NURSERY 'KNOW HOW' :

#11 Phytophthora sp. Root rot

McHort KNOW HOW
McPHERSON HORTICULTURE

November to March is the season for *Phytophthora sp*. to attack your container grown crops. Aerial symptoms include stunting, wilting, often only on one side of the plant, yellowing, then foliage browning and, ultimately, collapse and death.
The disease is infectious and readily spread by water movement of the zoospores and in potting mix, soil and dust in the persistent zoospore stage.
Although described as a weak pathogen, *Phytophthora* is a ruthlessly efficient exploiter of any injury site to gain entry to your valuable plant stock. Attack can occur from the soil damaging roots and stem bases, but the pathogen then causes a collar rot that extends well up the stem.

Many popular plant species in cultivation are especially vulnerable notably: Astelia, Azalea, Boronia, Brachyglottis, Erica, Dracaena, Grevillea, Griselinia, Knightia, Leucospermum, Lophomyrtus, Malus, Olearia, Protea, Rhododendron and the conifers species Chamaecyparis and Taxus.
Phytophthora sp. will, in favourable conditions, however, attack most plants.
Do not rely on aerial symptoms as evidence of attack exclusively. Your plants may well already be infected.
Inspect the root systems regularly.
Conditions that favour *Phytophthora* include:

Warm moist weather/environment.

Poor potting mix drainage or poor standing area drainage.

High soluble salts (Ec.) causing root burn.

Root damage by insect attack e.g. Sciarid fly.
Physical root injury during handling or potting operations. 'Sun strike' cooking roots on the outer edge of the root ball in planter bags.

Low levels of antagonistic 'Good guy' beneficial fungi e.g. *Trichoderma*.

The key areas of crop management that will limit risk from and losses to *Phytophthora* are:

Potting mix design.

Crop shading.

Boosting beneficial biological soil organisms.

Scrupulous crop hygiene.

Adequate standing area drainage.

Careful crop handling.

Proactive chemical fungicide applications.

The following ***10 point plan works*** well and is currently employed by **McHort** clients throughout New Zealand.

1.Select a well aerated free draining potting mix.
Aim for an AFP of 25-28 and a WHC of 50-55 .Ensure standing areas for container production do not puddle. Stand plants on either weed mat or metal but never on bare dirt.

2.Choose a potting mix based on composted and aged pine bark because it has far greater inherent disease suppression qualities than peat. Bark supports a more diverse range of beneficial organisms than peat appears to do.

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3. Do not over fertilise your crop. Be especially careful with fast acting, top dress, applied fertilisers in Spring or early Summer. Select products that are of mainly coated or encapsulated fertiliser types. These carry the lowest salinity threat. Avoid products which claim a very fast effect or have only short longevity unless you are prepared to re-apply these little and often.
Never allow the salinity (Ec) to build up in the potting mix. Monitor potting mix Ec. regularly with an Ec. meter using the 1:1.5 water extract method.

Maintain the Ec in the range 0.7—1.2.
Keeping the crop too dry can lead to high Ec. The relationship to fertiliser rate and diluting water volume in the root zone is a critical balance. Capillary irrigated crops should be leached through every two weeks in Summer with overhead irrigation.

4.Avoid damaging the root system of your stock when potting up or potting off. Even bruising can allow disease entry!

5.Frequently fine tune your irrigation practice. Know exactly how much irrigation is being applied and do not over water or apply more frequently than is necessary. Be especially careful with hairy, silver or small thick leaved species as these generally require less irrigation than other species.

6. Provide shade on the sun-struck side of the growing container. Try a skirt of white polythene pot high along the outer edge of each bed. Roots exposed to 35 C will be severely damaged even killed.

7. Boost the beneficial fungi in your potting mix by adding Trichodry™ Nursery and following up monthly until March with Trichoflow™ Nursery.
A regular and routine programme of re-application will be necessary to maintain a viable defense mechanism in the root zone. Control all pests that might cause injury to plant roots through which disease may then enter. Target Sciarid fly, Root mealy bug and Black Vine Weevil especially.

8. Maintain scrupulous crop hygiene, rogue out and remove from the nursery any suspect plants immediately.

9. Regularly clean all propagation equipment, benches and rooting containers with a strong biocide.

10. Routinely spray foliar applications of Aliette® WG or Fostonic two weeks before any plant handling that may result in root disturbance or injury.
Use an Aliette® WG drench as a spot treatment to clean up any disease hot spots. Maintain a monthly precautionary Aliette® WG or Fostonic foliar spray regime from November to March on all at risk plants. These chemicals stimulate the plant's own immune system rather than eradicating pathogens.

If you need help managing the *Phytophthora* threat to your crop, call Donald today.

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TRICHOPROTECTION® PROGRAMME for

Propagation and beyond of woody ornamentals to suppress root & stem and some leaf disease.

