

## THE AUSTRALIAN AVOCADO INDUSTRY

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Avocados, until comparatively recently, ranked as one of the very small horticultural crops. Fruit was sold to a committed but restricted market.

Over the past fifteen or so years, however, the Australian palate has become much more sophisticated, and avocados are now widely consumed.

The avocado industry has, during this period of increasing demand, been restricted to slow growth and at times significant reduced production, due to the ravages of root rot, caused by *Phytophthora cinnamomi*. Tree losses from this pathogen have until very recently countered the large plantings made each year.

Over recent years, the market price received for avocados has steadily risen due to the shortage in supplies.

Consistently high market prices provide the obvious motivation for increasing plantings by both established and aspiring avocado growers.

### Production Areas

The traditional production area is the sub-tropical coastal region extending from Gympie to Coffs Harbour.

Other areas have developed, the most established now being the Sunraysia area along the Murray River, centered on Muldura.

More recently, significant plantings have been made on the Atherton Tableland in North Queensland. Interest is also being shown in drier regions of South and Central Queensland.

The estimated tree population of the various areas to the year 1977 is listed in Table 1.

TABLE 1  
 AVOCADO INDUSTRY LOCATION AND TREE POPULATION  
 — 1977

QUEENSLAND		Trees
Mt. Tamborine .....	10,401	
Redland Bay .....	2,250	
Near North Coast .....	22,570	
Gympie .....	3,233	
Burnett .....	2,030	
Central Queensland .....	3,077	
North Queensland .....	9,217	
Total Queensland .....		53,833
NEW SOUTH WALES		Trees
Tweed District .....	1,452	
Brunswick .....	6,995	
Richmond .....	28,261	
Sunraysia .....	5,000	
Total New South Wales .....		41,708
VICTORIA		Trees
Sunraysia .....	10,000	
Total Victoria .....		10,000
SOUTH AUSTRALIA		Trees
Riverland .....	2,805	
Total South Australia .....		2,805
WESTERN AUSTRALIA		Trees
Total Western Australia .....	1,000	1,000
TOTAL AUSTRALIA .....		109,346

*Note:* Estimates of tree populations have been derived from unpublished data and personal communications. In some cases, tree population was calculated from cropping areas.

Because of the high mortality factor, most trees currently fall into the non-bearing category.

For example, in a recent Queensland industry survey, 20 per cent of trees of the Hass variety were under one year old, and 45 per cent were from one to five years old, giving a non-bearing population of 73 per cent. This situation also occurred with other varieties.

Plantings should continue at a high level for the immediate future, e.g. Queensland growers propose to plant 16,000 trees in 1977, of which 14,500 will be named varieties.

Volume of production is still quite small. Production for 1975-76 was recorded as 417 tonnes for Queensland and 293 tonnes for New South Wales.

No reliable figures were available for the Sunraysia area.

The location of production areas is illustrated in Figure 1.

## **LOCATION OF AVOCADO PRODUCTION AREAS**

### **Climate**

In general, the avocado industry is located in three climatic regions, which could be called sub-tropical coastal (Gympie to Coffs Harbour), sub-tropical elevated (Mt. Tamborine, Atherton Tableland) and temperate inland (Sunraysia). Annual rainfall varies in production areas from 250 mm (Sunraysia) to 1900 mm (Nambour).

Australian avocado plantings are predominantly located in medium rainfall areas, with a high concentration of precipitation during summer. This contrasts with major overseas production areas which generally occur in low rainfall areas. Periods of high rainfall significantly influence the severity of *Phytophthora cinnamomi* infections.

Excessive rain or drought conditions near flowering can severely reduce effective fruit set.

Cold weather or low atmospheric humidity also upsets pollination by reducing the receptivity of the stigma.

Frost is a major problem in the more temperate areas, necessitating close attention to site selection. Attempts to avoid frost pockets usually result in sitting on slopes exposed to wind. Hot, dry winds can have a severe effect on the water relations of the tree and can result in shedding of young fruit. Strong winds are responsible for surface blemishing of fruit

