Stoneville Horticultural Research Station: ten years of progress

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THE Stoneville Research Station is a tree fruit station situated in the Darling Ranges 25 miles north east of Perth. Climatically it is similar to the Hills fruit districts adjacent to Perth and is suitable for the growing of apples, pears and most stone fruits. Citrus fruits can also be grown moderately well.

Purchased as a partly developed property in 1955 with the assistance of the W.A. Fruit Growers Association, it has, in the ten years which have elapsed, undergone radical changes. Approximately half of the 85 acres in the property is suitable for fruit trees and this has been cleared and 20 acres have been planted.

The soils are mainly sands to sandy loams with some sandy gravels. In their natural state these valley soils are sometimes poorly drained due to the formation of iron hardpan ridges which develop as bars running along the contour of the valley. These bars which form as the result of long term seepage from ironstone gravel hill top catchments are found at varying depths and impede the movement of water through the soil. This was the position at Stoneville.

Extensive underground drainage to cut through these bars and also deal with the seepage has been carried out to remedy the position.

Irrigation water is available from two dams excavated in pipe clay deposits and a comprehensive irrigation system has been installed to enable all plantings to be watered. The water is of good quality with a salt content of 17 to 25 grains per gallon.

The annual rainfall is in the vicinity of 40 inches falling mainly in the winter. The summer period is usually hot and dry with little worthwhile rain. Periods of strong land winds blowing from the east are common during the summer.

**Kinds of Fruit Grown**

The station is conveniently situated for carrying out work on a variety of fruits and also is readily accessible to research workers stationed in Perth. The experimental programme encompasses most kinds of tree fruits, but the main emphasis is on apples which are Western Australia's chief fruit crop. At the present time experiments are in progress with apples, oranges and pears, with varietal work on various kinds of peaches, apricots and Japanese plums.

**Nursery**

The nursery was established soon after development of the station commenced and has played an important part in the progress achieved. Practically all experimental trees planted on the station have
Visitors to the 1966 summer field day listen to a Departmental speaker.

been raised in the nursery and considerable numbers have been propagated for field trials on growers' properties.

Propagation techniques developed include the raising of selected apple rootstocks in layer beds hilled with jarrah sawdust. This has virtually eliminated the weed problem in the layer beds and has facilitated all operations in the raising of the stocks.

The sawdust promotes very good root development on the off shoots and has not introduced any nutritional problems. All Malling-Merton and associated stocks have layered well but Northern Spy strains are very variable.

A point of interest in raising peach seedling stocks has been the detrimental effect of the Methyl Bromide soil fumigation carried out some time prior to planting peach pits. Poor seedling growth was exhibited right through the summer growth period.

First Experiment Planted

The first trial at the station dealt with orange rootstocks and was planted in 1959. Washington Navels and Valencias are
worked on citronelle, sweet orange, trifoliata, troyer citrange and Cleopatra Mandarin stocks. Differences in growth appeared early in the trial and these have continued. Citronelle and sweet orange have produced the largest trees followed by troyer citrange with Cleopatra Mandarin and Trifoliata giving quite small trees.

Yields during the two years of cropping have followed a similar pattern but the best quality fruit has been produced on trifoliata with the poorest quality on Citronelle.

An orange fertiliser trial will be conducted on an adjacent site but trees have not developed to a stage where treatments can be applied.

**Apple Rootstock Experiment**

In the apple rootstock experiment Granny Smiths and Jonathans worked on 14 rootstocks are planted in alternate rows. Rootstocks include Malling-Merton selections 103, 104, 105, 106, 109, 111, 113, 114 and 115 Malling XXV and Merton 793 with Northern Spy, seedling and Pomme de Neige root grafted trees representing current commercial stocks.

After five years growth rootstock differences are apparent in vigour, tree size and shape, and earliness of cropping. Promising stocks at this stage are MM109, MM115 and MM104 but a fair comparison will not be possible for some years. MM109 has produced big trees, induced early cropping and given the highest yields for both Granny Smiths and Jonathans, but in the early years weak anchorage necessitated staking some trees. MM106 trees are the smallest but commenced cropping in the third year. Lack of lateral growth tends to expose the fruit to sunburn injury. With Jonathans MM106, 109 and 113 have given good early colour.

Differences have been assessed on the basis of trunk enlargement, total annual shoot growth, visual tree ranking and fruit yields.

**Pear Rootstock Trial**

In the Pear Rootstock trial the two main commercial varieties Bartlett and Packhams Triumph are planted in alternate rows and worked on Pyrus calleryana seedlings from D6, Keiffer, Quince A and Winter Nelis seedlings. Trees on Quince A have an interstock of Beurre’ Hardy.
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Tree growth is significantly in favour of Calleryana seedlings which have produced the most uniform trees. Those on Quince A are the smallest with a strong tendency to early cropping.

**Apple Soil Management Trial**

Granny Smiths and Yates worked on MM104 and Pomme de Neige stocks have been given uniform treatment since planting of the apple soil management in 1963. Treatments to be commenced in 1966 include a sawdust mulch and subterranean clover as a winter cover crop used with various summer treatments including mowing, cultivation and couch grass competition.

