

AVOCADO CULTIVARS

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Mrs. Wood provides us here with valuable information on the characteristics of avocado cultivars. Pictures would undoubtedly have contributed to describe the cultivars, but are not available at this stage. We place the article as it is because of the demand for this kind of information and hope that a fully illustrated leaflet will become available to growers before long. — Ed.

There are three loosely defined races of avocado — the Mexican, West Indian and Guatemalan races. Each has its own particular characteristics.

In general trees belonging to the Mexican race are more cold hardy and more resistant to heat and low humidity. They are least tolerant of soil salinity and therefore do not do well in a coastal environment. The fruits tend to be small and have very thin, smooth skins. They take about six months from fruit set to reach maturity. The flesh often has a high oil content which gives a rich flavour and a pleasant creamy texture. Trees belonging to this race can be easily identified by the strong anise scent in their crushed leaves. Neither of the other races has this particular characteristic.

Trees from the West Indian race are the least tolerant of heat and low humidity. They are the most tolerant of soil salinity as either a rootstock or a top, and are therefore well adapted to a coastal environment. The fruits are generally large in size and have smooth, glossy skins of medium thickness. The flesh has a much lower oil content than the other two races and is mild to watery in flavour. The seeds are generally large in relation to the size of the fruit, and are often loose in the cavity. Fruits take about six months from fruit set to maturity. They generally have a very poor shelf life.

Trees from the Guatemalan race are intermediate in their adaptation to soil and climate. A very distinct feature is the red colour of the new foliage. The fruits have skins which vary from fairly thick to very thick and woody and are usually rough to very rough. The oil content of the flesh is generally high giving a fruit of pleasant flavour and texture. Fruits may take 12 months and as long as 18 months in colder climates, to mature.

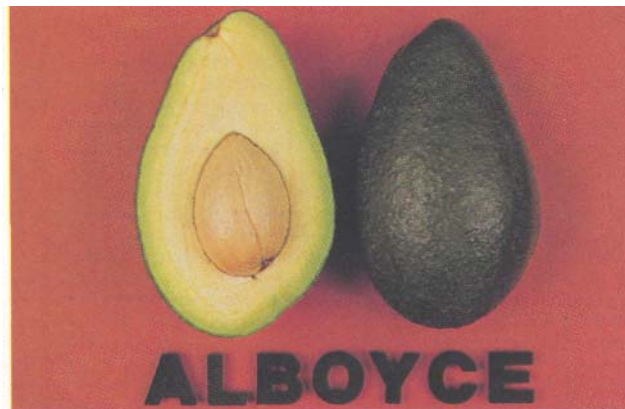
There are no known racial sterility barriers, therefore there has been a ready mixing of genes in areas where the different races grow together. In fact most of the present cultivars are hybrids having characteristics of more than one race, eg Fuerte is considered to be a natural Mexican X Guatemalan hybrid and Hass, long thought to be purely Guatemalan, has been shown to contain a small percentage of Mexican germplasm.

ALBOYCE

This cultivar was developed from a Hass open-pollinated seedling, bred at the University of California. It has type A flowers and trees at Burgershall have a slightly spreading, rounded growth habit. It is thought to be a Guatemalan X (Mexican X Guatemalan) hybrid.

Fruits are generally small. They are slim ovoid in shape and have a medium green, waxy skin. The skin is slightly rough and although thin, it still separates satisfactorily from the flesh. The flesh is an attractive yellow, has a smooth, creamy texture and a rich, nutty taste. Its quality is rated as excellent. The seed is tight in the cavity and does not adhere to the flesh. Its size is exceptionally small in relation to the size of the fruit. Therefore the disadvantage of small fruit is offset by the favourable flesh to seed ratio.

The fruit matures at the same time as Fuerte and has a long picking season as tree storage is very good.



