COMPOSTING TECHNIQUE CRITICAL ISSUES SUMMARY

Accurately measure the raw bark volume.

Record all temperature data from the same depth in the windrow.

Maintain adequate moisture levels, damp, but not wet, throughout the process.

Turn and mix thoroughly. Turn the windrow inside out each time it is turned.

Measure pH each turn.

Allow adequate time for the maturation phase.
Do not rush the process.

CONTACT McHort on 021 782250 or mchort@xtra.co.nz for more information

COMPOSTING TECHNIQUE SIMPLIFIED

To raw, moist, Radiata pine bark, add:

McFert Top 24 @ 1.5 kg/m^3

Mix thoroughly and form into a windrow at least 2 m tall at its apex.

* * * * * * * *

Monitor the temperature inside the windrow using a long probe thermometer.
You must reach 1 m into the windrow.
Recording the temperature daily will show that the temperature will rise after 7-20 days, depending on ambient air temperature.
Temperature will rise quicker in Summer than in Winter.
When the windrow internal temperature peaks, usually between 55-65^{o}C, turn the windrow inside out, adding water, as necessary, to any dry spots.

* * * * * * * * * *

Reform the windrow and recommence the temperature monitoring.

* * * * * * * * * *

Once the temperature peaks and holds, open up the windrow again, moisten if necessary, mix and reform.

* * * * * * * * * *

Test pH after each turn.

* * * * * * * * * *

It will be desirable to repeat this process 3 or 4 times.

* * * * * * * * * *

After reforming the windrow for the 4th time, monitor the internal temperature as before, but leave the windrow intact when the temperature peaks.

* * * * * * * * * *

Monitoring the windrow temperature we will see a gradual decline in temperature.
Once this trend is established, the bark is stabilized.
The process now enters the maturation phase of the composting process.
In this state the windrow remains undisturbed for a minimum of 4 weeks.

* * * * * * * * * *

After this maturation period, the material is ready for pH testing and for fertiliser additions in order to make it into potting mix.

* * * * * * * * * *

The total elapse time from start to finish will be 16-20 weeks, depending upon the time of year and ambient temperature and management technique. Allowing the windrow to overheat and/or dry out may stall the process and/or affect the quality of the composted and stabilized bark produced.

CONTACT McHort on 021 782250 mchort@xtra.co.nz for more information

NURSERY 'KNOW HOW' :
#2 TESTING INPUTS

McHort KNOW HOW
McPHERSON HORTICULTURE

NURSERY 'KNOW HOW' SERIES : #2 TESTING INPUTS

This article is limited in scope to containerized production of ornamentals using controlled release fertiliser in soil-less potting mix.
I make no excuse for this as this is the custom and practice of ornamentals' production, in the main, in New Zealand today.
Measuring crop inputs is a fundamental management function which enables you to produce efficiently, consistently and safely.

The 3 main reasons for testing:
Problem solving
Quality optimization and maintenance
Establishing bench mark data

As you all know, the symptoms of over watering a crop can be easily confused with those associated with under watering. Nutrient deficiency or toxicity symptoms similarly are easily confused. Testing enables us to more accurately differentiate.
A simple and quick salinity test of the potting mix will soon identify the difference.

Fine tuning the fertiliser inputs and modifying them during culture in consideration of the growing conditions is both practical and desirable.
Of great significance is deciding when the original charge of incorporated fertiliser is exhausted.
All too often this is only acted upon when the plant loses colour and vigour. A simple test with comparison and an interpretation method is a powerful tool for production optimization.
Correct timing of the supplementary nutrient charge, usually top dressed, is vital for quality continuity, maintenance and economic production. Measuring the pH of a potting mix will allow us to monitor any pH drift. This can and does occur much more frequently that most growers acknowledge. pH drift can result in nutrient lock-up and consequent deficiencies.
By measuring the nutrient content of a potting mix or plant tissue of the ideal crop, we can establish bench mark data by which to compare any subsequent crop/s grown under the same production regime.

As I understand it, most growers currently test, especially plant tissue, entirely for the purpose of problem diagnosis. This is often frustrated by the fact that so little data exists for so called normal plants of the same type.
The answer lies in building up a data base for the plants that are important to your business and being grown in the production system used . In New Zealand we have no Government funded research or extension service devoted to this aim, so you are on your own.

