Root disease challenges in container-grown ornamentals – plant material quality, irrigation water, crop cycles, and growing media considerations

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WHAT I WILL COVER

- **Planting material and quality**
- **Irrigation water**
- **Growing media**
- **Crop cycles**
- **Common root pathogen problems**

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PLANTING MATERIAL QUALITY

- **Stressed crops – biotic or abiotic**
- **Not fully rooted plants**
- **Irrigation at dispatch**
- **Transport shock**

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PLANTING MATERIAL QUALITY

- Susceptibility to root pathogens
- Changes in the growing media parameters
- Establishment post-planting
- Post-potting care

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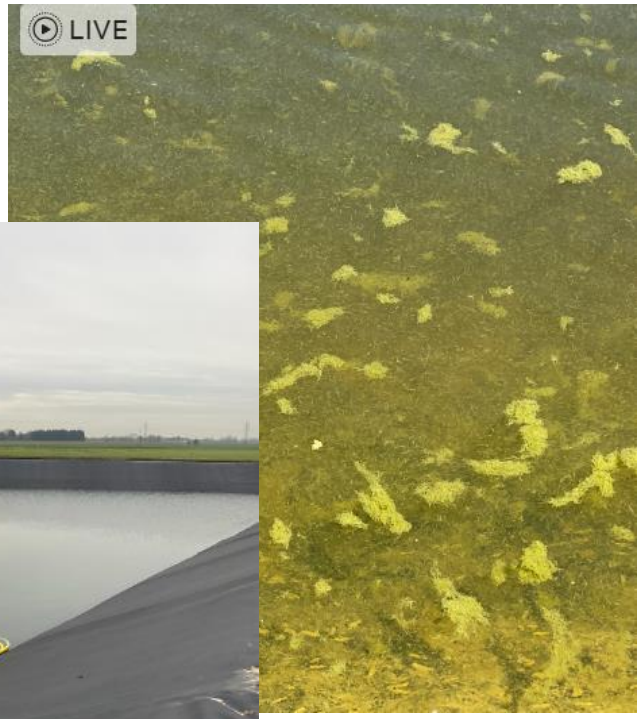
IRRIGATION WATER QUALITY

- Source of irrigation water
- Irrigation water treatments – see previous workshop
- Irrigation maintenance
- Water storage



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IRRIGATION WATER QUALITY

Dear Sirs

The tests on the water sample we received in the laboratory are now complete.

The results can be seen in the table below:

Lab No. & Description	*Pythium spp.* (CFU's/Litre)*	*Phytophthora spp.* (CFU's/Litre)*
TP/7/24 Glasshouse Water	0	0

*CFU = colony forming units

This is the final report from the Bacteriology team, and this completes the work by the team.

A serial dilution was carried out to test for the presence of Xanthomonas arboriocola pv. pruni and Pseudomonas syringae as requested.

Our ref	Your ref	Result	Our comment
2023009240	Reservoir water sample, [redacted]	Negative - no pathogen detected	No primary plant pathogenic bacteria isolated.

No primary plant pathogenic bacteria were isolated from the water sample we received. The sample was serially diluted onto semi-selective media and the plates were subsequently examined for growth typical for *Pseudomonas syringae* and *Xanthomonas arboricola* pv. *pruni*. No growth consistent with either pathogen was observed. As previously stated, this is a non-validated assay and as such a negative result cannot definitively confirm the absence of either pathogen.

I hope this information is of use to you, if you have any queries regarding this report please contact me on the number below.

Once testing is complete we dispose of samples within 10 working days.

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IRRIGATION WATER QUALITY

- **pH**
- **Alkalinity**
- **Iron**
- **Sodium and chloride**

Determinand	Value	Units	Determinand	Value	Units
pH	7.4		Conductivity	643	uS/cm
Nitrate-N	9.2	mg/l	Chloride	48.5	mg/l
Sulphate as SO4	70.1	mg/l	Phosphorus as P	1.0	mg/l
Boron	0.05	mg/l	Potassium	2.1	mg/l
Copper	< 0.01	mg/l	Magnesium	5.00	mg/l
Manganese	< 0.01	mg/l	Calcium	103.7	mg/l
Zinc	< 0.01	mg/l	Sodium	25.1	mg/l
Iron	< 0.01	mg/l	Carbonate	< 10	mg/l
Alkalinity as HCO3	221	mg/l			