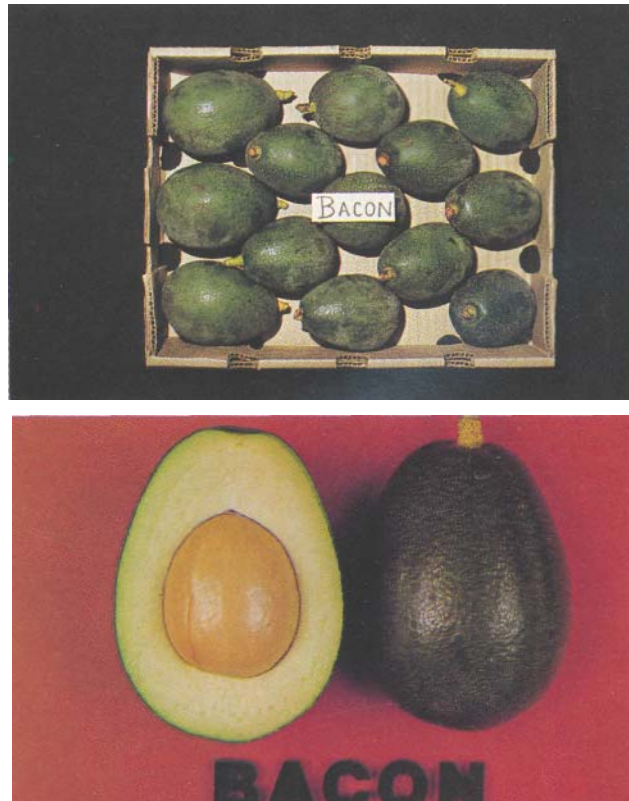
BACON

This cultivar is a Mexican X Guatemalan hybrid with type B flowers. It can be grown in areas with frost in winter as the tree is very resistant to cold. Trees planted at Burgershall have a narrow upright growth habit.

The fruits are small to medium in size. They are ellipsoid to ovoid in shape and have an

attractive, glossy, dark green skin speckled with numerous yellow lenticels. There is often some cork development in the lenticels at the blossom end. The skin is thin and membranous and in parts will not separate from the flesh. The flesh has a creamy texture and a good taste. Unfortunately the quality is often spoilt by splitting of the skin and the subsequent development of blossom-end rot, which spreads to the rest of the avocado. The seed is tight in the cavity and is medium in relation to the size of the fruit.

Bacon matures at the beginning of the Fuerte season, however its picking season is short as tree storage is poor.



EDRANOL

This cultivar was first propagated in America in 1932. It has Guatemalan characteristics and type B flowers. Mature trees have a narrow, upright growth habit and become very tall. They are susceptible to climatic extremes.

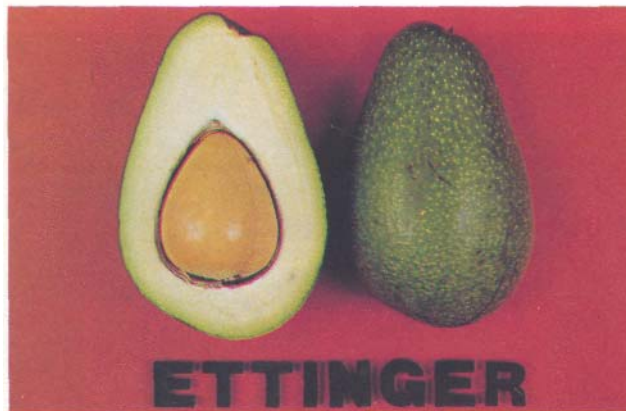
The necked pear shaped fruits are olive green with a moderately smooth, glossy skin. There is often cork development in the lenticels. The skin separates easily from the flesh. The flesh is attractive, of fair quality and has a rich, oily taste. The seed is tight in the cavity and does not adhere to the flesh. Its size is small in relation to the size of the fruit.

The main advantage of this cultivar is that it matures between the Fuerte and Hass seasons.

ETTINGER

This cultivar originated as a Fuerte seedling in Israel. Flowers are type B.

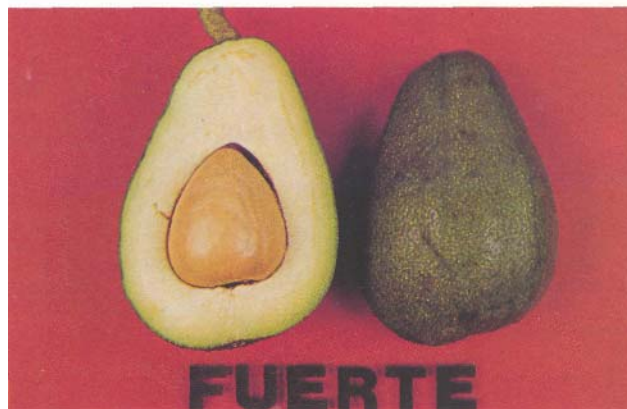
The quality of the Ettinger presently available in South Africa is very poor. The fruits have an unacceptable amount of fibre and a very limited shelf life. Budwood of this cultivar will have to be re-imported.