Who should do the testing?
Testing can be conducted at two levels:
1. By a specialist commercial laboratory.
2. By testing yourself, on site.
Tests conducted in the lab. are more wide ranging and offer greater accuracy, but at the cost of time and money.
On site testing, whilst limited in scope and accuracy, can produce useful results quickly and very economically. Ec and pH meters are essential. We sell them!

What should you test?
Potting mix, irrigation water and plant tissue.
In practical terms, on site testing is limited to Ec. (conductivity) and pH of potting mix, fertigation solutions and irrigation water. The value of this information , however, should not be under estimated as it forms the very foundation for consistently producing quality plants.
A specialist laboratory should be used to confirm your own results periodically and to extend the depth of findings for diagnostics and bench marking purposes.
The irrigation supply if from a bore should be tested every six months as it has been known for quality to vary with the season and to deteriorate over time.

NURSERY 'KNOW HOW' :
#2 TESTING INPUTS

McHort KNOW HOW
McPHERSON HORTICULTURE

A lab test will
relate hardness as well as pH.
This detail will be essential if correction is required. Tissue analysis of stock plants, those you propagate from, can be especially useful. Some species e.g. Lavender and Pittosporum have been known to be Calcium deficient. If you can manage the nutrition of your stock plants then
periodically testing will help you produce the best propagation material.

Frequency of testing
Test every batch of potting mix, home made or bought in, using your own test kit for Ec. and pH. If an abnormal result pops up, a lab. test may be justified. Stored potting mix containing controlled release fertiliser should be tested to ensure safe salinity levels are not exceeded.
To establish good bench marking data and to predict how long the fertiliser in the mix will last may involve testing monthly.
I recommend that your irrigation water is tested annually by a lab. and 3-4 times a year using your own on site test kit.

Sampling techniques.
When collecting material to be tested it is vital to have a consistent technique. Potting mix from a bulk heap should be collected as at least 20 sub-samples, handfuls, which are then gently mixed in a clean bucket. From this volume either draw off the 100ml required for on site testing or 1ltr to send on to the lab.
Sampling from a container crop in situ requires a different approach.
If possible take off the pot and take a small amount of mix from the root ball about half way down the pot. Avoid sampling pots on the outer edge of the bed.

McHort, McPherson Horticulture
88 West Road,RD1,OHAUPO
3881NZ

Ph 07 823 8330 Fax 07 823 8331
Mobile 021 782250
Email: mchort@xtra.co.nz

At least 20 such samples should be gathered and mixed together before submitting for testing. Do not gather samples immediately after rainfall or irrigation unless you wish to confirm an Ec. reduction after having remedied a salts accumulation problem by leaching.
When sampling leaf tissue choose the most recently expanded, mature leaves. You will need at least 70 leaves, from a species with medium sized leaves. Avoid sampling recently fungicide treated leaves or if this is unavoidable make a diary note as to which spray had been used and when.
Commercial laboratories such as R.J. Hill in Hamilton will provide sampling kits and guidance to assist you.

How to use the results
Interpretation of your results is the least understood factor in the equation. Most commercial labs. are not equipped to offer interpretations simply because they only see the samples submitted and not the circumstances of production. Their skills and expertise is almost always limited to the accurate production of results consistently. Interpretation needs a vast practical experience and excellent reference data derived from the same climate and cultural system being employed by you.
McHort specialize in providing this type of help, but need you to provide the data.
Equip your business with the basic testing tools and invest in some tuition on how to use them.
Start to collect base data from crops currently in production , make observations and record the specifics of potting mix inputs, production and potting dates, etc. along with your test results.
Need help? Call me, I shall be in your area soon.

NURSERY 'KNOW HOW' SERIES : #2 TESTING INPUTS

information | advice | supply

NURSERY 'KNOW HOW' :
#3 Quality Potting Mix

McHort KNOW HOW
McPHERSON HORTICULTURE

Quality Potting mix is, put simply, the inter-relationship of three key factors, chemical, physical and biological, precisely defining a potting mix. Quality results when the correct balance of suitable stable components and ingredients are used.
Quality is compromised even when superior components are selected if the critical blend and balance is not correctly engineered.
Not all potting mixes are equal and not all potting mixes are capable of growing quality plants. You should specify to your supplier exactly what you require and be prepared to check the accuracy attained regularly.
Mix specification and consistent adherence to the specification is critical.

