Water for Profit

BENCHMARK – IRRIGATING CITRUS

WATERFORPROFIT

Benchmarking can be an effective way to identify opportunities for improved management. While benchmarking can be conducted on any area of your farming operations, this sheet provides a basis for your irrigation performance.

Crop specifics

The citrus is a tropical evergreen tree that is grown in drier areas to maximise fruit quality. It flowers in spring and the ranges of cultivars are harvested the following autumn through to early spring. Fruit is therefore on the tree through summer and for periods of up to nine months.

Citrus trees are sensitive to both under- and over-watering. Under-watering can lead to problems such as fruit drop, and lower fruit quality from reduced size. Over-watering can lead to reduced tree growth due to poor soil aeration, increased incidence of root and collar rots, and leaching of fertiliser out of the root zone.

The root system of a cultivated citrus tree is based upon secondary lateral roots (the primary root which could become the taproot is usually severed during propagation) consisting of larger pioneer roots and bunches of fine fibrous roots. The root system can extend down to 150 cm in well-drained soil but the bulk of the root system is in the top 75 cm of soil.

Critical growth stages are listed below.

- Postharvest dormancy and first fertiliser application – sufficient irrigation is required during this growth phase to maintain root health and incorporate applied fertiliser.
- Pre-flowering and second fertiliser application – irrigation is required during this phase to induce uniform bud break and flush as well as fertiliser incorporation.
- Flowering and spring flush – citrus is extremely sensitive to moisture stress during this period and any stress during this time is likely to adversely affect yield by inducing fruit drop.
- Fruit growth – adequate and constant soil moisture during this period is critical to maximise fruit size and therefore final yield.
- Preharvest – the onset of fruit maturation sees a slight reduction in the water demand by citrus. Slight deficit irrigation during this period will help induce uniformity of fruit maturity and will also increase the flavour of the fruit.

Crop benchmarks

Irrigation requirements vary markedly depending on rainfall received during critical growth and fruiting periods. The total crop water requirement is generally between 8 - 10 ML/ha per season for mature trees with an irrigation requirement of approximately 5 - 8 ML/ha, allowing for inefficiencies and drainage loss.

Rainfall in citrus production areas can be irregular and intense. Effective rainfall is often only 3 - 5 ML/year. Best practice yields are in the order of 40 - 50 t/ha depending on the season. The tables below show volumes of irrigation water applied for a full season (2001) using a range of irrigation systems.

Young trees (generally less than 10 years old)

System	Average (ML/ha)	Lowest (ML/ha)	Highest (ML/ha)
Drip	3.4	3.9	3.6
Micro	1.9	6.9	3.7
Over-tree	10.7	12.5	11.3

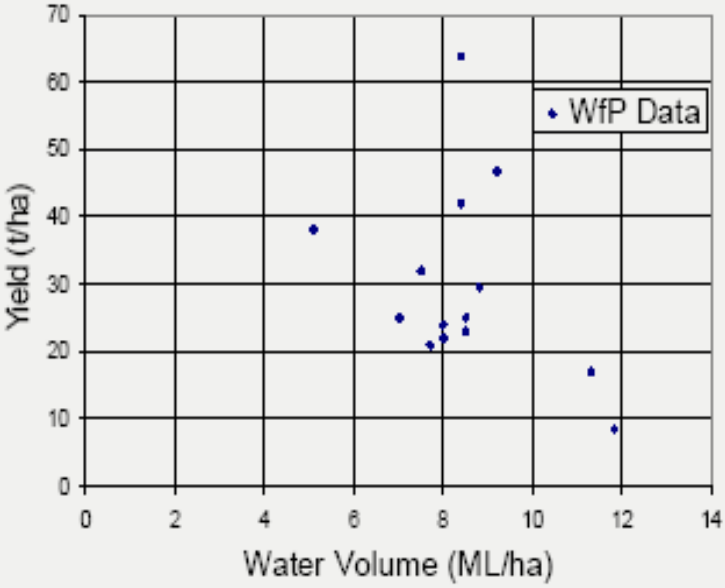
Mature trees (generally over 10 years old)

System	Average (ML/ha)	Lowest (ML/ha)	Highest (ML/ha)
Micro	4.6	7.4	5.8
Over-tree	8.7	11.3	10.1

Best practice guidelines

- Ensure irrigation system has the capacity to meet seasonal and peak water requirements. Regular maintenance and performance evaluations should be conducted.
- Systems that deliver the irrigation water under the tree without wetting the foliage such as under-tree mini sprinklers or trickle are best suited to citrus from a disease management and water use efficiency point of view. Overhead irrigation systems may help to improve fruit skin quality slightly but are generally less efficient.
- A monitoring program should be used to schedule both the timing of irrigations and the volume of water to be applied.
- Tensiometers are a useful tool to assist with irrigation scheduling. If used, they should be installed at depths of 250 and 600 mm. Irrigation should occur when the shallow tensiometer reads 20 - 35 kpa.
- The movement of irrigation water in the soil profile should be monitored to ensure deep drainage is minimised.
- A layer of mulch under the tree is important to reduce evaporation and increase soil organic matter.
- Maintaining adequate soil moisture during flowering / fruit set / fruit fill is essential for achieving optimum yields.
- Efficient crop water use and high yield potentials can only be achieved if the agronomic factors such as nutrition, disease and pest management are also optimised.

Yields of citrus compared to total water applied



Irrigation benchmarking data collected in Queensland as part of the Water for Profit program.

For more details contact the Growcom members access line on 07 3620 3844.

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