PINEAPPLE : A PROMISING INTERCROP IN COCONUT LANDS

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Pineapple a multiple fruit, succulent and tasty, rated only second to banana in popularity amongst growers, can be profitably grown in coconut lands. The contributory factors being, the availability of a favorable climate in the wet and wet intermediate zones, consumer demand, supplementry income and suitable soils. Higher costs involved in the initial establishment, short supply of coir dust, and labour have in the recent past brought about adverse effects on pineapple cultivation.

Although soils of the non traditional coconut growing areas such as Moneragala and Badulla are suitable for this crop, about ninety percent of the pineapple is grown as an intercrop under coconut. The aim of this paper therefore, is to educate growers on the scientific methods of pineapple cultivation under coconut.

Pineapple is consumed locally, and also contributes much to foreign exchange earnings.

It has also been shown that beneficial effects are more significant, when pineapple is grown in most of the neglected lands. Hence it has now become a practice for the owners

of neglected lands to lease out such lands for pineapple cultivation with a view to establish coconut subsequently as an underplantation.

Selection of suitable lands.

Region

Coconut lands in Gampaha, Mirigama and Attanagalla are popular for pineapple cultivation.Other areas such as Nattandiya, Kuliyapitiya in the wet intermediate zone have found to be suitable. It has now been spread to areas in Kurunegala, Hettipola in the dry intermediate zone as well. In such areas, coir dust should be applied to conserve soil moisture, and also to prevent formation of small fruits and immature fall.

Soil

Hard clay or very sandy soils, or water logging lands are not suitable, only well drained, gravely or loamy soils are recommended.

Coconut stands.

A basic need in pineapple cultivation is abundant sunlight. Hence success of a healthy pineapple stand depends upon sufficient availability of sunlight.

Effects on Coconut

Many growers assume that growing pineapple in coconut lands reduces coconut yield. This is incorrect.

The reduction in coconut yield in such instances are due to irregular planting of the intercrop, inefficient management, non application of fertilizer to coconut, surface runoff and the failure to remove old pineapple suckers from the field.

Growing pineapple as an intercrop under coconut certainly increases the coconut yield, as coconut palms benefit from fertilizer applied to pineapple, and also through weed control practices. The reduction in soil erosion, and the conservation of moisture in lands where coir dust is used, too enhance the agricultural standards of coconut lands.

A trial conducted by the CRI in a coconut estate at Kuliyapitiya which yielded only 1135 nuts per ac per year as a monocrop, revealed a threefold increase of 3240 nuts per acre per year, after satisfactory establishment of pineapple as an intercrop.

Hence it is recommended that pineapple under coconut be grown when the coconut plantation is below 05 years and over 30 years of age. In senile coconut lands pineapple could be grown for a few years after the establishment of the underplantation.There are two popular varieties found in Sri Lanka, namely Kew and Murisi.

Selection of Planting material.

Pineapple is propagated by suckers, originating from axils of the main plant and also from top of the fruit itself. Only the side suckers should be used as planting material.

During new planting, growers are advised to see that pineapple suckers are free from mealybugs which cause severe damage to plants. Suckers for propagation should be obtained from the main plant after first harvest.

It is only after the third year more side suckers will be available in the plantation.

Land Preparation

Shady and unprofitable trees with large canopies (eg. cashew) should be removed. During the wet season, the land should be tilled using a 4 wheel tractor, leaving a distance of 2 m from coconut palms. In case of sloping lands, tilling should be done only among coconut rows across the slope, without damaging the existing drains. Drains are important to prevent soil erosion.

Treatment of suckers

Fungal diseases, and mealybugs spread through planting material. To avert such damages, it is necessary to treat the planting material with suitable insecticides/fungicides.

Before the suckers are transported to the planting site, it is advisable to immerse them in a solution of Dimethoate (30 ml in 10 litres or 01 fluid oz in 2-3 gls of water) for at least 05 minutes. Afterwards the suckers should be kept inverted, in a shady place. For further preventive measures against fungal attacks and if necessary, the suckers could be immersed in a solution of Mancoseb or Ridomil in the same manner as described above. Do not mix insecticides with fungicides. After these treatments field planting should be done within 2-3 days.