A more detailed look at each key factor will illustrate quality issues.

Chemical properties are expressed and measurable as pH, conductivity, Nitrogen stability, toxicity, nutrient balance, amount and longevity.

pH
Most ornamentals are happy in a mix pH 6 - 6.5 (5 - 5.5 for acid lovers). Adjustment of mix pH is achieved by adding calculated amounts of liming materials; e.g. Ag. Lime and Dolomite lime. Each variant in base mix components; i.e. bark to pumice ratio, has the potential to change the liming requirement to achieve the same pH point. Low levels of lime input may require additions of Calcium as Gypsum and/or Magnesium as Kieserite to ensure adequate supply of these elements to your crop. Small particle sized liming materials will alter mix pH faster but may not hold it in the desired range for long enough. Use liming agents with fine particle size for short term crops and a mixture for longer term crops.

Conductivity or soluble salts level in your mix should not exceed Ec. 2.0 when potting pot grown G.O.L.'s, Ec. 1.6 if potting up cuttings or seedlings.
Ec. is quantified using a 1:1.5 water extract method. Fertiliser type and rate has a bearing on the salinity generated. Soluble types are very fast acting with poor longevity and a high salinity risk. Slow release and coated types are longer lasting and produce less salinity. Blending different fertiliser types may be advantageous but must be used on an informed, thoroughly trialled basis.

Nitrogen stability, especially in relation to composted mix ingredients, is laboratory tested and reported as N.D.I. Look for a result 0.7 - 1.0 N.D.I., but always read in conjunction with Ec. The result can be fudged by high soluble Nitrogen fertiliser additions. A high salinity reading may indicate this.

Toxicity is assessed by sowing fast germinating seeds and counting emergence and survival. The most common causes of toxicity are by-products from incomplete composting, too much soluble fertiliser or contaminations. Woody, more mature plants are more tolerant than young tender seedlings. Ammonium toxicity is a problem in cool Spring conditions for a number of annual seedling crops. The toxicity is often as a result of using either Urea or ammonium fertilisers at too high a rate. A laboratory test will identify Ammonium toxicity. Levels of Ammonium greater than 50 ppm are of concern.

Nutrient balance, amount and longevity relates specifically to your crop, vigour, stage of growth, cultural practice and, ultimately, how much you want to spend. Significant savings can be made with careful and informed selection.
Crop performance can be seriously depressed by getting the equation wrong, by either too much or too little!

NURSERY 'KNOW HOW' SERIES : #3 QUALITY POTTING MIX

NURSERY 'KNOW HOW' :
#3 Quality Potting Mix

McHort KNOW HOW
McPHERSON HORTICULTURE

Physical properties to consider are Water Holding Capacity, Air Fill Porosity and component stability. These factors describe the precise relationship of air to water to solid matter in a given mix. The W.H.C. is an expression of total water held in a mix after draining. Selected components in the mix should remain stable for the entire production cycle of the crop and not be prone to excessive breakdown or shrinkage. Most crops will be happy with 45-55 WHC and 18-25 AFP. Container shape and size should be considered when engineering the growing media. Shallow containers with a large relative surface area can accommodate a lower AFP and higher WHC especially when growing annual seedlings at a high density; e.g. annuals in punnets or cell trays.

Irrigation management has a powerful effect on crop performance, so your management capabilities and how they relate to the potting mix are equally critical. Re-wettability of a mix is a serious issue. Most consider re-wetting agents as essential. Add one with your fertiliser inputs. The rate applied will determine how long it remains effective. Use a rate of 0.5kg/m3 for short term crops and 1kg/m3 for longer term woody crops. Higher rates offer little tangible benefit. Granular formulations are preferred to liquid forms. Liquid forms require repeated applications and increase the risk of crop injury due to toxicity. Ultimately, plant roots fill the air spaces that would potentially fill with water. No amount of wetting agent helps!

