

AVOCADO GROWING IN NEW ZEALAND

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There is a growing interest in the possibilities of growing avocados as a commercial crop in New Zealand; small plantings have been made throughout the warmer regions of the Auckland province.

To date, however, there is only one commercial avocado orchard in production. This is at Gisborne, where these fruits have been grown with fair success.

Apart from a few preliminary efforts to collect and observe different varieties, it has not been possible to carry out much research with this crop.

The Department of Scientific and Industrial Research has, however, recently acquired land at the Bay of Plenty for citrus and subtropical fruit research and it is hoped more will be done with the avocado over the next few years.

New Zealand's climate is somewhat marginal for avocados; caution is necessary in making any decision to grow this crop on anything but a small scale at the present stage of our knowledge and experience.

Climate

Avocados can stand only very light frosts. In general, their susceptibility is similar to that of standard lemons. Good fruit production is dependent on favourable climatic conditions, especially during blossoming. Flower initials may become tender, even before buds have swollen much. These, as well as the open flowers, may be killed by a light frost, so that nearly complete crop failure may result. On a dry, still, clear night, flowers and opening buds may be killed on the upper part of the tree when exposed to the clear cold sky. And this even when air temperature is hardly down to freezing.

Spring conditions in New Zealand are generally wet and cold: adverse for good setting of avocado crops. There was a crop failure for two successive seasons at Gisborne, owing to cold snaps at crucial periods during spring 1968 and 1969.

Shelter

Under New Zealand conditions avocados require good protection from winds, as do citrus trees. Cool prevailing winds in spring may keep the daytime temperatures too low for good setting. Shelter belts help keep the air in the orchard still enough to permit flowers, fruits, and twigs to hold some of the heat they absorb in the sunlight, and so have a temperature that may be more favourable for setting. Also, branches of avocado

trees are fairly brittle, and easily broken by strong winds.

Avocado varieties

There is need for much more knowledge on avocado varieties for New Zealand conditions. A number of varieties have been introduced into New Zealand, but most have proved unsatisfactory croppers. The most promising at present are Hass and Fuerte (especially the former) from California. A local seedling from Bay of Plenty, Hopkins, is also promising. Other newly-introduced varieties are under observation and some may prove worth while for future plantings.

The harvesting season for Hass is about December to April; Fuerte from about July to November, Hopkins is normally harvested a little later than Hass—from about February through the autumn.

Pollination

Some varieties of avocado are known to require cross pollination to set fruit, but the above three varieties all seem to be reasonably self fruitful. Nevertheless, it has been demonstrated in California that the Fuerte variety tends to produce heavier crops when grown in close proximity to Hass as a pollinator. It is likely a similar situation exists in this country. In planning an orchard, consider possible benefits from cross pollination of different varieties.

Propagation

There are virtually no nurserymen propagating avocados, but a few individuals are beginning to show some interest.

The best way to obtain plants at present is for the grower to propagate his own.

Plants can be raised from seed, but seedlings cannot be depended on to bear good crops or desirable fruit. Nevertheless, there is some merit in growing a few trial seedlings (especially of a promising variety like Hass) in the hope of obtaining types that may be better suited to our conditions.

As avocado varieties do not come true from seed, they are normally propagated by budding or grafting on seedling rootstocks.

Any seeds from New Zealand-grown avocados are suitable for raising rootstock seedlings. Avocados imported from the Pacific Islands are generally of the "West Indian" race, requiring a tropical environment; seed from these fruits is unlikely to be suitable for raising plants for our cooler growing conditions.

If relatively large quantities of seed should be needed for propagation, it will probably be necessary at this stage to import suitable seed from California. This requires a permit from the Department of Agriculture.

Budwood or graftwood of different avocado varieties is also in short supply, but more will become available in due course from a new trial planting established by the

Department of Agriculture.

Budding of avocados is practiced successfully in California; some successes have also been achieved in New Zealand with this method.