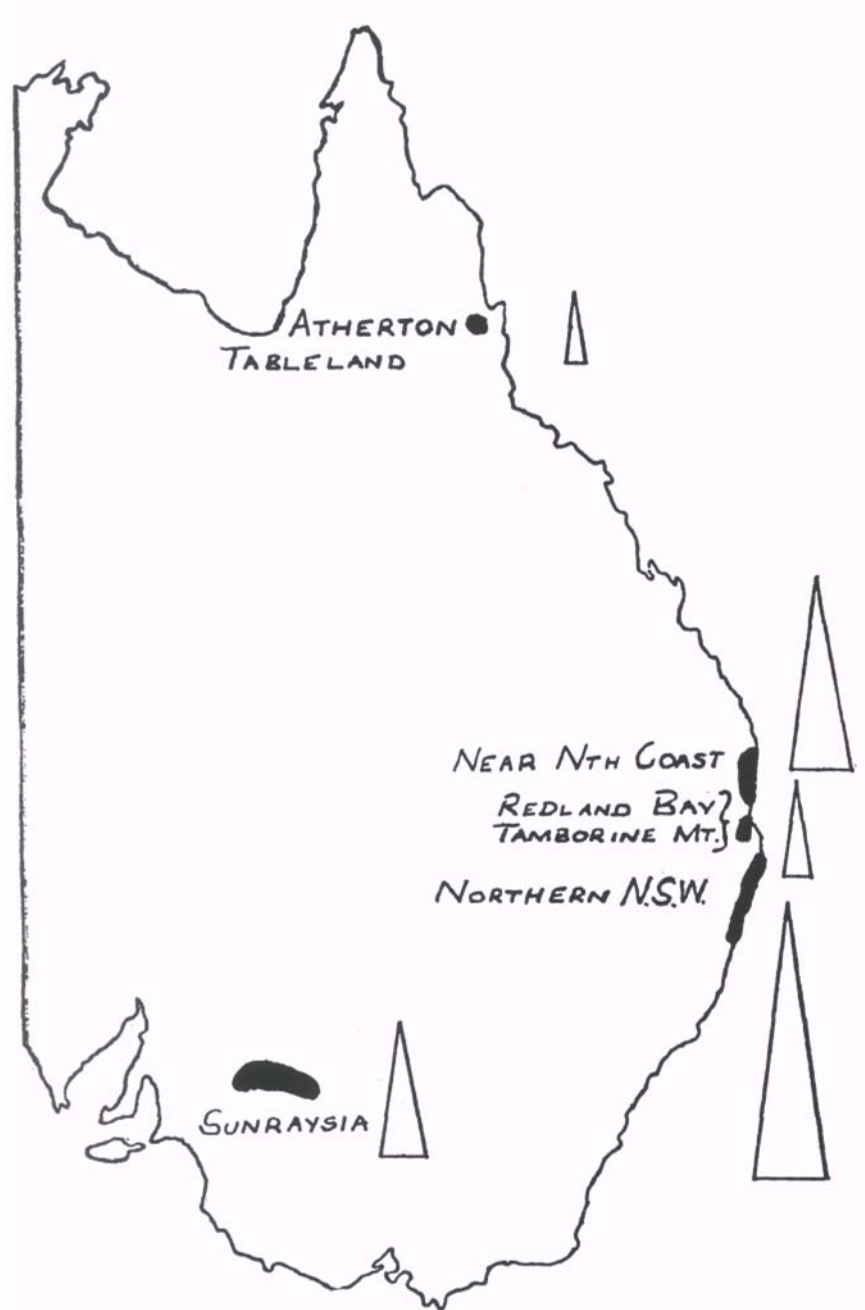


FIGURE 1

**Varieties**

Three varieties dominate the Australian industry: Fuerte and Sharwil (Guatemalan X Mexican hybrids) and Hass (Guatemalan type).

An estimate of varietal significance is provided in Table 2.

TABLE 2  
ESTIMATED VARIETAL DISTRIBUTION IN DESIGNATED  
PRODUCTION AREAS

	Fuerte	Hass	Sharwil	Rincon	Wurtz	Zutano	Hazzard	Edranol	Bacon
Queensland .....	39	31	18	3.1	2.9	0.2	1.8	1.1	—
Northern N.S.W. ....	44	30	22	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Sunraysia .....	50	28	7.7	3.4	—	5.4	N.A.	—	2.7

Varietal preference is indicated in Figure 2, which illustrates trends in recent plantings in Queensland over a seven year period.

