

The Growing of Passion-Fruit

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Passion-fruit is grown to a varying extent in most of the Highlands Districts of the New Guinea mainland. The variety grown is mainly the purple passion-fruit (*Passiflora edulis*) which thrives in frostfree regions between 3,000 and 6,000 ft elevation. Cottee's General Foods Ltd have a large factory at Goroka where all the fruit from the various Districts is processed and the juice then shipped to Australia.

THE passion-fruit plant is a woody, perennial climber and for this reason is grown on some structure or support. It has fairly large, lobed leaves with tendrils at the nodes to support the vine as it climbs. The flowers are large and conspicuous with a crown of numerous thread-like rays and varying combinations of colours in which purple predominates. They depend largely on insects for pollination.

The name comes from the symbolism of the crucifixion seen in the flower; Spanish explorers

who first found the plant in South and Central America named it "The Flower of the Passion".

The edible pulp and seeds of the passion-fruit are important constituents of both fresh and canned fruit salads and are used for flavouring. A considerable part of the crop is processed. The soft drink trade has greatly increased its requirements of passion-fruit juice as a flavouring constituent during the last few years.



Plate I.—Seedlings should be planted out when they are about 6 in high. Note the fence which will provide support for the vine

(Photo: D.I.E.S.)

The harvest of passion-fruit is seasonal, the bulk being harvested from late December to April with the peak coming about mid January.

Prior to 1952, Cottee's Ltd purchased their passion-fruit requirements totally from New South Wales and Queensland and from a company-owned operation in South Africa. In 1952 due to difficulties caused by Government import regulations, passion-fruit from South Africa could not be imported into Australia, and as a result the South African operation was closed down. It was then decided to try to obtain passion-fruit requirements from New Guinea.

When the industry was first established in Goroka, indigenous farmers had very little cash income. Consequently, the Administration was anxious to introduce new industries which would enable the people to grow cash crops other than the usual vegetables.

Passion-fruit can be grown under "wild" conditions through the trees, fences and pig

houses. Special knowledge or experience is not needed to grow the crop. A regular collection system has been organized by Cottee's and growers know when the truck will come. When fruit is purchased at the road side, the buyer spreads it out on a sorting table, and green and over-ripe fruit is removed. The price ranges from 2 to 2½ cents per lb in the Eastern Highlands and may vary slightly in other districts. The pulp is frozen after extraction in four gallon containers, which are freighted to Lae by road and then shipped to Australia.

In the first year of operation (1952), 6,000 gallons of juice were produced. This caused Cottee's to start a factory in Goroka. In 1955 passion-fruit growing was commenced in the Mount Hagen area and a factory was established there. The crop soon became a popular one.

With the success of passion-fruit as a cash crop, the Administration also introduced coffee plantings. It took four to five years for coffee



Plate II.—Vines growing on a yar tree (*Casuarina* sp.)

(Photo: D.I.E.S.)

to bear. As the coffee came into bearing, the passion-fruit production fell rapidly and in 1962 the passion-fruit factory at Mount Hagen was forced to close.

In 1969 passion-fruit growing was once again promoted by Cottée's and the Administration, and introduced throughout the Highlands region. Passion-fruit is ideally suited to the Highland villagers. It requires no capital investment and very little work output and the cash return is satisfactory. It grows in a variety of soil conditions. Passion-fruit is very susceptible to virus and fungus attack when intensively cultivated. Commercial cultivation of passion-fruit requires a fairly high degree of management and is not encouraged at present.

As a subsistence crop, three cultural practices are recommended:—

1. Growing on Casuarina trees.
2. On garden fences.
3. On village homes or pig houses.

Nurseries

The majority of seedlings are produced in "open beds" central nurseries and distributed by Cottée's and D.A.S.F. to the grower. Village level nurseries are also planted and encouraged. The main points to take into consideration when establishing nurseries are:—

1. Select well drained soil in a slightly shaded area;
2. Turn the soil over to a spade depth;
3. Break the soil to a fine tilth;
4. Construct a suitable protective fence where necessary;
5. Form the soil into seed beds approximately 3 ft wide;
6. Mark out rows approximately 9 in apart (one handspan);
7. Plant seed thinly approximately $\frac{1}{2}$ in deep and cover;
8. Weed frequently; and



Plate III.—A house can provide support for a vine.

