Pineapple Production in the Markham Valley

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The cultivated pineapple (Ananas sativa) *is a well-known fruit throughout Papua New Guinea. Like a number of other fresh fruit crops, large scale commercial production is restricted by difficult export marketing problems.*

However, with the rapid increase in urban population at the major centres throughout the country, local market consumption is beginning to look attractive for small scale pineapple enterprises close to these major centres.

SOILS

Pineapples grow well on well-drained loams with a friable subsoil and ample organic matter. While they may prefer acid soil conditions, they also appear to thrive on alkaline soils. The plant has a very shallow rooting habit and is thus subject to nutrient stress, especially nitrogen in open soils that drain freely. This shallow rooting habit makes the plant susceptible to damage during cultivation, which should be kept to a minimum.

PLANTING MATERIAL

Four different types of vegetative material taken from the mother plant can be used in pineapple propagation. These include tops, slips, suckers and butts. Odd seeds are often found in fruit but propagation is slow and the plants do not breed true. Commercial use of seed is not possible.

Tops—This material is broken from the top of the ripe fruit at harvest, and while use of tops will give a uniform stand, use of tops is restricted to canning enterprises. In the marketing of fresh fruit the top is left on the fruit, and is thus not available for planting. After the tops are removed from the fruit the smaller leaves are removed so that about $\frac{1}{4}$ inch of the base of the stalk is exposed. This should be done while the top is still fresh as stripping becomes more difficult later on.

Slips.—These are offshoots from the fruit stalk (*Plate* I). As they are usually small, it is common practice to leave them on the parent plant as long as possible to increase in size. After collection the small pinelet at the base of the slip is broken off and slips stacked to dry. As with tops the basal leaves are pulled off to assist in early establishment of the root system after planting.

Suckers.—Suckers result from the development of the buds found in the axils of the lower leaves (*Plate* II). Suckers usually develop towards the end of the fruiting cycle, but rate of development can be quite variable. Grading is essential if uniformity is desired. Very large suckers are not always satisfactory since they are more susceptible to moisture stress. As with other material, it is desirable to strip the base to allow the ends to dry out.

Butts.—The butt is the stem of the mature plant and when cut up into small pieces and planted, it will shoot. The younger part of the butt germinates more readily. This method can only be recommended where there is a big demand for planting material since the plants so produced would take up to 2 years to produce fruit.

GRADING

It is desirable to grade all planting material with regard to size since non-uniform material will cause difficulties in crop management and give a crop of variable fruit size because of unequal competition between adjacent plants.

TIME OF PLANTING

Normally the time of planting is determined by the availability of planting material, which is dependent to some extent on time of fruit production. Thus, at present, planting would be carried out over the early new year period after suckers from plants that flowered in June had developed sufficiently. Tops would have been planted slightly earlier.

However, as will be discussed, time of crop production can be controlled and if the right vegetative material is available, successful planting can be carried out at any time.

Plate I.—Pineapple plant showing a slip growing out from the stem immediately below the mature fruit, and further down the stem a sucker growing out between the leaves

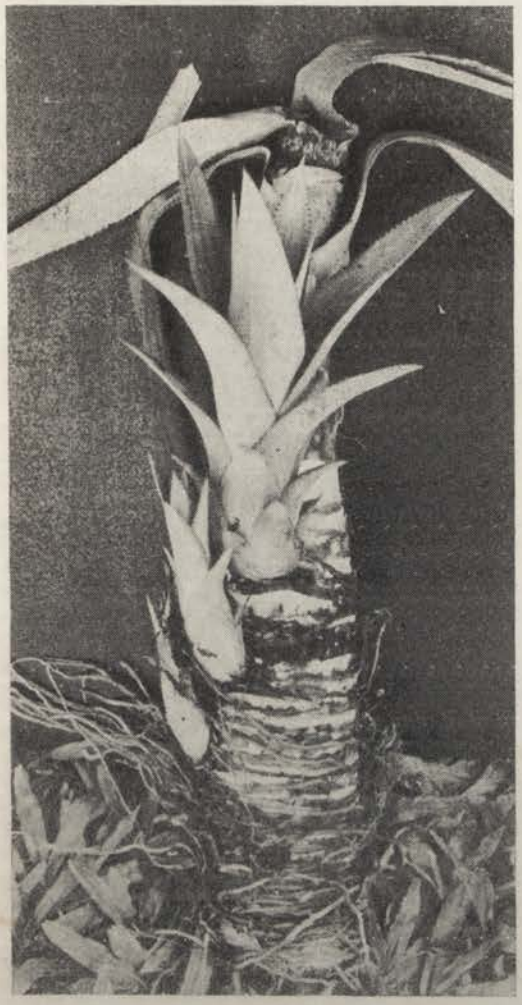

Plate II.—When the leaves at the base of the stem (the butt) are pulled off, several suckers may be seen. They may be pulled off and used as planting material. It is desirable however, that suckers of the same stage of development be planted together.

SPACING

At present planting techniques currently employed in Queensland are carried out at Bubia. This consists of 2 rows 1 ft apart with plants 1 ft apart in the row. Each double row is 6 ft apart from centre to centre, to give a plant population of approximately 14,500 plants per acre. Such spacing should lead to efficient land usage, but where land is not limited wider spacing may be used to allow easier maintenance, which does become difficult especially in ratoon crops.