McHort, McPherson Horticulture
88 West Road,RD1,OHAUPO
3881NZ

Ph 07 823 8330 Fax 07 823 8331
Mobile 021 782250
Email: mchort@xtra.co.nz

Heat in a fresh mix is a healthy sign
Temperatures above 35—40 C, however, will need careful management.
Spread out a hot heap to dissipate the heat. Apply cooling water, if necessary. Avoid building any potting mix into a heap higher than 1.5m.
A bark based mix that is delivered and remains cold is of far greater concern! The lack of heat might indicate very little microbial activity and a consequent lack of disease suppression.

Microbial issues
A good mix will be rich in diversity and amount of beneficial organisms, fungi and bacteria. The composting process not only enriches beneficials, but also usually reduces the pathogen population. This is a significant and real bonus not usually associated with peat mixes. Composted materials are probably less likely to contain either pests or weed seeds. The pasteurising effect during composting usually takes care of that. Additional beneficials can be added to any potting mix. *Trichoderma* is one such organism, more are becoming available. These include bacteria, amino acids, brassinosteriods and glycosides. McHort are developing uses for a number of commercial products in this area including Seamac PCT, Numax, Terra-Sorb and VitaZyme.
Bark and wood waste composted mixes will support larger and more viable populations than peat based mixes.

Impartial, quality, advice is available from McHort. We don't make or sell potting mix, so you can be sure that we will only recommend a potting mix specification for your exact needs. Call today for a free consultation; our knowledge and experience in this field is simply unrivalled.

information | advice | supply

NURSERY 'KNOW HOW' SERIES : #3 QUALITY POTTING MIX

NURSERY 'KNOW HOW' :

#6 Crop monitoring

McHort KNOW HOW
McPHERSON HORTICULTURE

3. Rainfall/irrigation volume and frequency
Measure using a professionally calibrated rain gauge. A free standing, mobile, model can be positioned in amongst your crop to catch irrigation. Know exactly how much volume you are applying over what run time. Dry or over- wet zones, can be identified by repositioning the rain gauge once base data has been collected in the original location. Be aware that significant changes to your potting mix; i.e. altering the percentages of peat, bark or pumice will require alteration to your irrigation management.
Irrigate your container crop at or before the mix is 60% moisture depleted. Replenish to Container Capacity + 10%. Over–drain can be measured by putting the container into an over sized poly bag and clipping the outer bag to the rim of the growing container.
Any irrigation over and above that required to restore Container Capacity will be found trapped between the two.

4. Growing media Ec. (conductivity) and pH Measure using Eutech Ec. and pH meters and a simple sample preparation technique and testing protocol. The results are virtually instantaneous and inexpensive.
Monitoring the Ec. of in-situ container crops gives a valuable insight into nutrient availability and especially excess which might injure roots. Tracking media pH can show the effects of an acidifying fertiliser or hard water irrigation. Ec. can be used as a predictive tool to determine remaining coated type fertiliser longevity.
Establish a bench-mark by grinding up a 100ml sample of fresh mix and testing the Ec. produced. Compare this result with a recovered 100 ml sample from an in use mix. The fresh mix result is the 100% potential nutrient yield expressed in Ec. A simple calculation will identify how much remains in the in use mix.

5. Crop growth rate and sale ability
Measure using a photographic record. Make up a background board, white with some bold target markings for reference points. Select the same plant for monthly photos throughout production of the crop. Shoot the plant in 'Birds eye' and profile views using a marker pole to show height gain. Place a natural green colour swatch between the subject's leaves and the white background to monitor leaf colour. The monthly progress of your target plant will be obvious and recorded in a fast and durable way. Continue the system and build up a photographic and data "Blue print" of crop production for the future. Collect leaf analysis results of your best ever crop to reinforce this data.

6. Insect identification and population
Measure using Sticky card traps, yellow or blue, installed 150cm above your crop. Use 1 card / 4sq. m in propagation and 1/ 15-20 sq.m in growing on houses.
Check the cards every 3-4 days and mark trapped insects with a dot from a bold marker pen. Use a magnifying glass to identify the stuck insects. Population fluctuations can be read in conjunction with the pesticide application record to confirm effectiveness.