Planting Systems

Single row system

This is more suitable for Murisi variety, as weeding and other estate cultural practices can be easily adopted. Falling of the mother plant after the first harvest, and tilting of the fruits during the subsequent harvests are two disadvantages observed in this system. Number of suckers required for this system are 3500 per acre (Fig. 3)

Double row system

This is the most popular system at present, as it provides space for more plants, and avoids tilting of the fruits. The notable disadvantages are difficulties encountered in weeding, and the susceptibility to mealy bug damage. Number of suckers required for this

advantages are difficulties encountered in weeding, and the susceptibility to mealy bug damage. Number of suckers required for this system is 5000 per acre. (fig.2)

Multiple row system

This system can accommodate 10.000 plants per acre. Although the cultivation lasts for only two years, this system generates, more income over the others. Moreover, under this system the plantation is less prone to mealy-bug damage. Many pineapple growers prefer this system, as this enables them to supply to the export market uniform, medium sized fruits weighing 1.2-1.5 kg each. The constraints in this method are the practical difficulties that workers have to face during maintenance, but these could be overcome if the workers wear gloves while weeding and fertilizer application etc.

Planting has to be done in 10cm deep trenches. Plants will have to be kept errect to ensure quick establishment. To obtain a uniform plantation it is important to plant according to the size without mixing plants of various sizes.

Fertilizer For Pineapple

Fertilizer application is important in pineapple cultivation. Surveys have revealed that the growers apply excess doses of urea which causes the spread of mealybug. The nutrient requirements of Murisi differ from that of Kew.As murisi is grown more extensively, the following mixture is recommended for a plantation of 10,000 plants per acre.

i At planting - initial dose.
Superphosphate - 220 kg
M.O.P. - 110 kg

ii Surface application
4-6 weeks after planting - Urea 220 kg
5-6 months after planting - Urea 220 kg
9 months after planting - MOP 175 kg

iii During the 2 nd year (15 months after planting)

Urea	175 kg
Saphosphosphate	10 kg
MOP	35 kg

Continue application of the above mixture every six months.

It is also advisable to bund soil or coir dust among rows after the first surface application of fertilizer (4-6 weeks after planting) except in multiple planting systems. It will be more efficient to apply fertilizer during light rains, and should ensure that the fertilizer be spread closer to the basal region of the plant where the leaf bases are concentrated.

Urea should not be applied after application of artifical flowering hormones, as otherwise the fruits deform and cause premature fall.

Fertilizer for Coconut

It is a common practice amongst growers who cultivate pineapple under coconut to ignore the application of fertilizer to the coconut stand. This retards coconut palms. It is therefore emphasized that coconut palms be applied with the CRI general fertilizer mixture,within a circle of 2 m radius from the base of the palm, and the manure circle kept mulched using coconut fronds, or husks.

There is a tendency for the coconut plantation to revive faster as pineapple plants receive higher doses of urea. This causes an

