest quantity of fruits for export.

POST HARVEST HANDLING

This includes preparation, packaging, storage and transportation. Pineapples destined for the export market must first be cleaned of any adhering insects, especially mealy bugs, then dipped in a solution of fungicide eg. benlate or dovicide. Care should be taken to pack fruits according to sizes and stage of ripeness. Each fruit should be protected from each other by a protective material eg. cardboard, sponge, shredded paper or styrofoam. Additional precautions in minimising damages are that fruits should not be packed in more than two (2) layers and boxes should not be stacked too high. Also, boxes should not have sharp inside edges or protruding points which may cause open wounds for disease causing organisms to enter. The recommended storage temperature and relative humidity are 8° to 13°C and 85 - 95% respectively. Under these conditions the fruits can safely be stored for 2-3 weeks. Transportation for the export market is by sea- or air-cargo, while to reach the local markets farmers use mostly trucks or vans.

EXPORT MARKET

From the mid-eighties, Barbados emerged as and still remains the major export market for this country's pineapple. Fresh pineapple is the major produce although other products include pineapple chunks, pineapple jam and pineapple juice. Trinidad is the second largest market with an increasing demand for pineapple chunks. Other export markets include Canada, St. Lucia and the United States of America.

TABLE I:

Volume of Pineapple Exported by Sea and Air
by Country for 1991 (Metric Tonnes)

COUNTRY	VOLUME	PERCENTAGE
Barbados	321.91	50.76
Trinidad	310.31	48.93
St. Lucia	1.15	0.18
USA	0.48	0.08
Canada	0,28	0.04
Total	634.13	

SOURCE: NEW GUYANA MARKETING CORPORATION
ANNUAL REPORT, 1991.

The above total had an estimated value of US \$257,000.

The major constraints to the exportation trust are:-

1. Difficulties experienced in guaranteeing the export quality of fruits especially when the journey took more than two (2) days.
2. The non-existence of an efficient and regular cargo service to the New York, and Toronto markets.
3. Inability to solve the problems of internal discolouration of pineapples.
4. Difficulties experienced in monitoring the movement of pineapples across the Guyana/Suriname border.
5. Problems with organising export shipments of quality produce from the area of production, especially those far removed from the major points of export.

The processing of the fruits into jams and juices has partially minimised the problem, but since the fresh fruit commands the largest slice of the market there are still serious problems to be overcome.

WAXING

In 1991 the Astral Wax and General Works Company commenced extending a service of waxing fruits and vegetables for producers and exporters in Guyana. The advantages are:-

1. It extends the shelf life of the pineapples by reducing the transpiration and respiration rates.
2. It gives the fruit an attractive glossy appearance hence enhancing customer's appeal.
3. It reduces overall wastage during long journeys.

While unwaxed pineapples have a shelf life of approximately 14 days if stored under cooled conditions, the waxed counterparts have a shelf life of up to 32 days. This increases the prospects for -

1. Accessing extra regional markets which were distantly unreachable.
2. Utilising sea-freight rather than air-cargo, which, although having a longer journey will reduce the final cost through a lower transportation cost.
3. Increased volume of exports through a lower rate of spoilage.
4. As a result of (3) above there should be greater earnings for the producers while reducing the price that the customer pays.

Waxing of pineapple is done manually by dipping in a solution containing 1 part wax to 3 parts water. With pineapples, 5,000 lb of fruits can be waxed per gallon of wax. A fungicide may also be used with this wax. One person can do about 500 pineapples per hour. Care should be taken to ensure that only fruits of the highest quality are waxed since low quality/damaged fruits will not benefit by this process.

Waxing is not a panacea, therefore pre and post-harvest techniques should continue to be sound; only then can the full benefits of the process be realised.

DISCUSSION

According to the New Guyana Marketing Corporation, (3), pineapple can be regarded as the most important non traditional crop in Guyana,

where it is ranked third behind sugar and rice as a foreign exchange earner. Despite this however, production, though reaching a peak in 1988 where the export was 663.2 metric tonnes, had decline. Several reasons have been cited for this decline:

1. Poor Drainage and Irrigation- Poorly maintained drainage canals caused flooding in the wet season. A poor rates and tax collection system has hindered the work of the local authorities.

2. Pest and Disease Problems- The disease Gummosis, caused by a yeast, has been responsible for serious declines in both production and quality.

3. Shortage of farm labour- With the revitalising of the Sugar Industry, pineapple farms are losing hired labour because of comparatively higher wages and salaries being paid by sugar estates. Most of the major pineapple growing areas are in sugar producing regions and so competition for labour is great.

4. Escalating Cost of Production and Opportunity to produce other crops such as sugar cane

Farmers argue that the returns on investment is greater with sugar cane. With pineapples, the cost of inputs, farm labour and agronomic problems tend to be an obstacle to investment. Also sugar cane growing is less laborious than that of pineapple cultivation.

Since the main pineapple growing regions are contiguous to the sugar estates, farmers are switching easily as a market is readily available. It should be mentioned that much of the fresh produce is being absorbed by the local markets close to the areas of production.