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IRRIGATION WATER QUALITY

- **pH**
- **Alkalinity**
- **Iron**
- **Sodium and chloride**

Sample Point~: Borehole

Test Name	Result	Units	Method No
Colour	Colourless #		CHEM001
Clarity	Clear #		CHEM001
Odour	None #		CHEM001
Taste, Qualitative	Not tested #		CHEM001
Solids - Visual	None #		CHEM001
pH	8.6	pH Unit	CHEM038
Electrical Conductivity @ 20°C	1300	µS/cm	CHEM038
Total Dissolved Solids - Meter	960 #	mg/l	CHEM038
Permanganate Value - 4hrs @ 27°C	0.6	mg/l	CHEM008
Ammoniacal Nitrogen as N	1.8	mg/l	CHEM011
Albuminoid Nitrogen as N	0.13	mg/l	CHEM011
Nitrate as N	0.6	mg/l	CHEM028
Nitrite as N	< 0.01	mg/l	CHEM027
Alkalinity, Total as CaCO3	705	mg/l	CHEM038
Alkalinity, Bicarbonate as CaCO3	681	mg/l	CHEM038
Alkalinity, Carbonate as CaCO3	24	mg/l	CHEM038
Alkalinity, Hydroxide as CaCO3	< 15	mg/l	CHEM038
Hardness, Total as CaCO3	120	mg/l	CHEM062
Chloride	65	mg/l	CHEM028
Sulphate	49	mg/l	CHEM028

IRRIGATION WATER QUALITY

- pH
- Alkalinity
- Iron
- Sodium and chloride

Sample Point~: Borehole

Test Name	Result	Units	Method No
Cadmium, Total	< 0.0002	mg/l	CHEM062
Chromium, Total	< 0.0003	mg/l	CHEM062
Copper, Total	< 0.0017	mg/l	CHEM062
Iron, Total	0.031	mg/l	CHEM062
Potassium, Total	2.8	mg/l	CHEM062
Manganese, Total	0.0086	mg/l	CHEM062
Sodium, Total	320	mg/l	CHEM062
Nickel, Total	< 0.0003	mg/l	CHEM062
Lead, Total	< 0.0002	mg/l	CHEM062
Zinc, Total	< 0.0029	mg/l	CHEM062

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GROWING MEDIA

- Behaviour of peat-free growing media
- Green waste and bark constituents
- Physical and chemical parameters of growing media
- Storage of growing media

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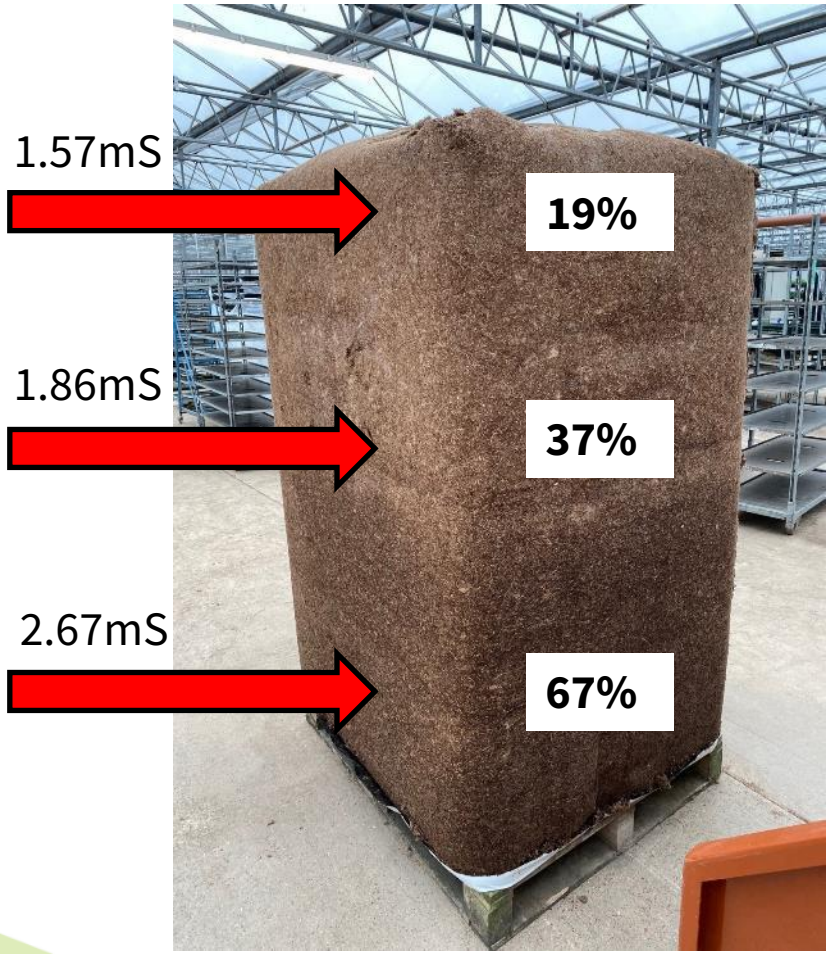
GROWING MEDIA