FUERTE

This cultivar originated from a natural Mexican X Guatemalan hybrid and has type B flowers. In South Africa it is still the standard by which all other avocados are judged. The fruits are very variable in shape — varying from necked pear to ovoid. They are medium green in colour and are medium in size. The thin, waxy skin is slightly rough and separates easily from the flesh. The flesh is attractive, of excellent quality and has a rich, nutty flavour. The seed is tight in the cavity and does not adhere to the flesh. Its size is medium in relation to the size of the fruit.

In the warmer areas, Fuerte matures in mid-March. It has a long picking season as tree storage is good. One of the main problems with this cultivar has been its history of erratic bearing in certain areas. In addition there have been problems with internal fruit quality on the overseas market, in past seasons.



HASS

This cultivar originated in America as a seedling in 1926. It has type A flowers and mature trees have a compact, rounded growth habit.

Hass fruits are generally small, ovoid in shape and are black when ripe. The rough skin, which is relatively thin for a Guatemalan, separates easily from the flesh. The flesh is of outstanding quality, has a firm, creamy texture and a very rich, nutty taste. The seed is tight in the cavity and does not adhere to the flesh. Its size is generally small in relation to the size of the fruit.

In the warmer areas, Hass matures at the beginning of August. The fruit can withstand rough handling and resists bruising. It has good transport and storage abilities. Fruits can be left to hang on the tree until market conditions are favourable as tree storage is excellent. One of the problems with this cultivar is that as the tree matures there may be a decline in vigour and a decrease in the fruit size. It is also inclined bear alternately.

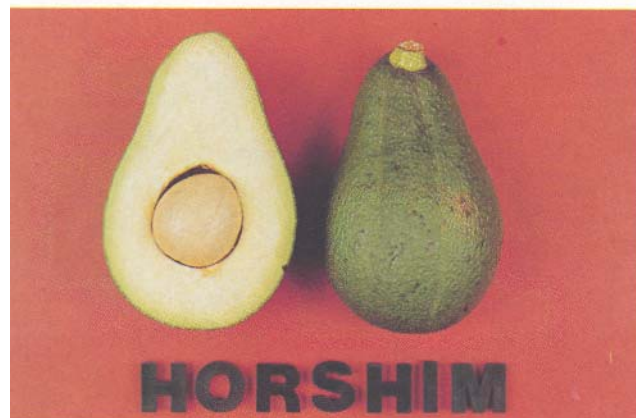
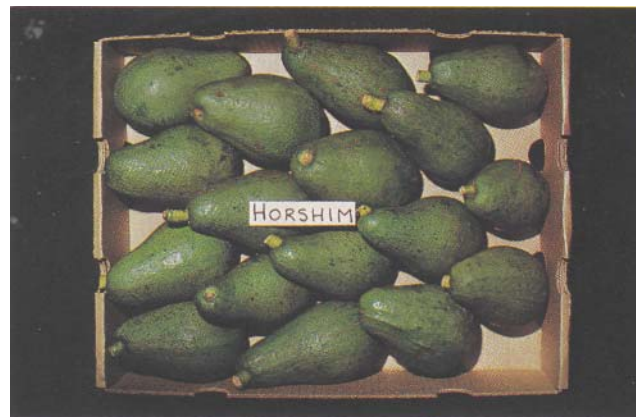
HORSHIM

This is an Israeli cultivar with type B flowers. Young trees at Burgershall are showing a rounded growth habit.

The fruits are small to medium in size. They are pear shaped, often with a pronounced

neck. They are medium green in colour and have slightly rough, waxy skins. The skin, although thinner than that of Fuerte, still separates from the flesh. The flesh has a firm texture and a rich flavour. In America (1977) Horshim was rated as having the highest quality of known varieties'. The seed is small to medium in relation to the size of the fruit. It is often loose inside the seed coats, which, however do not adhere to the flesh.

The Horshim season runs concurrently with that of Fuerte and tree storage is good. The only problem encountered so far with this cultivar in Israel and California, has been its marked alternate bearing habit. There have been no studies conducted on yield in South Africa, so it is not possible to predict if it would be a problem in this country. They have found, however, that production can be increased by the use of Tova (A type flowers) as a pollinator.