(Photo: D.I.E.S.)

9. Germinated seedlings approximately 2 in high should be thinned to 2 in spacings.

Seedlings 6 in high should be planted out. Tall, leggy plants are better avoided, but if they must be planted, they should be cut back.

Selecting Planting Areas

- (a) Under Casuarina trees.
- (b) Fences—any type suitable, e.g., fences around cattle projects, subsistence gardens.
- (c) Houses—village houses, pig houses, etc.
- (d) Possibility of wire strung between trees around settlement blocks.

Planting Out

1. Clear a suitable space 2 ft from the base of trees.
2. Prepare a hole approximately 10 to 12 in wide and deep.
3. Replace top soil and firmly plant seedling.
4. Water seedlings.
5. It is advisable to place a pit-pit stick in a suitable position for the vine to grow on to the tree, fence or house.

Maintenance

1. Keep the ground clear around the plant.
2. Train vine on to tree, fence or house.
3. A useful life for vines under subsistence conditions is three years. Therefore new replacement vines should be planted every two years.

Harvesting

1. When fruit is mature it falls on the ground. The only "harvesting" required is to clear the fruit from the ground. A vine may produce fruit 6 to 10 months after planting, but the main crop is produced after about 18 months. Cottee's purchase all the fruit in the Eastern Highlands, and in other districts they have their agents who do the purchasing.
2. During the "flush" it is advisable to pick up the fruit daily and store in a cool place until sold.
3. Ground below the vines should be kept clear to facilitate picking up.

Diseases

Fortunately disease is not a great problem in New Guinea. This is probably due to the fact that the crop is grown under "wild" conditions

and is not susceptible to attack by diseases. Once passion-fruit is grown in a high density, problems arise with diseases.



Plate IV.—When the fruit are ripe they fall to the ground. If the ground is kept clear of grass and weeds, the fruit are easy to find

(Photo: D.I.E.S.)

Brown Spot of Passionfruit

This disease is caused by a parasitic fungus (*Alternaria passiflorae*) which, under favourable weather conditions, can destroy a crop and cause serious damage to the vines. The first symptoms are small circular brown spots which appear on the leaves. Older spots may be either circular or angular in outline and may be almost an inch in diameter. Affected leaves drop off quickly and the vine may lose all its foliage. On the stem the disease appears in the form of elongated dark brown areas.

The disease on the fruit is a dark green spot. As the spot enlarges the diseased portion sinks inwards forming a slight hollow, becoming brown in the centre. Eventually the skin shrivels and the fruit drops off.

Control

In the Territory, spraying is impracticable so pruning is the recommended method of control. Affected leaves and stems should be burnt as soon as the disease appears. Leaves which have fallen to the ground should also be collected and burnt.

Damping Off

This is found in very many nurseries. It is caused by a fungus in the soil. At the beginning of damping off the seedling may show a pale colour due to the destruction of the chlorophyll. The stem of the young plant becomes constricted above the ground and the young seedling falls over. The plant becomes a dirty white colour and shrivels. Damping off may be greatly reduced by soil sterilization or seed disinfection. This may be carried out by heat, or by chemicals, where Zineb is used.

Cultural Practices

Seeds are planted in a moist soil and are not watered again until they germinate. They are then watered only when the temperature rises, usually in the latter part of the morning.

Pruning

Pruning serves a variety of purposes. Dead wood is removed and the vines are opened up

to assist in disease control. Pruning stimulates the production of new fruit-bearing laterals. Fruit is borne on new wood or vines.

Dense vines promote the development of leaf and fruit diseases such as brown spot. By pruning disease conditions are made less attractive.

When pruning, all laterals are cut about 12 to 18 in from the leader, usually with a pair of secateurs.

CONCLUSION

All seeds are obtained from the Cottee's factory at Goroka, and distributed upon request to the Highlands Region.

The market for passion-fruit is at present quite buoyant, and provided quality is maintained, growers will have no difficulty in selling their fruit.

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Plate V.—The buyer will buy only good, ripe passion-fruit

(Photo: D.I.E.S.)