

## Recommendations for the control of root rot

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### Sound Orchard Practices

According to the latest research in Australia (Broadbent, Trochoulis, Baigent, Abbott & Dettmann, 1989), the principal factor affecting the incidence and severity of root rot was soil drainage, as determined by the presence of bedrock, weathering rock or high bulk density and clay in the top 80 cm and by topography. Management treatments such as cover cropping, application of dolomitic lime, urea calcium nitrate, gypsum or fowl manure did not significantly affect *Phytophthora* incidence. Very little research on the effect of fertilisation on *P.c.* incidence in South Africa is available. Although Ca has been reported by various workers to reduce root rot, Broadbent *et al* (1989) could find no positive effects on root rot development or behaviour of *P.c.* that could be attributed to the influence of higher Ca levels.

### Ca-Aliette injections and timing of treatment

According to Whiley (1990), once avocado trees have been brought back to full production after treatment with Ca-Aliette for the control of root rot, treatment needs to be continued on an ongoing basis. The frequency of treatment will largely depend upon disease pressure in individual orchards, but should not exceed a minimum of once every two years in Australia. Timing of treatment ie injection has recently also been shown to be of PRIME IMPORTANCE. Treatments should be given during LATE SPRING OR SUMMER when trees are NOT actively growing. The reason for this being that during "active growth" (Figure 1a) most of the phosphorate remains trapped in the leaves, with very little reaching the roots (Figure 1b).

### DISEASE FREE NURSERIES Minimum nursery standards Site selection and layout

- Isolated, well drained area (preferably elevated).
- No run-off or drainage water to flow through nursery. Precautions such as cement furrows or drains around the site (especially the upper side) should be taken.
- Area must be suitably fenced to exclude people, dogs and other animals, vehicles and implements. The area where potting mix sterilisation is done also to be fenced.
- Access to area should be limited with a minimum number of entrance points.
- Each entrance be provided with a minimum number of entrance points (eg Copper sulphate) in sufficient amounts to decontaminate feet and footwear. Replenish when

necessary.

- Permanent, sturdy raised platforms (preferably wire mesh) must be provided on which containers are placed.
- If solid platforms are used, these must be disinfected between each batch of trees (using Copper fungicide or formalin solution).

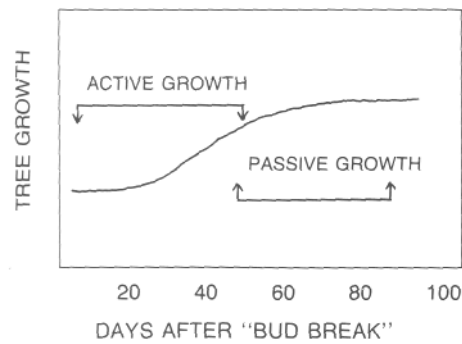


Fig 1a Avocado tree growth.

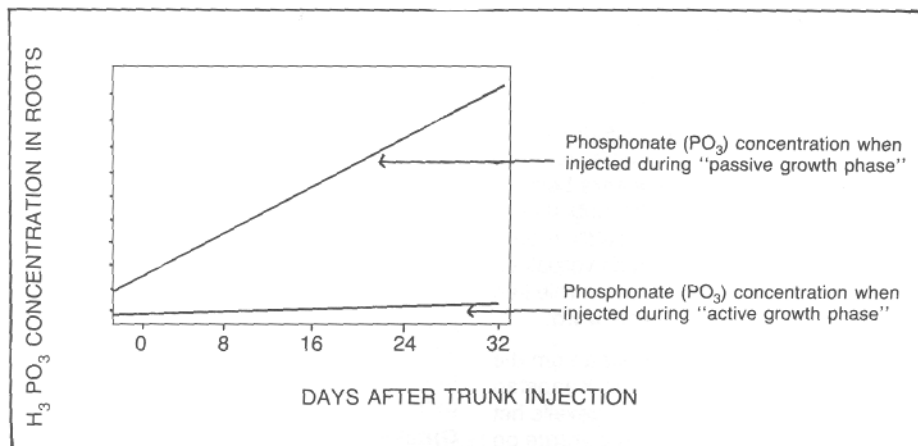


Fig 1b Phosphate concentration in avocado roots.

**TABLE 1** Chemical control of orchard trees infested with *Phytophthora*

Corrective treatment			Maintenance treatment	
Drip Diam (m)	No syringes	Ml/syringe	No syringes	Ml/syringe
3	2	10	3	10
4	4	10	4	15
5	4	15	5	15
6	6	15	6	20
7	7	15	8	20
8	8	15	9	20
9	9	15	10	20
10	8	20	10	25
12	12	20	12	30
14	16	20	16	30

**The following are to be regarded as strong recommendations**

- The nursery should be as far as possible from *Phytophthora* and crown gall hosts.
- The nursery floor, or walkways, should be well drained, preferably concreted or covered with crushed gravel and sprayed weekly with copper sulphate.
- The immediate surroundings of the nursery should be grassed to reduce dust.

**Potting mixture**

- The potting mixture used must have good drainage properties and be free of lumps.
- Potting mixture must be sterilised before being used.
- If stored it should be kept in a holding bin or sterilised floor preferably where it was originally sterilised and kept tightly covered.

**Water**

- Borehole water should be used preferably.
- Canal, dam or river (surface) water must be **decontaminated** by effective filtration and chlorination.
- If watering is done manually, hosepipe or watering-can nozzles must be kept off the ground at all times. Suitable hooks should be provided.
- Check water quality regularly.

**Seed and graftwood**

- Cuttings must not come into contact with the soil in the orchard.
- Cuttings must be cut from approved and tested sources and preferably under supervision. Parent trees must be true-to type, healthy, high yielding and sunblotch-

free.

### **General nursery procedure**

—Tools within the nursery must not leave the sterile nursery area.

### **The following are strong recommendations**

No plants from another nursery should be introduced in the sterile area. Consult the authors before introducing plant material from Malawi or other countries.

—Weak plants which show any signs of deficiencies must be culled.

—Exclude all vehicles from the fenced-in area.

—Workers and visitors to the sterile area should be limited. Provide footwear for use in the nursery only.

—Nursery should at all times be tidy and clean.

### **Minimum tree standards**

—Plants must be true-to-type, healthy and free of *Phytophthora*, crown gall and other pathogens.

—Plants must be free from obvious serious deficiency symptoms or insect damage.

### **The following are strong recommendations**

Mother blocks used for cutting of bud-wood should be kept under hail netting.

—Mother blocks should be kept free of disease and insects.

—Keep a record of the field performance of mother trees.

### **TOLERANT ROOTSTOCKS**

Use rootstocks that suit your particular conditions best. Duke 7 is fairly tolerant to root rot but susceptible to stem canker. Martin Grande is a fast grower and trees on this rootstock are slow to come into full productivity.

### **CHEMICAL CONTROL OF ORCHARD TREES INFESTED WITH *PHYTOPHTHORA***

Ca-Aliette injections applied as corrective or maintenance treatments. The number of syringes and amount of Ca-Aliette per syringe is shown in Table 1.

Timing of Ca-Aliette injections has recently also been shown to be of prime importance. Treatments should be given during late spring or summer, i.e. about 60 days after bud-break when trees are not actively growing (Whiley, 1990).

Furthermore, have soils tested for the presence of *Phytophthora*. This service is supplied by the Department of Microbiology and Plant Pathology, University of Pretoria.