PINKERTON (Patented)

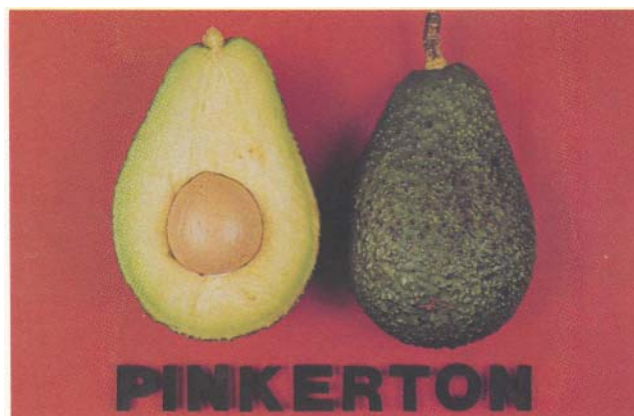
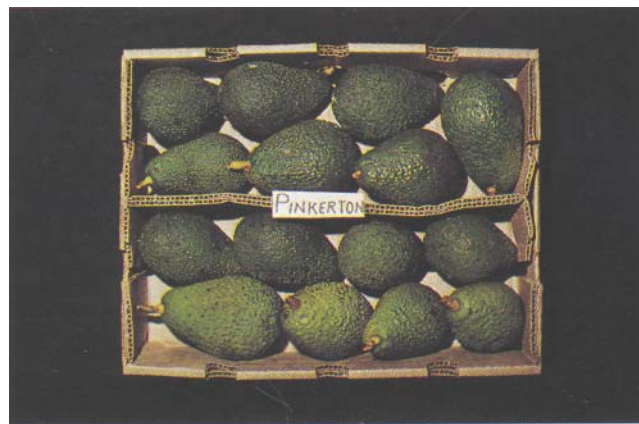
This cultivar originated in 1961 as a probable Hass X Rincon hybrid — it shows predominantly Guatemalan characteristics. The trees planted at Burgershall although still young, show a spreading, open growth habit. They are precocious and start bearing at an early age. Some of the fruits are sunburnt — perhaps this will not be a problem once the trees are larger and have more leaves. It has type A flowers.

The fruits are medium in size, thick ovoid to pear shaped and are dark green in colour. They have very rough, warty skins which separate easily from the flesh. The flesh is an attractive yellow, has a smooth, creamy texture and a rich, nutty taste. The quality is rated as excellent. The seed is tight in the cavity and does not adhere to the flesh. Its size is exceptionally small in relation to the size of the fruit.

There are two distinct fruit sets. The early or off-bloom fruit matures slightly later than the early Fuertes, with the balance ripening throughout the Fuerte season. The fruit must therefore be selectively picked on the basis of size. Tree storage is excellent.

In America, Pinkerton is the cultivar showing 'the newest major expansions' on the grounds that it is Very precocious — a terrific producer, more consistent than Hass'. There are hopes that it will become the 'winter Hass'. It takes more time than Hass to soften after picking — this could be an advantage for shipping long distances.

Further trials will have to be conducted in other areas of South Africa in order to determine whether it will perform well in this country too. Perhaps it will not be suitable for the colder avocado areas in the country as it is inclined to become 'necky' under some climatic conditions.



RYAN

This is a Guatemalan cultivar with type B flowers. It has been planted in the past as it matures at a time when no other avocados are available, and prices on the local market

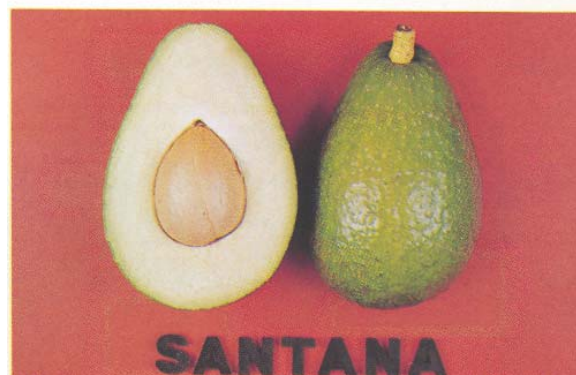
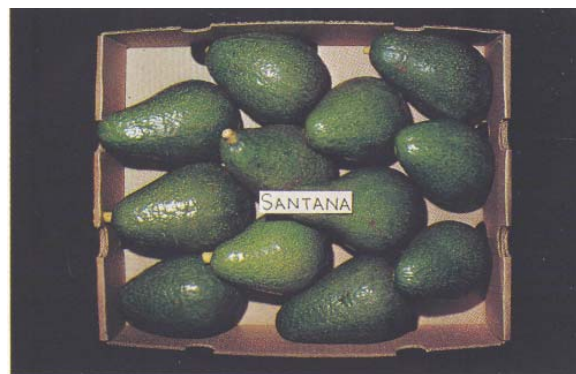
are high. However, fruit quality has been consistently poor. The large seed often germinates inside the fruit — sometimes causing it to rot whilst still on the tree. In addition fruit sometimes fails to ripen satisfactorily. New budwood of this cultivar has been imported, in the hopes that it will prove superior to the Ryan which is currently being propagated in this country. Only a small amount of this new source is available from the CSFRI, as the trees have not yet been planted out from the nursery, due to the drought conditions.