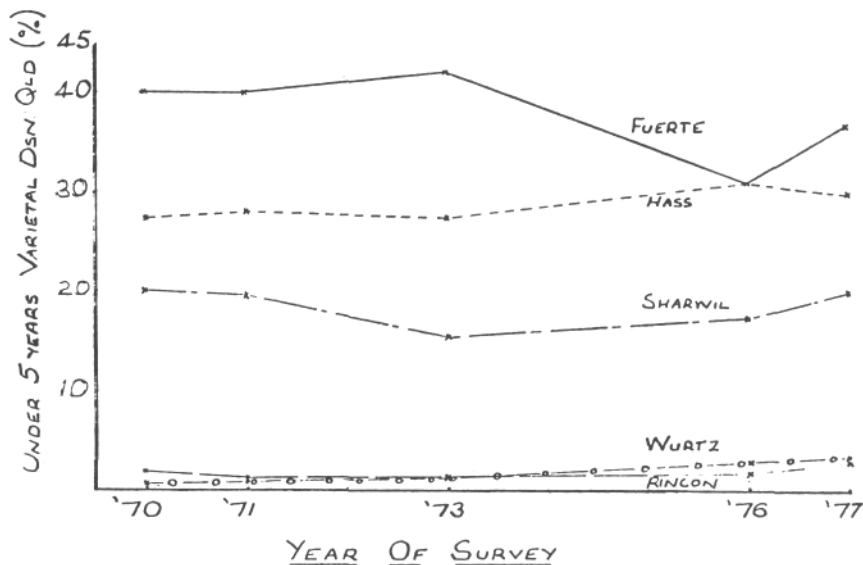


FIGURE 2

Of the proposed 1977 planting (of 14,500 named varieties) for Queensland, Fuerte should account for 29.6 per cent, Hass 27.5 per cent, Sharwil 25.4 per cent, Hazzard 4.1 per cent, Rincón 3.7 per cent, Edranol 2.6 per cent, Wurtz 2.1 per cent, Ryan 1.9 per cent, Nabal 0.8 per cent, Zutano 0.3 per cent and Anaheim 0.2 per cent.

## Soils

Since avocado trees are extremely susceptible to poor drainage, it is essential that the soil has no clay band, hard pan or any other formulation in the sub soil which may impede free flow of water. A minimum of 1 m of top soil is desirable. Preferred soil types range from loamy sands to clay loams. Heavy clay loams are undesirable due to their inherently poor internal drainage characteristics. Red clay loams of basaltic origin are commonly used for avocado production.

## Propagation

Vegetative propagation is the standard practice due to the natural variability associated with sexual reproduction. Most trees are propagated from seedlings to which scions are grafted.

No specific rootstock selection is practiced; there being no recognized seed source and a serious shortage of seed supplies. Guatemalan types are normally preferred over Mexican, although generally most types of seed are readily purchased for rootstock material.

The most common grafts include the cleft graft, whip graft and side graft.

With *Phytophthora cinnamomi* being the major industry problem, good nursery practice is most important. Unfortunately, few nurseries are producing disease-free avocado trees.

Requirements for minimizing disease risk have been well defined and include the use of disease-free seed, sterilized or fumigated potting mixture, chlorination of irrigation water, and strict nursery hygiene.

Currently an Australian-wide effort is being made to upgrade nursery hygiene. A proposal for a voluntary "approval scheme" for nurseries is now being implemented jointly by the Australian Avocado Growers' Federation and relevant State Departments of Agriculture.

Considerable effort is being devoted to the upgrading of planting material, both rootstock and scions, in terms of freedom from virus and trueness to type.

### **General Plantation Management**

Land preparation, planting and orchard management practices are all closely inter-related to control procedures for *Phytophthora cinnamorni*—e.g. in use of cover crops, mulching, drainage, adjustment of calcium levels, use of ammonium form of nitrogen etc.

Plantation density depends largely on the system of management. Most orchards have been established on a permanent spacing of 9-10.5 m using either the square or diagonal systems. A recent trend involves use of a modified hedge row system with spacings of 4.5-6 m along rows with rows 10-12 m apart. After about eight years when the trees are well-established they are thinned to avoid excessive competition.

In most situations it is necessary to include windbreaks, such as bana grass or slash pine, particularly when trees are young.

Regular irrigation is not practiced in the medium to high rainfall areas. However, natural precipitation has to be supplemented during the drier months. The southern industry is obviously dependent on irrigation.

Sprinkler irrigation is common, being far more significant than trickle irrigation.

Leaf scorch caused by excessive salt levels in irrigation water is considered to be the major problem faced by South Australian growers. Great interest has been shown in obtaining West Indian rootstocks which exhibit salt tolerance.

Research in the Sunraysia area has involved the testing of root-stocks for salt and cold tolerance. Application of required nutrients is still only crudely controlled. Plant analysis services have not yet placed major emphasis on avocados.

The biennial bearing characteristic continues to cause unpredictability in avocado production. Differences in bearing performance occurs both on a farm-to-farm, and tree-to-tree basis.

## Harvesting

Skill is required in determining fruit maturity, the usual criteria being the known time of cropping for the variety, fruit size and a dulling of the surface gloss on the skin. Oil content provides an objective maturity index, but unfortunately the acceptable range in contents is quite high, both within a variety, and between varieties.

