

Flood Mitigation in Subtropical Avocado Orchards

Avocado Café
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About the speaker

- 30 years of subtropical fruit research, commercial production, nursery, intellectual property management (23 years in avocado).
- Moved from South Africa to Australia in 2010 to become Birdwood Nursery Technical Manager. Live on the Sunshine Coast, Qld.
- Started Subtropical Fruit Farm Consultancy Services July 2014 and operated full-time since August 2014. www.avocadofarmadvice.com .
- Specialise in conventional and organic avocado farming and nurseries in regions with wet summers and dry winters worldwide.



Some Facts

- Avocado is super-sensitive to waterlogging and therefore to flooding.
 - Avocado roots start to die within 24 hours of waterlogging due to asphyxiation
 - No rootstocks that can tolerate can tolerate waterlogging- Bounty may give probably give 48 hours before roots start dying.
 - Following the relief of asphyxiation stress, *Phytophthora cinnamomi* (Pc) pressure is extremely high due to relatively anaerobic soil conditions.
 - No avocado rootstocks available to growers which have complete resistance to Pc
 - only various levels of tolerance.
- Therefore, planning for periodic flooding may be partially achieved through:
 - orchard design, soil water infiltration, surface drainage, sub-surface drainage



Orchard Design

- Planning for periodic flooding may be partially achieved through orchard design:
 - Choose orchard topography with at least 4% slope to facilitate easy surface run-off
 - Select soil with fast water infiltration through the soil profile,
 - Plant on ridges at least 2' above the original soil surface so the roots are perched above the waterlogged soil in the event of flooding
 - Avoid planting on the contour – rather orient rows straight down the slopes so that water is not impeded by ridges running across the natural runoff path. Erodeable soils should be seeded with an aggressively rooting grass cover
 - Avoid planting orchards in soils with a perched or shallow water table,
 - Use rootstocks with the highest tolerance to waterlogging. Eg Bounty. Avoid Reed seedling



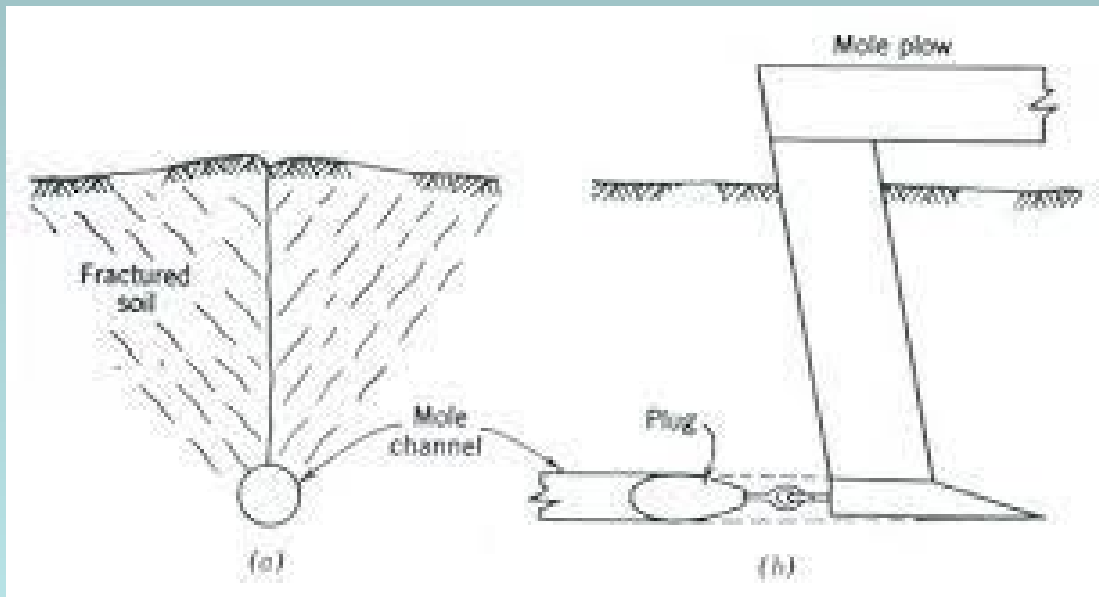
Orchard Design

- Avoid planting orchards in soils with a perched or shallow water table,
- Use rootstocks with the highest tolerance to waterlogging. Eg Bounty
- Where soil drainage is inadequate, install a professionally engineered piped drainage system to rapidly remove excess subterranean water
- Avoid planting trees in depressions or where water will naturally flow
- Install under-road culverts or pipes at the lowest crossing points under roads running parallel to the contours. The compacted roads will often “dam up gravitational subterranean water flow above the road.



After Flooding

- Once an orchard has been inundated with water:
 - Turn off irrigation & nutrition before rain gets too heavy.
 - Inspect orchards and try to remove any impediments to surface water runoff, where feasible
 - In the absence of subterranean piped drainage system, where soil type allows it, consider pulling mole drains in inter-rows after prolonged flooding rain.



After Flooding

- Once an orchard has been inundated with water:
 - Make notes on observations of water flow and stagnant water areas for future planning Turn off irrigation & nutrition before rain gets too heavy.
 - Decide early whether to staghorn weak trees to improve survival.
 - In the longer term decide whether you can significantly improve drainage for the affected trees (eg mounding, improved surface drainage, installation of subsurface drainage). If not then remove avocado trees from the area, and use it for some other purpose. Building better mounds for future tree rows may help in marginal areas as long as they are orientated to allow the water to get away and not dam it up.



Phytophthora Root Rot

- Several days of cool, cloudy weather affect the ability of avocado trees to resist the Pc because they haven't been able to photosynthesize adequately to build up reserves of carbohydrate to fight against the disease and grow new feeder roots.
- The timing of phosphorous acid applications is critical because it will go to the parts of the tree that are growing most actively at the time of application.
- Phosphorous acid is needed in the feeder roots to protect them from attack so it must be applied when the feeder roots are actively growing, April-June (Southern Hemisphere) once the most recent leaf flush is fully expanded and hardened.
- Phosphorous acid can be applied by injection or multiple foliar sprays but only use the foliar method if the trees have a full and healthy canopy of leaves (this is needed to allow sufficient uptake of the chemical). In other cases, use the trunk injection method.

Phytophthora Root Rot

- Regularly test the phosphorous acid content of your feeder roots. If you don't have root levels of 150ppm or more four weeks after your autumn applications or over 90ppm going into summer, then you need to re-examine your application practices.
- **Concluding Remarks**
 - Resist the temptation to replant trees in areas which have succumbed to the effects of flooding, as the likelihood of a repeat event is high in the next flood