Correlation and interpretation:
Gather your data diligently, read records in conjunction with one another and you will build a more detailed picture of the production environment and your management effect on it.

McHort can assist by supplying monitoring equipment and designing a monitoring strategy especially for you.
Call Donald today to discuss your requirements

NURSERY 'KNOW HOW' SERIES : #6 CROP MONITORING

McHort, McPherson Horticulture
88 West Road,RD1,OHAUPO
8331NZ

Ph 07 823 8330 Fax 07 823 8331
Mobile 021 782250
Email: mchort@xtra.co.nz

NURSERY 'KNOW HOW' :

#6 Crop monitoring

McHort KNOW HOW
McPHERSON HORTICULTURE

They say 'information is power' and I'm in no doubt that quality data collection and correlation can advance our knowledge of plant production management.
Given this I'm concerned by the apparent lack of interest and activity in this vital area and wonder why. Is it too complicated or expensive or are growers unsure as to how to start?

Below, I suggest strategies and systems by which you can gather useful crop and environmental data in a relevant form which will empower your management and result in making better crop production decisions.

My approach is simple so that you will understand, sustain and administer the system with ease. Delegation of certain tasks is envisaged and indeed involvement of your staff is often highly beneficial. Harness their skills and enthusiasm and through their greater understanding of production challenges, you will reap big rewards from more motivated, satisfied workers, better crops and reduced costs.

I shall start with basics, keep the technical jargon to the minimum and allow you to develop the concept to whatever level suits you. It is intended as a foundation upon which you should build.
Let me introduce the concept that 5 main factors in the production mix really influence plant growth. These are, in the simplest terms, the ***BIG 5:***

LIGHT, HEAT, WATER, NUTRIENT and AIR

My maxim in developing this strategy is:

'If you can't measure it, you can't manage it'

So, with that in mind, we rationalise which factors we can control or influence before we start trying to measure them. For example, if you grow outdoor crops the value in measuring light levels is limited, simply because it would be unrealistic to supplement light. Yes, it would be, and is, different if you grow annual seedlings under glass when extra lighting in Spring may be considered beneficial, even essential.

So the message is, measure what is relevant to your particular cropping regime and environment. For now, I shall focus on the four remaining factors and then apply 6 fundamentals of measuring and monitoring.

McHort, McPherson Horticulture
88 West Road,RD1,OHAUPO
8331NZ

Ph 07 823 8330 Fax 07 823 8331
Mobile 021 782250
Email: mchort@xtra.co.nz

These are: **Air temperature**

Root zone temperature

Rainfall/irrigation volume and frequency

Growing media Ec (conductivity) and pH

Crop growth rate and sales appeal

Insect identification and population

All are highly relevant to production success, all link back to the **BIG 5.**
Avoid the mistake of setting unrealistic data collection goals. Too much data can confuse. Start modestly and build progressively.
Remember the information gathered is supplementary to your daily observations and existing knowledge.
At best it will highlight trends and confirm, or otherwise, the effectiveness of your management inputs.

Let's then review the 6 fundamentals in turn.

1.Air temperature. Measure using a Quick set max.-min. thermometer. Establish monitoring sites in protected cropping areas, under shade and outdoors. Read the thermometers daily, ideally at the same time each day, and remember to reset them.
The data collected will help you understand the specific micro climates in which you grow, see the contrast between environments and map the progression of the seasons.

2. Root zone temperature. Measure using special soil thermometers. Insert them so that the tip is in the centre of the host root zone. Use in the same site, in the selected production environment, even if and when the crop changes. Mark the
monitoring station with a white painted stake for ease of identification. This will give consistency and continuity of data. Protect the soil thermometer with an oversized plastic pipe sleeve. This will shield the indicator, red, spirit and
preventing it from being bleached colourless. .
Plant species' response to root zone temperature varies. Some plants will not actively grow at less than 15° C; others lose roots at just 26° C.
Irrigation is a valuable tool for cooling roots, but the effect is double edged and chilling may also slow growth rate.

NURSERY 'KNOW HOW' SERIES : #6 CROP MONITORING

NURSERY 'KNOW HOW' :

#7 Stock plant management

KNOW HOW McHort
McPHERSON HORTICULTURE

NURSERY 'KNOW HOW' SERIES : #7 STOCK PLANT MANAGEMENT

.Do you manage your stock plants?