Harvesting aids in the form of hydraulically elevated picking platforms are in fairly wide use. The fruit should be double cut, leaving a very short stub on the stalk end. Since the skin is easily bruised, avocados require careful handling.

Harvesting times vary with variety and district. Generally the coastal Queensland, N.S.W. areas enter production earliest in the season, followed by the tableland areas and then the Sunraysia district. Avocados are produced in quantity from late March to December.

## Disease Problems

Phytophthora rootrot (causal organism *Phytophthora cinnamomi*).

This is the most serious problem, occurring also in all major countries except Israel.

It has been well documented, and over recent years a comprehensive, integrated orchard management system has been developed in an attempt to control the disease. Current indications are that this system is successful, although it involves considerable expense in materials and labour.

Tree losses have been devastating e.g. it was estimated that an average of 50 per cent of trees were lost in Queensland following the 1974 wet season, and a slightly lower proportion in New South Wales. The disease is present in all areas, but causes little concern in the Sunraysia district.

Anthraxnose (Causal organism equaling *Glomerella cingulata*).

Anthraxnose is a major field and post-harvest disease, particularly on more susceptible varieties such as Fuerte.

Infection of the fruit remains in a latent condition until ripening commences. The disease develops during ripening, and large portions of individual fruit can be rapidly destroyed.

If losses throughout the marketing system could be accurately quantified, much more emphasis would probably be given to control of this disease.

Other fruit rots can be significant, particularly *Dothiorella sp.*, which causes stem end

rotting.

Verticillium wilt (causal organism *Verticillium dahliae*) occasionally causes significant loss, although usually infection involves the loss of individual branches only of older trees.

## **Insect Pests**

The main pests of commercial importance in avocados are mono-lepta beetle, fruit fly, fruit sucking bug and latania scale.

Monolepta Beetle (*Monolepta australis*) is now considered the most serious avocado pest in Queensland and New South Wales. The beetle swarms throughout the year but chiefly in spring-summer. Severe damage to young foliage, flowers and fruit can be caused within 24 hours. The growth of young trees can be set back by 12-18 months while surface feeding on avocado fruit results in hard brown scar tissue which can render unmarketable up to 100% of the fruit on a tree.

Fruit fly (*Dacus tryoni*) affects particularly the early maturing varieties such as Zutano and Fuerte, rather than late maturing types such as Hass, Ryan and Nabal.

The fruit fly sting develops into a star shaped crack with raised edges from which the sap exudes and dries as a white residue. In most Guatemalan and Guatemalan-Mexican hybrid varieties, a small hard lump of tissue develops beneath the sting. As fruit fly larvae hatch from the eggs only in thin skinned Mexican varieties such as Zutano, fruit quality is impaired only by the extent and number of these blemishes.

Fruit spotting bug (*Amblypelta hitida*) produces a plateau shaped lesion, often with narrow cracks, and with deep internal damage. Fresh damage exhibits a water soaked area from which the sap exudes and later dries to form a white residue as in the case of fruit fly stings. In many instances it is difficult to differentiate between damage caused by fruit spotting bug and fruit fly.

Latina scale (*Hemibenlesia lataniae*) can cause sporadic problems, particularly where persistent insecticides are used in the orchard.

## **Marketing**

Fruit is generally packed in 1/3 bushel containers, with dimensions of 450x290x90 mm. This is a single layer pack, containing from 16 to 30 fruit.

Australian avocados are all marketed in the fresh form, and consumed within Australia. The largest markets are Sydney and Melbourne, followed by Brisbane, Adelaide and Newcastle.

Should root rot be controlled on a permanent basis, the potential for over-production is high. However, lower prices coupled with aggressive sales promotion efforts should greatly expand the present demand. The industries in the various areas have already initiated promotion programmes, financed on either a compulsory (Queensland) or voluntary package levy (Northern New South Wales, Sunraysia).



## **Research**

Australian Research effort on the avocado has been intensified over recent years. During October, 1977 prominent research and industry personnel from Australia and New Zealand participated in a week-long workshop whose aims were to identify deficiencies in avocado research, formulate research proposals and to co-ordinate activities of the various agencies involved.

## **Australian Avocado Growers' Federation**

This national organization representing avocado growers, through the various state and regional avocado associations, was formed late in 1974. Since then it has been active in a number of areas, including organization of field days, development of a nursery approval scheme, plant quarantine, maturity standards.

During 1978 the first growers' study tour conducted by the Federation will visit California. .

The Secretary of the Federation is—Mr. R. J. Seaman, C/- C.O.D., P.O. Box 19, *Brisbane Market*, Queensland, 4106 Australia.