- Storage of growing media
- EC, moisture percentage and temp.
- Mixing uniformity
- Particle size distribution (PSD)



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CROP CYCLES

- Optimum potting times
- Smaller inputs more challenging to establish
- False economy of trying to shorten the crop cycle
- Overwintering in small sized pots is a challenge
- Availability of production beds with different irrigation systems and drainage characteristics
- Influence of pests caused by poor husbandry

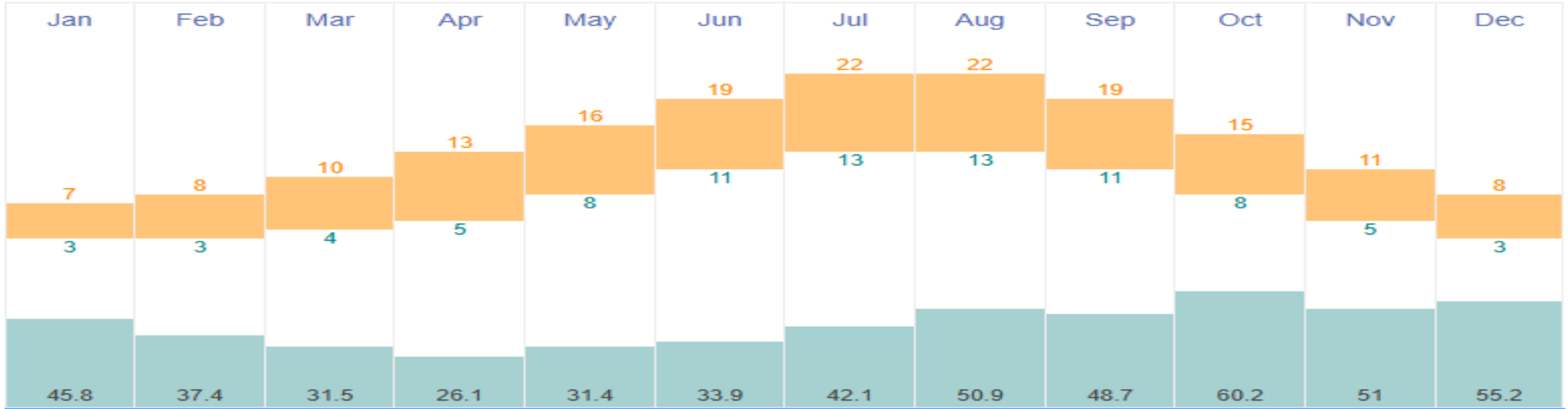
CROP CYCLES

- **Potting times are most crucial – which months to avoid!**

Annual Weather Averages Near Norfolk

Averages are for Norwich Weather Centre, which is 21 kilometers from Norfolk.

Based on weather reports collected during 1992–2021.



Showing: All Year

All Year Climate & Weather Averages in Norfolk

High Temp: 22 °C	Precipitation: 42.8 mm	Wind: 17 mph
Low Temp: 3 °C	Humidity: 80%	Pressure: 1015 mbar
Mean Temp: 11 °C	Dew Point: 7 °C	Visibility: 10 km

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COMMON ROOT PATHOGENS

- **PHYTOPHTHORA SPP.**

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- **FUSARIUM SPP.**

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COMMON ROOT PATHOGENS

- **PYTHIUM SPP.**

HTA

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COMMON ROOT PATHOGENS

- **RHIZOCTONIA SPP.**
- **THIELAVIOPSIS SPP.**
- **OTHERS**

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SUMMARY

- Stress is the largest contributor to the development of root pathogens
- Crop cycle planning is very important
- Goods-in and plant material quality checks
- Crop husbandry and uniform irrigation
- Mostly reactive approach to root pathogen control in the industry
- Incorporating plant protection products into the growing media is not the solution – addressing the symptoms not the cause!

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