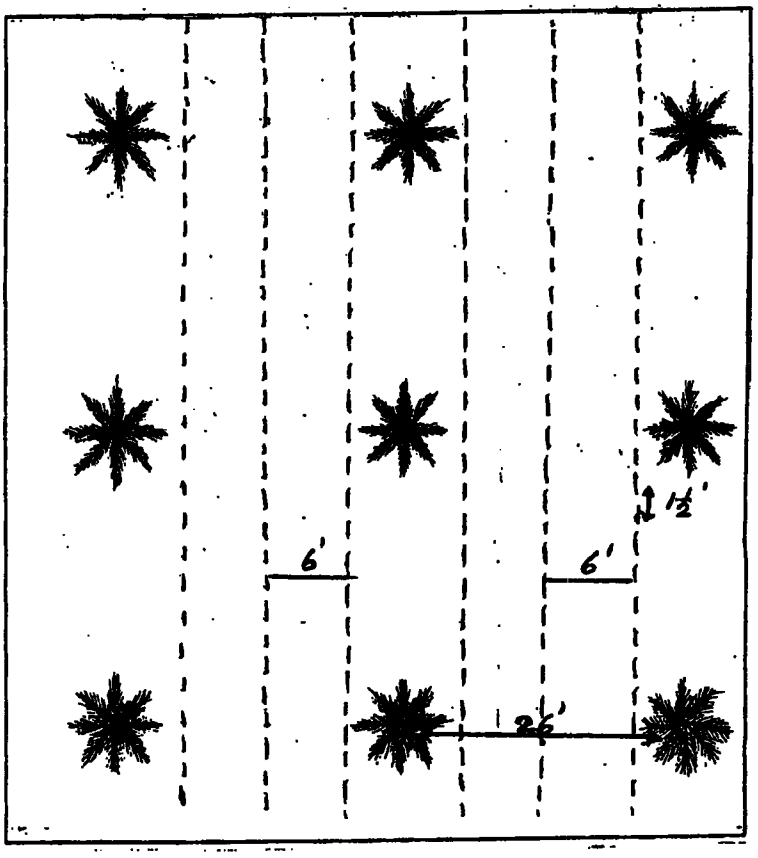

Figure 1. Single row system

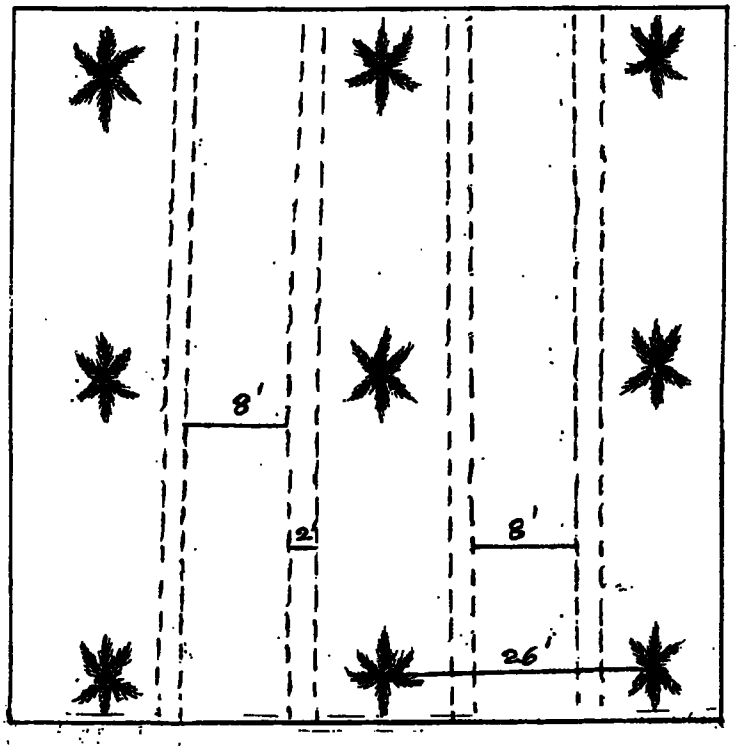

Figure 2. Double row system

imbalance in coconut nutrition and show magnesium deficiency symptoms especially in gravel soils of the wet zone. Hence the application of 01 kg of dolomite per coconut palm per year has to be maintained.

Soil or coir dust bunding

When pineapples are planted in the single and double row systems, the plants after the first year tend to tilt, resulting in smaller fruits. Tilting can be corrected by building soil/coir dust bunds,15-20 cm in height, after the basal application of fertilizer. If coir dust is not available, coconut husks could be used, but this should be mounded with soil. This practice conserves moisture effi ciently, and promotes production of larger fruits.

Weed Control

In a pineapple plantation, keeping weeds well under control is important. The following methods are recommended to minimize weeding costs.

i Manual weeding

Use of mammoty weeding is economical,but difficult during rains, labour shotage is one constraint, as mammoty weeding has to be done many times a year.

ii Use of coir dust

Application of coir dust enhances soil moisture conservation, and weed control as well. If available in large quantities,roughly 80-100 trailer loads per acre,is required.

When the coir dust supply is limited its ap plication could be restricted to either sides of rows only.

iii Chemical control

When growers experience difficulties in obtaining the coir dust requirements or sufficient labour, they resort to the use of weedicides,of which paraquat and diuron/direx are common.

Growth and Management of Suckers

Suckers develop faster after the first harvest. It is therefore necessary to limit each plant to have only two suckers to enhance the development of larger fruits and also to minimize the mealy bug damage.

Diseases

Various diseases have been recorded in other countries, but only the following are of significant importance to our country.

i wilting of young plants
ii Bole and root rot
iii Bud (crown) rot
iv Fruit rot

i Wilting.

The worst is the pineapple virus diseases spread by the invading mealy bugs. Rotting or damages to the root system also cause wilting. The leaves turn violet red, and terminals become so flexible that they can just be bent without breaking. Bushes with the above symtoms could be seen sporadically in the plantation, and the disease spreads in patches.

All diseased bushes should be destroyed with the application of a suitable weedicide such as paraquet by pouring the solution into the bud. Control of mealy bugs will diminish the spread of the disease.

ii Bud (crown) rot

This is caused by soil borne fungus., When diseased, the young leaves could be pulled out easily from the crown. The following control measures are recommended.

i. Selection of disease free planting materials
ii Improvement to drainage systems
iii Avoid deep planting
iv Avoid soil getting into the bud region
v Timely application of fungicide such as Mancoseb

iii Fruit rot

Rotting would start with the entry of the causative agent ***Ceratocystes paradoxa*** (fungus) through wounds on the fruit or the stalk. Blackening of the stalk is a clear indication of the disease being carried into the entire fruit. Measures must be taken to avoid the mechnical injuries to fruits, and proper post harvest techniques should also be adopted. Before storing, it is advisable to dip the cut end of the stalk in a solution of Binomial '80'. This mixture could be prepared by dissolving 100g. of the wetable powder Benomil '80' in 100 litres of water.