Whether you propagate from seed or cuttings, from stock plants in the soil or in a container, there can be no doubt that healthy vigorous stock plants produce the best propagation material. So, do you have a dedicated stock plant management programme in place? If not, why not?

Seed or cuttings

Most seed will be gathered from the native landscape, but careful selection is critical to future success. Avoid plants that are subject to stress. A plant laden with seed is an attractive proposition, but sometimes the reason is that the plant is under significant stress. Seed volume is often highest in drought conditions for example. That plant near the path or Highway, whilst easy to collect from, may be challenged by traffic pressure and/or pollution. Sometimes, in the very struggle for survival, plants will set a huge seed volume. Be wary, germination percentages may be very low; the parent plant being in poor condition.
Pittosporum seed may vary, within the same species, in size and colour.
P. eugenoides with plump shiny black seed often has a high germination and vigour compared to small dull brown seed of the same species.
Cutting material taken from container grown stock may be significantly inferior to that from a plant growing in the soil. The restricted root run in the container limits nutrient and water supply. In the soil a plant's root system can range freely to find what it needs!
Be especially wary of cutting material taken as a windfall of second and subsequent formative trimming and training. It may lack the optimum complement of essential nutrients.
This is very common practice in New Zealand when producing Lavender. Our growth rates are exceptional, especially when compared to Northern Europe, and call for more frequent regulatory trimming.
If provision is not made for this, results can be poor. A progressive degeneration of Lavender, for example, is very common. Although not immediately apparent, this degeneration can lead to poor plant habit, form and disease resistance. The nutrient thought to be implicated in this syndrome is Calcium. Growers often overlook the continuity of supply of Calcium and, sometimes, Magnesium when topdressing container stock. Depleted Calcium may lead to poor cell wall structure resulting in reduced disease resistance and, in some species, poor structure and habit.
This 'weeping' habit effect has been recorded in Pittosporum and may also be accompanied by some stem splitting. Calcium cannot be re-distributed within the plant to make good temporary Shortfalls, as it can with, for example, Nitrogen. Calcium uptake is continuous and is diverted to the growing point. If Calcium is short in supply, the thickness of each new cell wall may be reduced to make what Calcium there is go further. Eventually the plant itself will regulate growth under depleted Calcium supply situations by limiting, or even ceasing, root development. As a consequence stem and leaf expansion ceases and plant growth stalls.

Best practice

Establish your own stock garden from which to collect propagation material. If you have to forage in the 'bush', get off the beaten track and select carefully. Treat your stock plants with the reverence and respect they deserve. They are, after all, your raw material, the very foundation of each and every crop.

NURSERY 'KNOW HOW' :

#7 Stock plant management

McHort KNOW HOW
McPHERSON HORTICULTURE

Stock grown in the soil should enjoy intensive management, every bit as much as your container crops.
Regular applications of fertilisers, including lime, should be in accordance with soil analysis interpretations at least every second year.

Mulch, mulch and more mulch

Mulch the stock garden to suppress weeds, preserve moisture, replenish the organic matter and encourage beneficial microbes.
The establishment of a good mulch layer will encourage and maintain adventitious roots, which will further sustain plant health and vigour.

Try restoring the micro-biological balance

Inoculate with Trichoprotection® products to boost natural disease suppression.
An application of either TrichoDry™ to the mulching material or to the soil before applying a mulch is a viable proposition.

'Benchmark' plant performance

For key species 'bench-mark' health and vitality by recording leaf analysis data. Reliance solely on a visual check of stock plant health and vigour may not be very reliable. Collecting hard data is a better option. Choose the best example of the species you can find and sample the most recently fully expanded leaves.

"Benchmark" against this sample of your stock plant each year at the same time. Hopefully any deficiencies in nutrient uptake will, with careful monitoring, become apparent. Use this information to balance the feeding regime.

Container stock plants

Replace stock frequently and don't use out-grades from your production.
Always choose the best for stock plants, never the worst. Topdress fertiliser more frequently than you would the production crop.
Every cutting you detach removes nutrients. You must replenish nutrients regularly with supplementary feeding. Plants held in containers for more than six months may benefit from extra Calcium and Magnesium as well as the regular N,P,K + Te top dress. Gypsum and Kieserite are useful for this purpose and will not raise the pH as would Dolomite or Ground Limestone.