BARK & PEAT/BARK BASED SEED MIXES

PRODUCT: Use ***TRICHODRY NURSERY***
When blending into the media is practical.
APPLICATION RATE
@ 1kg per cubic metre supplied in either 1kg or 25kg packets
APPLICATION METHOD
Blended into the media before tray or pot filling
FREQUENCY
Prior to sowing or setting cuttings, follow up with post germination or root initiation applications of *TRICHOFLOW NURSERY* (use 250ml per hygiene tray per application) monthly thereafter.
Prior to potting off or up, follow up with applications of *TRICHOFLOW NURSERY* at monthly intervals at 25ml per litre of pot volume.

ALL GROWING ON MEDIA AND PUMICE OR OASIS ROOTING MEDIA

PRODUCT: Use ***TRICHOFLOW NURSERY***
Either as an alternative to TRICHODRY when blending into the media is not practical or as a follow-up treatment to boost activity at any stage of production.
APPLICATION RATE
@ 250g per 100 Litre supplied in 500g packets
APPLICATION METHOD
Drench or immersion in prepared solution.
FREQUENCY
Prior to sowing or setting cuttings, use 250ml per hygiene tray per application.
Follow-up at monthly intervals.
Post potting off or up, use 500ml per tray of GOL's or 25ml per litre of pot volume.

FOR ALL CROPS IN PROPAGATION & BEYOND

PRODUCT: Use ***TRICHOSPRAY NURSERY***
APPLICATION RATE
@ 5g/10Litre with Plant Soap PS1@ 30-40mls/ 10 Litre
TrichoSpray is supplied in 100g packets with a 5g measure included.
APPLICATION METHOD
Foliar spray
FREQUENCY
7-14 day intervals after stock is taken out from under mist irrigation.

Carefully observe the mixing instructions on the pack to ensure maximum solubility.
Keep all *TRICHOPROTECTION* product in the fridge at 4ºc. Reseal in-use packets before storing.
Organic liquid feeds may be mixed with all *TRICHOPROTECTION* products.
Use all prepared solutions the same day. Avoid spraying under bright conditions.

TRICHOPROTECTION Biological inoculant treatments are intended to assist you in preventing disease in your crop. They are NOT suitable for the eradication of existing established diseases.
It may be necessary to intervene with chemical fungicides to achieve disease free crops.
Check with us before adding any chemical fungicide to your mix or applying them to the foliage.
Several fungicide are compatible with a *TRICHOPROTECTION* programme consult us for specific details

McHort are your specialist *TRICHOPROTECTION* supplier.
Contact us on 021 782250 or 07 8230355 for product and information.

TRICHOPROTECTION® PROGRAMME
for SEEDLINGS & CUTTINGS
to suppresses root & stem roots & some leaf fungi.

IN BARK & PEAT/BARK SEED SOWING MIXES & CUTTING MIXES
PRODUCT
Use ***TRICHODRY NURSERY***
APPLICATION RATE
@ 1kg per cubic metre
APPLICATION METHOD
Blended into the media before tray filling
FREQUENCY
Prior to sowing or setting cuttings, follow up with post germination/ root initiation drench applications of *TRICHOFLOW NURSERY* at monthly intervals. (use 250ml per hygiene tray per application approx.)

FOLLOW -UP TREATMENT FOR SUSTAINED EFFECT
PRODUCT
Use ***TRICHOFLOW NURSERY***
APPLICATION RATE
500g per 200 Litre
APPLICATION METHOD
Drench (use 250ml per hygiene tray per application approx.)
FREQUENCY
Prior to sowing seed or setting cuttings, follow-up at monthly intervals.

FOR ALL CROPS IN PROPAGATION & BEYOND
PRODUCT
Use ***TRICHOSPRAY NURSERY***
APPLICATION RATE
5g/10Litre with Plant Soap PS1@ 30-40mls/ 10 Litre.
APPLICATION METHOD
Foliar spray. 5g / 10 ltr measuring spoon provided for knapsack application.
FREQUENCY
7-14 day intervals after stock is taken from under mist irrigation.

Carefully observe the mixing instructions on the pack to ensure maximum solubility.
Keep all *TRICHOPROTECTION* product in the fridge at 4°c
Reseal in-use packets before storing.
Organic liquid feeds (Nitrsol Organic) may be mixed with all *TRICHOPROTECTION* products.
Use all prepared solutions the same day.
Avoid spraying under bright conditions.

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TRICHOPROTECTION™ A LIVING BARRIER PROTECTING AGAINST PLANT PATHOGENS

TrichoProtection™ is a suite of products especially formulated for high value ornamental crops and is designed to suppress plant pathogens through niche exclusion either in the root zone or on the aerial parts of plants.

By introducing the optimum strain of *Trichoderma sp*., a beneficial fungus, in the right place at the right time in the right concentration *Trichoderma* can rapidly establish and form a living barrier either around the plants root system or on stem, leaf and flowers.
The proliferation of this colonisation effectively pushes away and keeps harmful fungal Pathogens at bay and in so doing protecting the crop from attack.

The system is dependent on weight of numbers and a continuous and active *Trichoderma sp.* population. Follow up applications are desirable to maintain active and on going protection. As with most biological disease control methods they are most effective as protectants and hardly effective at all as curative treatments.

Different TrichoProtection™ formulations have been developed for a range of application methods and cropping situations. In general early application in crop production is both best and most economical.