SANTANA (Patented)

This cultivar originated as a seedling of a Zutano tree which is a Mexican type. Young trees at Burgershall exhibit a slightly spreading, rounded growth habit. They are precocious and start bearing at an early age.

The fruits are generally large. They are thick ovoid to pear shaped, sometimes with a pronounced neck. They are glossy and light green, with a relative smooth skin. Cork sometimes develops in the lenticels, particularly at the blossom end. The skin is leathery and separates easily from the flesh. The flesh is pale, has a soft, mushy texture and a fair flavour. The quality of the avocado is sometimes marred by the development of blossom-end rot. The seed is tight in the cavity and does not adhere to the flesh. Its size is small to medium in relation to the size of the fruit.

Hopes that this would be an early maturing cultivar, have proved unfounded. Fruit matures at the beginning of the Fuerte season and the picking season is short as tree storage is poor.

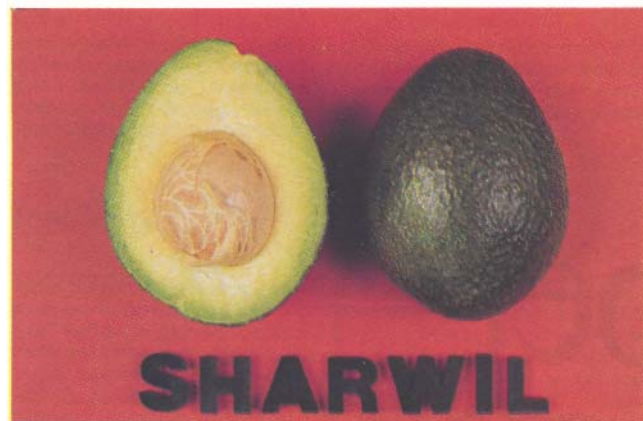


SHARWIL

This is an Australian cultivar which is a Guatemalan X Mexican hybrid, with type B flowers. Young trees at Burgershall have a spreading growth habit.

The fruits are small to medium in size and are dark green. They have rough skins and are slim ovoid to ovoid in shape. The skin separates easily from the flesh and although it is thick and corky, it is not so thick as to be impossible to judge when the fruit is ripe. The flesh is attractive in appearance and has a moderately rich nutty taste. The seed is tight in the cavity and does not adhere to the flesh. Its size is small to medium in relation to the size of the fruit.

It matures slightly later than Fuerte. In Australia it is markedly alternate.



TEAGUE

This cultivar originated in California as a seedling from a Duke X Fuerte hybrid, and shows predominantly Mexican characteristics. Young trees planted at Burgershall have a slightly spreading, rounded growth form. There may be a rootstock incompatibility problem as two out of the six trees planted, have died, however they are grafted onto rootstocks that are no longer commercially used.

The fruits are small to medium in size. They conform to the desired pear shape and are

a light green colour with a very smooth, waxy skin. They become attractively shiny with handling. The skin is very thin and is easily damaged. Fruits must therefore be handled with more than the usual amount of care. The flesh is an attractive cream colour, has a smooth creamy texture and a light, spicy taste. The seed is tight in the cavity but does not adhere to the flesh. The size is small to medium in relation to the size of the fruit.

Teague fruit matures as much as six to eight weeks before Fuerte and may thus be valuable in filling a gap on the local market. However, trials should first be conducted to determine its transport and storage abilities and the condition in which the fruit arrives at the market.

All these cultivars are grown in a variety plot at Burgershall. Edranol, Fuerte, Hass, Pinkerton and Ryan (old source) are all commercially available.



NEW SELECTIONS

There are three new and promising selections from the University of California's Avocado Breeding Program, for which patent rights have been granted. Negotiations are currently under way for their importation into South Africa. All three are green-skinned at maturity, have thick, rough skins that peel well and are about as cold sensitive as Hass. Some important characteristics such as storage and shipping abilities are not yet known. In addition none of the three varieties has been adequately tested on a commercial scale.