Pest and disease management

Don't forget to keep your stock plants free from pests and disease by including them in your routine spray programme. Implement a regular monitoring programme for all stock plants. Growers sometimes overlook spraying of the stock garden when they spray the production crop. Don't fall into this elementary trap.

Manage for success, don't leave it to chance.

If you would like help or advice, please call me.

McHort, McPherson Horticulture
88 West Road, RD1
OHAUPO 3881 NZ

Ph: 07 823 8330 Fax: 07 823 8331
Mobile: 021 782250
Email: mchort@xtra.co.nz
www.mchort.co.nz

NURSERY 'KNOW HOW' SERIES : #7 STOCK PLANT MANAGEMENT

NURSERY 'KNOW HOW' :

#9 Root zone temperature

McHort KNOW HOW
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.

McHort, McPherson Horticulture
88 West Road,RD1,OHAUPO
8331NZ

Ph 07 823 8330 Fax 07 823 8331
Mobile 021 782250
Email: mchort@xtra.co.nz

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. In Summer and early Autumn irrigate from about 2pm to avoid a heat spike. Remember water holds heat more efficiently that 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 accumu-

NURSERY 'KNOW HOW' :

#9 Root zone temperature

McHort KNOW HOW
McPHERSON HORTICULTURE

In Summer and early Autumn irrigate from about 2pm to avoid a heat spike. Remember water holds heat more efficiently that 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.

McHort, McPherson Horticulture
88 West Road,RD1,OHAUPO
8331NZ

Ph 07 823 8330 Fax 07 823 8331
Mobile 021 782250
Email: mchort@xtra.co.nz

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 that 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.

information | advice | supply

NURSERY 'KNOW HOW' SERIES : #9 ROOT ZONE TEMPERATURE

McHort. McPherson Horticulture

POTTING MIX TESTING

Using the 1:1.5 Water extract method to determine Ec and pH

Equipment:
Conductivity meter
pH meter
Calibration solutions, pH4, pH7, Ec 2.74
A small measuring cup calibrated for 100ml and 150ml
A screw top container with a minimum capacity of 500ml
A square of fine mesh shade cloth, large enough to cover the top of the screw top container
Plenty of clean water

Testing procedure: A rapid method for indicative purposes only
1. Calibrate the test meters in accordance with the manufacturer's instructions
2. Measure 100ml of potting mix, loose fill, made up of several sub-samples
3. Place in the screw top container
4. Measure 150ml of irrigation water and add this to the potting mix in the screw top container
5. Attach the lid and shake the mix for 1 minute
6. Pour the liquid through the fine mesh shade cloth back into the small measuring cup.
   Do not squeeze the sample. You need to recover at least 100ml of the solution.
7. Test the liquid extract using the calibrated meters

Scope and purpose of this test:
To provide a quick, realistic and reliable measure of potting mix or soil pH and Ec
To produce reliable and repeatable results in the field inexpensively
To provide predictive data on when to apply supplementary fertiliser during culture
To gather numerical data about growing media pH and overall nutrient status with a view to optimizing crop performance.

N.B.
The Ec data will not tell us which nutrient salts are present but will quantify the total soluble salts in the sample.
When encapsulated fertiliser products are in the potting mix this test does not measure unreleased soluble nutrients. However if the sample is ground-up prior to adding the water the Ec value of the total soluble salts yield from the mix can be measured.
If a fresh potting mix containing an encapsulated controlled release fertiliser is ground-up and tested this data will form a 'bench mark' from which Ec and ultimately fertiliser longevity verification can be interpreted, from the same specification mix, at any point during crop production.
When Urea forms part of the nutrient charge in a mix it is important to allow for the fact that Ec testing does not accurately measure the total salinity felt by the root system. This is because Urea forms a molecule in water and not ions as with other fertiliser salts. Allowance for this factor should be made when Ec data is interpreted.

For more information and interpretation of your results contact:

Donald McPherson at McHort on 021 782250 or e-mail mchort@xtra.co.nz

Information, Advice, Supply