It is important to integrate a TrichoProtection™ system with other chemical pest and disease strategies to avoid incompatibility. McHort have extensive knowledge of compatible chemicals and can make this vital information available on request.

McHort have the most comprehensive practical knowledge of what works and what doesn't in the use of this exciting alternative technology so please consult us.

TRICHOSPRAY NURSERY

A wettable powder format of leaf, stem and flower colonising strains of *Trichoderma.* Applied as a foliar spray to the aerial parts of the crop to protect against a range of fungal pathogens. Repeat applications every 10-14 days are suggested. Apply in combination with McHort Plant Soap PS1 to enhance establishment.

TRICHOFLOW NURSERY

A wettable powder formulation of soil dwelling *Trichoderma* strains for drench application to the root zone. Wet up propagation media before sowing or setting cuttings to establish a *Trichoderma* population prior to germination or root initiation. Apply in combination with Nitrosol Organic to enrich the media with a food source for the *Trichoderma*. Repeat applications every 14-28 days are suggested.

TRICHODRY NURSERY

A fine granular powder formulation of soil dwelling *Trichoderma* strains for blending into growing media and potting mix. Blend into potting mix before potting off or up. Follow up drench applications of TrichoFlow Nursery with Nitrosol Organic are suggested to reinforce the *Trichoderma* population. TrichoDry Nursery is an economical choice for mass inoculation of larger volumes of growing media but will benefit from further supplementation.

TRICHOPEL NURSERY

A heavy granular formulation for placement, in concentration, directly below or alongside the root system of more established plants when potting up or transplanting. The concentrated format of soil dwelling *Trichoderma* rapidly colonise the root zone affording sustained protection during the most vulnerable post potting/planting period.

TRICHOSPRAY COMPATIBILITIES WITH CHEMICAL PESTICIDES

Product Name	Type	Active Group(s)	Compatibility	Comments
Acrobat MZ 690	F	morpholine, dithiocarbamate	Not compatible	Allow 12 - 15 days after application before applying Trichospray
Aliette WG	F	fosetyl-aluminium	Compatible 24hr	Allow 24 hours after application before applying Trichospray
Amistar	F	azoxystrobin (strobilurin)	Tank compatible	May be tank mixed at label rates with Trichospray
Bravo	F	nitrile	Not compatible	Allow 12 - 15 days after application before applying Trichospray
Captan	F	cyclic imide	Compatible 5 days	Allow 5 days after application before applying Trichospray
Champ, Kocide	F	copper hydroxide	Tank compatible	May be tank mixed at label rates with Trichospray
Euparen Multi	F	sulphamide	Compatible 5 days	Allow 5 days after application before applying Trichospray
Foli-R Fos 400	F	phosphorus acid	Tank compatible	May be tank mixed at label rates with Trichospray
Mancozeb (Dithane DF)	F	dithiocarbamate	Not compatible	Allow 12 - 15 days after application before applying Trichospray
Neptune	F	pyrimidine	Compatible 5 days	Allow 5 days after application before applying Trichospray
Qunitec	F	phenoxyquinoline	Compatible 5 days	Allow 5 days after application before applying Trichospray
Ridomil Gold 2.5G	F	mefenoxam (phenylamide)	Not compatible	Allow 12 - 15 days after application before applying Trichospray
Rovral Flo	F	iprodione (dicarboximide)	Not compatible	Allow 12 - 15 days after application before applying Trichospray
Scala	F	pyrimethanil (anilopyrimidine)	Compatible 5 days	Allow 5 days after application before applying Trichospray
Shirlan	F	pyridinamine	Not compatible	Allow 12 - 15 days after application before applying Trichospray
Sulphur (Thiovit Jet)	F	sulphur	Tank compatible	May be tank mixed at label rates with Trichospray
Sumisclex	F	procymidone (dicarboximide)	Compatible 5 days	Allow 5 days after application before applying Trichospray
Systhane	F	myclobutanil (DMI - triazole)	Not compatible	Allow 12 - 15 days after application before applying Trichospray
Switch	F	cyprodinil/phenylpyrrole (anilopyrimidine)	Not compatible	Allow 12 - 15 days after application before applying Trichospray
Teldor	F	hydroxyanilide	Tank compatible	May be tank mixed at label rates with Trichospray
Thiram	F	disulphide	Not compatible	Allow 12 - 15 days after application before applying Trichospray
Chess WG	I	pyridine azomethine	Compatible 5 days	Allow 5 days after application before applying Trichospray
Confidor	I	chloronicotinyl	Tank compatible	May be tank mixed at label rates with Trichospray
Eco oil	I	canola oil	Tank compatible	May be tank mixed at label rates with Trichospray
Endosulfan (Thiodan 35EC)	I	sulphurous acid, cyclic diol ester	Tank compatible	May be tank mixed at label rates with Trichospray
Lannate	I	methomyl (carbamante)	Tank compatible	May be tank mixed at label rates with Trichospray
Neem oil	I	azadiractin	Compatible 5 days	Allow 5 days after application before applying Trichospray
Success	I	spinosyn	Compatible 5 days	Allow 5 days after application before applying Trichospray