However, there is a tendency for the eye of inserted buds to fall out, so that no shoot grows, even though the bud shield continues to live. For this reason, grafting is generally preferred at present for propagating avocados in this country. Grafting has been successful under glass and outdoors. For late summer or autumn grafting, scions from new growth with fully-expanded, mature leaves are used. For spring grafting, scions are taken in late winter before growth begins. Graftwood taken in late winter can be kept in polyethylene bags in a refrigerator at 40°-45°F for one or two months.

Scions with 2 or 3 buds and approximately 2 inches long seem to be best. They may be united by either whip and tongue or cleft graft methods on to the rootstock seedlings. A greater measure of success has been achieved in New Zealand by grafting seedlings already established in their permanent position, rather than grafting plants in nursery rows for subsequent transplanting. In transplanting grafted plants, the scion is prone to dying back to the graft union before the tree becomes properly established.

Top working of older trees can be done successfully using the above-mentioned grafting methods on small branches, and also by bark-grafting larger cut limbs.

Planting distances

Large-spreading varieties (such as Fuerte) are planted 40 feet apart on the square. For medium-spreading varieties (such as Hass) 30 feet is sufficient. Double planting at 15 to 20 feet spacing is recommended, however, to increase returns in early life of the orchard. After 10 to 12 years each alternate tree must be removed before overcrowding occurs.

Soils

The trees grow well on a rather wide range of soil types, but a medium-textured soil with a depth of at least 3 feet is best. Hardpan and clay soils are unsuitable, unless adequate drainage is provided. Such soils restrict root activity, and favour root rot caused by *Phytophthora cinnamomi* (to which avocado trees are very susceptible).

Irrigation

Like most fruit tree crops, avocados need sufficient moisture, and suffer if allowed to become dry. The need to irrigate depends on the season and locality, but in the main it corresponds with the need of other fruit trees in the district.

It must be stressed that avocados are extremely sensitive to excess water. This may occur with over-irrigation or poor soil drainage.

Fertilisers

The chief nutrient needed by avocados is nitrogen, but under New Zealand conditions applications of phosphorus and potassium are also necessary.

Mature trees need about 1 to 2 lb of actual nitrogen per year. Half the fertiliser is applied in August and the other half about November.

Young non-bearing trees require much less nitrogen. They can be damaged by too much fertiliser.

The amount of fertiliser that is applied will vary from orchard to orchard (depending on past applications, soil type, and materials used), but, as a rough guide, young trees receive about 1 lb. of a complete N:P:K fertiliser containing about 10 percent nitrogen, for each year from time of planting until the rates of nitrogen recommended for a mature tree are being applied.

Pests and diseases

Vigorously-growing avocado trees seldom suffer seriously from diseases or pests. Spraying may sometimes be desirable to control pests such as leaf-roller caterpillars, thrips, and mealy-bugs. A *lygus* bug can sometimes cause serious bud drop.

The most serious disease is avocado root rot, caused by *P. cinnamomi*, discussed earlier.

Harvesting

The fruit is clipped from the trees, to avoid the risk of wounds caused by pulling the stems out.

The stage of maturity for picking is a little difficult to gauge accurately. However, avocados are harvested over a fairly long period without serious loss of quality. Fruits harvested 6 weeks or more before they would reach full maturity on the tree will probably soften and have good flavour. Fruits may take several weeks to soften after harvesting, but the period varies with variety, stage of maturity, and storage temperature.

Growers learn by experience to judge maturity reasonably accurately, as with most other kinds of fruit.

Storage

Cool storage delays ripening after picking, but some varieties are subject to chilling injury even at temperatures above 40°F. The effects of chilling appear as darkening of vascular strands in the flesh, and browning of the skin. Unless the injury is fairly severe, flavour is not affected much, but the fruits become very unattractive in appearance. Similar injury can be caused on the trees with varieties which carry maturing fruits during winter months, when low temperatures occur.