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PRODUCTION OF AVOCADO TREES IN THE NURSERY

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1. The limiting factor for production of avocados in most parts of the world is *Phytophthora cinnamomi.*

This is also the case in South Africa. (1, 2, 3, 5, 7.)

A survey showed 90% of the avocado nurseries to be infected with *P. cinnamomi* (8). This fact shows a lack of knowledge in the application of sound nursery practices. The magnitude of avocado rootrot in orchards in all production areas makes it essential that the general standard of nurseries should be drastically improved.

2. AVOCADO ROOTSTOCKS

The method of root rot control that holds the greatest possibility of success in the long run is the development of a rootstock which is resistant to *Phytophthora cinnamomi (7).*

2.1 *Seedling Rootstocks*

Almost all nursery trees produced in South Africa at present are on seedling rootstock. Genetically seedlings are highly variable (3) For many characteristics such as resistance to *Verticillium* and several other desirable qualities genetic differences can be greater in than among horticultural races. According to Ben Yaakov in Israel the rootstock scion interrelationship is both complex and highly significant.

2.2 *Clonal Rootstocks*

One of the most promising and exciting developments in the control off. *cinnamomi* is the use of clonal (vegetatively propagated) rootstocks (1, 3, 4, 6, 7)

In field trials throughout Southern California, Duke 6 and Duke 7 cuttings are showing 80 90% healthy trees compared to 10-20% with the standard 3.rootstocks in old avocado root rot areas (7). Although not completely resistant, Duke 6 or Duke 7 should perform well on sites where other rootstocks fail.

Apart from Duke 6 and Duke 7, G6, G22, G166 and G755 show promise and testing continues by Dr G. Zentmyer in California.

Huntalas, which is also promising is said to be infected with sun-blotch virus.

2.2.1 Propagation of Clonal Rootstocks.

Clonal propagation of avocados has been studied by a number of investigators but the variability and inconsistence of rooting found between races and cultivars within each

race hampered progress

The etiolation technique was developed by Frolich and adapted by Brokaw and Atkins to a commercial possibility which opened a new dimension in avocado production, hopefully in South Africa as well.

Briefly the etiolation method of producing rooted cuttings is as follows (6):

1. A large nurse seed producing a strong seedling is planted in a small container.
2. The seedling is tip grafted as close to the soil level as possible with the cultivar to be rooted.
3. The scion is allowed to grow until the union is well established, then cut back to near the base of the scion.
4. As soon as the buds show signs of growth the whole plant is placed in a dark chamber at 21-24ºC.
5. The plants are brought to the light after the shoots have made 7 to 10 cm of growth. A collar is placed around the stem and filled with the growth media to continue the exclusion of light from the base of the tips. The tips of the shoots are left exposed to light, but shaded until chlorophyll develops in the exposed developing leaves.
6. Shoots grow until several leaves have matured, then the etiolated shoot is girdled near its base.
7. The established cuttings are then transplanted to larger containers for growth to the required size for grafting and field planting.

3. NURSERY PRACTICES AND LAY-OUT TO PREVENT *PHYTOPHTHORA CINNAMOMI*

1. Establish the nursery in an isolated area away from orchards and fence it to restrict movement of vehicles and people.
2. Build a cement furrow system around the nursery to keep run-off water out and to keep area dry.
3. Have one entry only and supply a footbath with Copper sulphate.
4. It is most important that soil and water sources be tested in advance to ensure that they are free of *Phytophthora cinnamomi* and other pathogens. A borehole is the ideal water source.
5. Sterilize soil mixture with Methyl Bromide or steam and allow for the required safety period.
6. Drainage of soil mixture must be good and containers must have adequate drainage holes.
7. Containers may not come in contact with soil and must be placed on structures that have been sterilized.
8. Remove all shade trees, shrubs and weeds and refuse any plant from another

nursery until tests prove it to be free of *Phytophthora* or insect diseases. Do not allow visitors unescorted in the nursery.

9. Seed and graftwood may only be collected from trees that are free of sun-blotch virus and of which the origin and production is known.
10. Seed may only be picked at shoulder height and higher and not from the ground. Mature fruit should be picked and allowed to ripen before removal of seed. Wash the seed in clean water, sterilize for 30 minutes in water at 50°C and treat with fungicide.
11. Destroy all slow growing plants regularly.
12. Inspect the graft for incompaticility and discard weak grafts.
13. Trace elements can be applied as a foliar application. Zinc and Boron are important. The optimal pH for soil mixture is 6,4.
14. Sanitation and total surface sterilization of nursery area is important and must be done regularly.
15. Nursery tools may never be used outside nursery area.
16. It is important to keep a record of mixtures and propagation sources.
17. Inspect regularly for insect pests and diseases.
18. Do not leave trees too long in nursery as they tend to become root-bound.
19. Nursery personnel must be well trained and should be well acquainted with all aspects of healthy nursery principles.
20. Never stop experimenting.

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