Pests

1 Mealy bugs

Mealy bugs are white and are powdery like. They cause heavy damage by sucking the sap from the entire plant and the fruit, the worst damage being the spread of the virus which causes wilting. As ants live in association with the mealy bugs and carry them away, it is also important to control ants as well.

The following guidelines should be followed

i Obtain disease free plants, and treat them as described.
ii Keep the plantation free of weeds.
iii When using coir dust, avoid covering the base of plants.
iv Diseased bushes to be destroyed by pour ing paraquet and burning them within the farm.
v If mealy bugs and ants are present spread of the disease could be avoided by spray ing an insecticide such as" Dimethoate" be fore and after harvesting.

2 Damage by borers

It has been observed since recent times that a white grub 2-3 cm long causing damage by boring the stem beneath the soil, especially in sandy soils. The symptoms are similar to those seen in mealy bug insfested bushes, turning violet red before wilting. When such a bush is uprooted and the basal portion inspected, large numbers of these grubs could be seen feeding on the basal portion. As a preventive measure apply curator/ fueridan or carbofuran to the soil in the infested rows. Avoid applying excessive doses of urea and thick layers of coir dust.

Flowering

In major pineapple growing areas such as Gampaha, Nittambuwa,flowering commences in January, February, and are harvested accordingly in May, June, which is the normal harvesting season for pineapple.

Use of hormones for inducing flowering.

The advantages of the above system are two fold. One is the continuous supply and the other is the generation of more profits during the off season.

To induce flowering, chemicals such as Calcium carbide,Nephthalene acetic acid and Etherphone are used. Calcium carbide which was popular until recently has been found to be more suitable for the kew variety. Calcium carbide crystals should be powdered, and 2-5g of this powder is sufficient to be placed in the bud region of a pineapple bush having around 30-35 leaves.

For murisi variety, the application of Etherphone 5% (e.c) liquid is more beneficial. This hormone is marketed under various trade names, and the concentrations too seem to differ in the market. The following directions are suggested. First dilute 30ml of etherphone 5% e.c. with 50-65 litres of water. To this mixture add 1 kg of urea. From this stock solution appply 100ml on to the bud of each promising pineapple bush. This hormone has been observed to be more effective than calcium carbide, and easy to apply. Four weeks after hormone application, the bud region starts reddening, and after 16-18 weeks the fruits begin to ripe. Rainfall pattern may effect a few changes.

Application of hormones or urea above

the recommended doses cause deformity or splitting of the fruits, while under doses cause poor bearing. Hence it is important to apply only the recommended dose. It has been observed that high prices for pineapple can be obtained during July-September and December-April, and therefore it is advisable to plan fertilizer and hormone application, accordingly. Etherphone can be used for pre-ripening and for yellowing of the fruits.

Usually the application of higher doses of urea tends to cause formation of suckers very close to the stalk. Such plantlets should be removed to ensure larger fruits.

Harvesting and Marketing.

From formation to ripening of a pineapple it takes an average of four months, although it is quicker during rains. When the fruit is riped, the eyes become distinctly clear and harvesting is advisable when about 25per cent of the eyes closer to the stalk turn yellowish.

When pineapples are to be exported as 'green' fruits the harvesting should be done at least two weeks before the 04th month, with the length of the stalk remaining at 10-15cm.

A fully developed kew variety fruit weighs around 4-5kg as against Murisi which is around 2kg. Exporters prefer uniform sizes weighing 1.2-1.6 kg, where a cardboard box would accommodate 6 fruits conveniently. Grading of pineapple is done according to the fruit size and appearance.

Maintenance of the 2nd crop

After the 1st harvest, fertilizer application has to be continued as stated earlier. It is also the practice of some growers to apply a small quantity of urea after the first harvest, to obtain larger fruits. Thereafter the excess suckers can be sold as planting material, after retaining two suckers from each bush while taking precautionary measures to keep mealy bugs under check. The subsequent application of fertlizer and hormones should be continued as stated earlier.

A pineapple plantation can be continued profitably for a period of eight years provided the plants are free from the wilting disease, and if planted in a single or a double row system, the plantation can last five years, and is limited to 2 years in the multiple row system.