

NURSERY 'KNOW HOW' :

## #6 Root zone temperature

KNOW HOW  
**McHort**  
McPHERSON HORTICULTURE



**Critical to optimum growth and health of a container crop is the root zone temperature.**

Too cool and growth will be restricted; too hot and the roots can be damaged. It is then surprising that many growers do not routinely monitor root zone temperature (RZT). Even fewer attempt to manage it. The key to any management strategy is collecting and collating information. Use a soil thermometer to measure RZT.

**Thermometer location is critical.**

A metal sleeved soil thermometer should be pushed into the containerized root ball of the target crop so that the tip is in the very centre, top to bottom, left to right, of the root zone. Shield the red spirit indicator from direct sunlight using a piece of plastic pipe as a sleeve. Exposure to direct sunlight bleaches the spirit colourless and therefore impossible to read.

**Site selection.**

Select a permanent monitoring site in each growing environment. A thermometer will be required in the propagation area, in the growing on area, where liner plants (GOL's) are produced and in the final production beds. Mark that position clearly, so the thermometer is easily found. Use a white painted stake, or a striped surveyor's pole. Avoid a position at the edge of the area, or near a door in an enclosed environment. These locations will not give readings typical of the whole area. We seek uniform and typical data which represents an average for that area.

Record temperatures at the same time each day. Mid morning or just before lunch are

**Recording frequency.**

Record temperatures at the same time each day. Mid morning, or just before lunch are satisfactory, but be consistent. You could simply put each reading onto a wall calendar day by day and extract the required data at a later date for analysis.

**Data loggers for the computer literate.**

Those of you who are computer literate may prefer to install data loggers. These are now widely available at modest cost. They are completely weather proofed and can be left in situ for 6 months or more. Multi channel loggers will record RTZ in several location at the same time. A soft ware package, available with the data logger, allows you to down load the information onto your PC. From your PC you can produce graphs which illustrate RTZ fluctuations over time, season by season and even hour by hour, if you wish.

**What influences root zone temperature?**

Firstly, never pot young tender stock into hot potting mix. Potting mix can heat up in storage due to microbial activity associated with decomposition. Potting mix temperatures in excess of 50°C have been noted. Cool it before use by either spreading it out to air cool, or damp it down with water, or both. Quality potting mix should not be this hot! Once potted, radiant heat from the sun raises RZT.

**The effect of irrigation.**

Irrigation will cool or even chill the root zone. It is then critical to understand this influence if optimum RTZ is to be maintained, especially in early Spring when radiant heat gain is at a premium. As a general rule, in Winter and early Spring irrigate as near to dawn as practical to maximize radiant gain during the day.

**McHort, McPherson Horticulture**  
**Mobile: 021 782250**  
**Email: [info@mchort.co.nz](mailto:info@mchort.co.nz)**  
**[www.mchort.co.nz](http://www.mchort.co.nz)**

information | advice | supply

NURSERY 'KNOW HOW' SERIES : #6 ROOT ZONE TEMPERATURE

## #6 Root zone temperature

KNOW HOW  
**McHort**

McPHERSON HORTICULTURE



In Summer and early Autumn irrigate from about 2pm to avoid a heat spike.

Remember water holds heat more efficiently than does air. If you irrigate early in the day on a really hot day, the RTZ will be higher for longer than had you watered later in the day. This is due to the accumulative heat retention.

The result could be par boiled roots!

### **Managing RTZ is secondary to irrigation.**

Having pointed all that out, do not compromise plant health or growth performance by withholding or delaying irrigation simply to manage RTZ. Always irrigate well and to waste, but in consideration of the plants' needs and the RTZ. Try to avoid overhead irrigation in very bright sunlight, or so late in the day that the leaves are not dry by night fall.

### **Optimum root zone temperature is species specific.**

As a guide, most crops will perform best with a root zone temperature in the range 18—24°C. Tropical and sub tropical species require an RTZ at the high end of this range, plant species indigenous to extreme Northern or Southern latitudes, or altitude are typically happiest at the lower end of the RTZ range.

### **Fertiliser behaviour is affected by potting mix temperature.**

Coated, controlled release, fertilisers popularly used for container production, are significantly affected by RZT. If potting mix temperatures are too high, fertiliser delivery may become dangerously high. Root burn may result due to salinity.

If potting mix temperature is too low, fertiliser delivery may not be enough resulting in poor growth.

### **Managing root zone temperature.**

In most cases, management is limited to maximizing radiant gain from the sun in the cooler months and minimizing it during the hotter months. Making sure glass or poly tunnel covers are clean and restricting air flow through the growing house will maximize heat gain. Heat reduction is achieved by shading, increasing air flow and by irrigating to cool the root zone.

### **What we know about New Zealand conditions.**

Research conducted by myself in co-operation with seven Polytechnic sites throughout NZ established the following:

The highest RZT occurs between 4pm & 6pm in high Summer. Black pots attain a 2-3°C higher RZT than white pots.

Containers irrigated mid-morning on hot days rose to a higher terminal temperature than those irrigated early to mid afternoon. Free draining, bark based potting mix warmed up faster than peat mix, but did not reach as high a terminal temperature. Irrigating significantly cools the root zone. Irrigating mid morning in Winter will result in a loss of valuable heat gain for the day compared to irrigating close to dawn. Air temperature was different to root zone temperature and was not a reliable indication of likely root zone temperature. Root zone temperature needs to be managed in order to optimise crop performance. Optimum fertiliser selection for release pattern, longevity, performance and economy can only be achieved with access to, and an interpretation of, the specific RTZ data for your crop. This data will of course be specific to your cultural practices, geographical location and season of production.

**McHort, McPherson Horticulture**

**Mobile: 021 782250**

**Email: [info@mchort.co.nz](mailto:info@mchort.co.nz)**

**[www.mchort.co.nz](http://www.mchort.co.nz)**