FERTILIZATION

The plant food requirement of pineapples is high, bearing in mind that between 10 and 20 tons of fruit per acre can be removed per crop.

On an alluvial calcareous soil at the Bubia Agricultural Experiment Station in the Markham Valley, fruit production increased when nitrogen and potassium were added but not when phosphorus was added.

Nitrogen.—Leaves of pineapple plants deficient in nitrogen turned a reddish-orange colour and the lower leaves curled and dried off. Plants with adequate nitrogen ranged from a light green colour to a dark green colour with a purplish tinge. In one trial added nitrogen increased fruit size from 42 oz to 45 oz and per acre yield from 8.4 tons to 9 tons of fresh fruit. Based on 7,250 plants per acre.

Potassium.—When nitrogen was limiting the addition of potassium did not appear to affect fruit size but where nitrogen had been added the application of potassium further increased fruit size from 45 oz to 46¾ oz, equivalent to an increase of almost half a ton of fruit per acre. In addition fruit on potassium-treated plots were not so prone to leaning over (lodging), a condition which leads to fruit sunburn and distortion.

Nitrogen was added as ammonium sulphate at the rate of 350 lb of compound per acre and potassium as muriate of potash at 500 lb of compound per acre.

In the light of the apparent response of many crops in the Markham Valley to added sulphur, it is worth bearing in mind that some of the response in the nitrogen-treated plots may be due to the sulphur in ammonium sulphate.

With regard to use of fertilizers in pineapple production, split applications of fertilizers, especially easily leached ones such as nitrogen, are desirable. In porous soils where heavy rainfall is common, leaching can be considerable, with the result that the plant foods are washed out of the range of the root system. Addition of various forms of humus such as rotting plant material should appreciably reduce this loss.

FLOWERING

It appears that the flowering process in the rough leaf pineapple is affected by hours of daylight and unless chemically treated this variety will only flower consistently from mid

year until December. After the first signs of flowering, which appears as a pink flush in the heart of the plant, fruit development takes a further 3½ months. Thus there is quite a long gap in the year when pineapples are very scarce if only natural flowering is relied upon.

Fortunately this plant is one of the very few plants that can be induced to flower by the addition of a chemical, in this case alpha napthalene acetic acid. By pouring the correct amount of this chemical (trade names: Phyomone or Shellestone) into the heart of the plant, flowering processes are initiated and within 5 or 6 weeks of the application the pink flush becomes evident.

This means that provided the right planting material is available fruit production can be organized on a regular basis. A current trial indicates that this induction may be made in as little as 10 weeks after planting out of medium-size suckers.

RIDGING

Ridging may be necessary where there is a chance of waterlogging and in a trial at Bubia, a comparison was made between ridged and unridged plots. Surprisingly it was shown that unridged plots gave fruit of 51 oz compared to 44½ oz in ridged plots, an increase of almost 1½ tons of fruit per acre. The ridges in this case were 2 ft wide, with the centre of each ridge 6 ft from the centre of the next ridge. The furrow in between was about 12 in deep. Suckers were planted 6 in from the shoulder of the ridge.

Besides having smaller fruit, ridged plants also leaned appreciably into the furrow, presumably through loss of support of the lower leaves on the furrow side. This leaning led to sunburn and fruit distortion. One reason for the big size difference may lie in the excessive leaching that would occur under the ridged conditions. Obviously ridging of this sort is not satisfactory and other methods of drainage should be considered.

SHADING

A common observation often made of pineapples is the much greener and healthier appearance of plants growing in the shade of trees when compared with adjacent plants under unshaded conditions.

A comparison was made between shading plots with hessian and leaving others unshaded. As expected shaded plants remained much greener, and they also produced fruit of an average weight of 57½ oz compared to 44½ oz of unshaded fruit, an increase of 2½ tons of fruit per acre. This obvious benefit may not have been so marked if nutrients were not limiting under the unshaded conditions. On the other hand, pineapples may prefer shaded conditions. However, the main conclusion is that pineapples can be grown successfully under shade. On the basis of this it may be possible to successfully interplant existing coconut groves with pineapples, in areas where market outlets exist.

RATOONING

In Australia pineapple plants are allowed to ratoon, normally twice. The original plant gives one fruit and a number of suckers. After harvesting, all suckers except one are removed. This sucker produces another fruit and more suckers. As before, after harvesting, only one sucker is left on this plant and allowed to produce fruit. After the third cropping (second ratoon crop) the area is ploughed out and replanted.

Successful ratooning depends on sucker production. No detailed work on the ratooning aspects of pineapples in Papua New Guinea has yet been carried out, but would warrant further investigation.

MARKETS

Regular pineapple production on a commercial scale to supply increasing urban populations could be an attractive proposition for a small number of enterprises adjacent to the main centres.

Large scale production may be possible if satisfactory arrangements could be made with New Zealand marketing organizations in backloading cold storage ships which transport fresh fruits and vegetables from New Zealand to this country.

Pineapple juice extraction for distribution throughout Papua New Guinea may also be feasible.