WHITSELL (Patented)

This is a predominantly Guatemalan type but is unusual in that its fruits have some of the spicy anise flavour usually associated with Mexicans. It has type B flowers, which makes it a useful pollinator as most of the other late flowering cultivars have type A flowers.

The fruits are somewhat larger than Hass. The flesh is rich and has a flavour rated as 'very good' but not as 'nutty' as Hass. The seed size is rated as small plus in relation to the flesh. Fruits mature at the same time as Hass. Tree storage is good and yield may be as much as twice that of Hass. However its productivity is also subject to alternation.

Trees tend to be semi-dwarf, with an irregular contour. Tree density could therefore be increased. As a result of this dwarfing tendency grafted trees are slow to 'take off after planting out. Therefore planting material may have to be selected more carefully than is considered necessary with present commercial cultivars.

GWEN (Patented)

It has type A flowers. The fruits are about the same size as Hass and have the same rich, "nutty" flavour. It is inferior to Hass in terms of average seed size.

The fruit matures at approximately the same time as Hass, however, tree storage is even better. On one tree, at the same time, the old and the new crops received the same 'good minus' flavour rating.

The tree has a narrow upright habit and therefore tree density can be increased as much as three times that recommended for Hass. It has tremendous yields and its productivity does not alternate as markedly. It grafts easily and grows well.

ESTER (Patented)

It has type A flowers. The fruits are bigger than those of Hass and on the average the seed to flesh ratio is larger. Its flavour is only rated at being 'good' as it lacks 'nuttness' but might be preferred by those liking a milder taste. The fruit matures later than Hass, making it a competitor of Reed. It hangs later than Reed but its tree storage is limited by the fact that it is inclined to russet with time.

The tree is spreading with a regular contour trees will probably not become as tall as Hass. It is very dense and vigorous and the limbs are therefore not as subject to wind damage as trees with an open growth form. It has very heavy yields and its productivity is not markedly alternate.

REED

This cultivar, as well as being grown in California, is also grown in Western Australia. It is a Guatemalan — possibly a Nabal X Anaheim hybrid, and has type A flowers.

The fruits are medium to large, dark green and round. They are of good eating quality and have a rich, "nutty" flavour. The seed is large in relation to the flesh.

The tree has a slender, upright growth form which is subject to wind damage. It is also frost sensitive. The fruit matures slightly later than Hass and tree storage is excellent.

Negotiations are also under way for importation of this cultivar. However, extreme care must be exercised and budwood may not be released for several years as tests will have to be carried out to ensure that the Reed originated from a 'black streak' free source.

CLONAL ROOTSTOCKS

The development of workable cloning procedures has enabled specific seedlings, tolerant to *Phytophthora cinnamomi* to be reproduced. These can then either be used as rootstocks in a replant situation or in establishing new orchards.

Experience has shown that young trees grafted onto clonal rootstocks require extra care initially and are more susceptible to bad cultural practices in the early stages. They will not thrive in areas with poor drainage and may be overwhelmed by very high concentrations of the pathogen eg in areas where they are subject to runoff from heavily infected, mature trees. Under these circumstances chemicals may be used to help the young trees become established and provision must be made for adequate drainage. Dr Michael Coffey,

UCR plant pathologist, stresses that in a replant situation other mechanisms are required to give an extra measure of protection while the tree is becoming established in pre-infested ground. These take the form of fumigation or treatment with chemicals before planting and subsequent follow-up treatments, or a combination of both.

Once established, resistant rootstock strains will survive where traditional ones will not. The trees are often smaller than if planted in non-infested areas but they look healthy and bear normal crops for their size. In addition, a striking feature of trees grown on clonal rootstocks is their uniformity.

There are several root rot resistant clones, including Duke 6, Duke 7, G6 and G 755. There are indications that the resistance of Duke 7 and G 6 is caused by a different biological mechanism. Duke 7 will support a significant population of the pathogen without root growth being limited, whereas, in G 6 there are early indications that point to the fact the development of the actual fungus is restricted. It is not advisable for an entire industry to be based on the use of one clone only, as there is a danger that the target disease could overcome its specific disease mechanism.

DUKE 6 AND DUKE 7

These are both seedlings of Duke, a Mexican type. They both show good tolerance of root rot but Duke 7 is more easily propagated.

G 6 (Patented)

This is also a Mexican type — the original tree was found growing in the wild in Guatemala. The parent G 6 clone has shown good root rot resistance.

G 755 (Patented)

This is probably a seedling of *Persea schiedeana* — a close relative of the avocado. It is very vigorous and shows promising root rot resistance. There are also no problems with graft compatibility.

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