Various fertiliser treatments will be superimposed on all soil management systems.

**Apple Soil Moisture and Level of Cropping Trial**

This experiment was planted in 1964. It consists of Granny Smith treatment trees with Golden Delicious as internal and external guards and pollinators. It is planned to study the effect of soil moisture regimes and crop size on tree growth and fruit development with emphasis on the part these two factors play in apple die-back.

**Apple Planting Distance Trial**

The first section of the apple planting distance experiment consisting of Granny Smiths worked on MM104 and MM106 stocks pollinated with Delicious was planted in 1965. The second section using

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Apple trees grown in drums being lifted for study of the roots

Dessert and canning peach varieties under test in the variety block. A dense winter cover of Yarloop subclover with regular mowing of summer weeds has overcome a soil erosion problem, also provided good working conditions and given excellent tree response.
MM109 and MM115 stocks will be planted in 1966. The trees are planted on an expanding grid system to give a wide range of planting distances. The aim of the experiment is to determine the best economic planting distance in terms of tree size, cost of management and per acre yield.

New Varieties
As promising new varieties of fruit become available they are introduced to the station for assessment.
Most of this work is in the early stages and only limited observations have been possible.

Apples
The Starkrimson Delicious is cropping earlier than other red strains under test and gives full dark red colour well ahead of harvest. Hi Early, although well-coloured, is not as consistent in colour as Starkrimson and Royal Red produces a lighter red colour. These latter varieties are inclined to be flatter than Starkrimson.

Several imported varieties including Starks Earliest, Min Jon and Stark Earliblaze, also several local seedlings and mutations are in the early stages of testing.

Peaches
Amongst the yellow fleshed dessert varieties Starking Delicious (late December) and July Elberta (mid-January) are showing considerable promise. Early Vee also has some promising characteristics.

A number of imported canning peaches are under observations including South African varieties, Goosens, Keimoes, Maluti and Tokane and several Victorian selections. The features of the South African varieties to date are excellent colour but with a strong tendency to small fruit. Maluti and Tokane are also likely to conflict with the Golden Queen in maturity.

Citrus
Various strains of Navel and Valencia oranges are included in plantings, including some local selections. Other citrus include a number of mandarins, grapefruit and lemons.
An unusual hybrid is the Puerto Rican Chironja thought to be a natural cross between grapefruit and orange. The seedlings were raised from seed obtained from Puerto Rico. Budwood from the seedlings has been worked on to citrus stocks but no fruit has yet been produced.

Olives
A range of olive varieties is under observation. At five years of age promising pickling varieties are Verdale, Verdalion and Hardys Mammoth. The oil variety Mission is also producing good crops.

Short Term Experiments
Studies are being made of root growth of young apple trees in relation to environmental conditions. The trees are grown in drums and examinations are made after removing the trees and washing the soil from around the roots. Roots are then sorted and weighted. Results to date show that practically all root growth is made from October to May but that lack of moisture greatly reduces the weight of roots and consequently shoot growth.

Studies of apple fruit bud initiation, formation and development have also been commenced.

The degree to which scion rooting occurs in the main apple varieties when root-grafted with selected stocks is also being investigated.

Delayed Foliation—Apples
A study of delayed foliation in apples conducted over a number of years has shown that when very mild winters are experienced delayed and protracted blossoming leads to a reduction in crop. Experiments with dormant oil sprays have shown that this delayed foliation may be partially corrected by an application of D.N.C. (Dinitro ortho cresol) in oil early in August. This treatment has led to normal cropping in seasons when comparable unsprayed trees have carried a reduced crop.

Virus Testing
The Biological Services Division is carrying out a testing programme concerned with apple mosaic virus and also line pattern virus of stone fruits. As a result of this testing, a number of Japanese plum varieties as well as various rootstocks have been shown to be free from line pattern virus.

The growth suppression effect of plum line pattern virus on peach seedlings has also been demonstrated. Infected seedlings grew only one third the size of healthy trees.

Administration
The Research Station is administered by the Division of Horticulture, and the experimental planning is arranged through an Advisory Committee consisting of the

Pear Rootstock Trial—Pyrus calleryana D6 seedlings are giving the largest and most uniform trees for both Bartlett and Packham pears
The orchard management work is carried out by a Manager, technical assistants who record results and farm workers. Experimental work is planned and supervised by head office staff who also assist with the establishment of trials and measurement of results.

The station was officially opened by the Hon. Minister for Agriculture (Mr. C. D. Nalder) on the 14th January, 1966.

Future Plans

Land suitable for experimental planting is limited and careful selection of trials is therefore necessary. Future plans include the investigation of rootstocks for Japanese plums and factors involved in the successful replanting of apples on old apple soil. Work on growth substances particularly in relation to crop initiation and control will also be expanded.

At the present time all experimental plantings are making very satisfactory progress but many have not yet fruited. Some very interesting results are anticipated in future years.

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