Tips for establishment of crops in peat-free growing media

Methwold Village Hall, St George's Hall Complex, High Street, Thetford IP26 4NT (a.m.)

Darby Nursery Stock, Broadfen Farm, Severalls Road, Methwold Hythe, Thetford IP26 4QU (p.m.)

21ST May 2024

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Agenda

Time	Content	Speaker
Springfields Events and Conference Centre		
09:00 – 09:30	*Coffee, tea, and refreshments*	
Presentations		
09:30 – 10:10	**Building momentum towards peat-free production**	Wayne Brough, **HTA**
10:10 – 10:50	**Establishment of crops in peat-free growing media – grower and scientific viewpoints**	Alastair Hazell, **Darby Nursery Stock Ltd**, Raghavendra Prasad, **RHS**
10:50 – 11:00	*Coffee, tea, and refreshments*	
11:00 – 11:40	**Plant Growth Promoting Rhizobacteria (PGPR) - benefits of incorporation into peat-free growing media**	Simon Taylor, **Plantworks Ltd**
11:40 – 12:20	**Coir as a main constituent of peat-free growing media – physical and chemical properties of different coir fractions and challenges around supply**	Tom de Vesci and Raul Cabrera, **Horticultural Coir Ltd**
12:20 – 13:00	**Practical advice and tips for improving crop establishment in peat-free growing media. Experiences from different crop sectors**	Selchuk Kurtev, **Zest Sustainable ICM**
13:00 – 13:45	*Lunch buffet*	

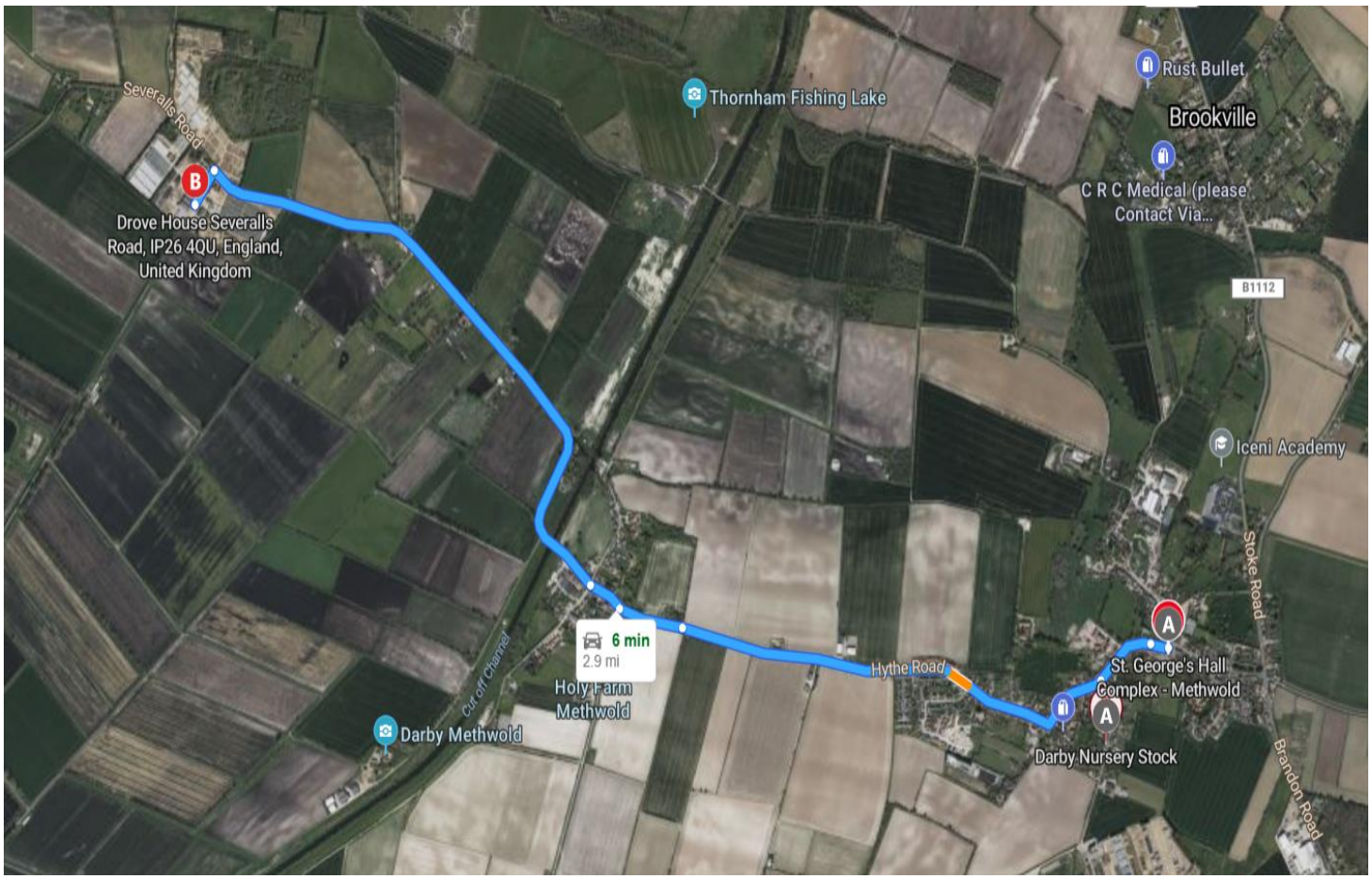
Nursery tour (Clay Lake site) and discussion		
14:00 – 14:15	Introduction to Darby Nursery Stock	Alastair Hazell, **Darby Nursery Stock Ltd**
14:15 – 15:30	Nursery tour of Darby Nursery Stock. Split into two groups	Alastair Hazell / Selchuk Kurtev
15:30	*Wrap up and depart*	

BASIS and NRoSO continued professional development points will be available on the day of the workshop.

Location

Addresses and locations:

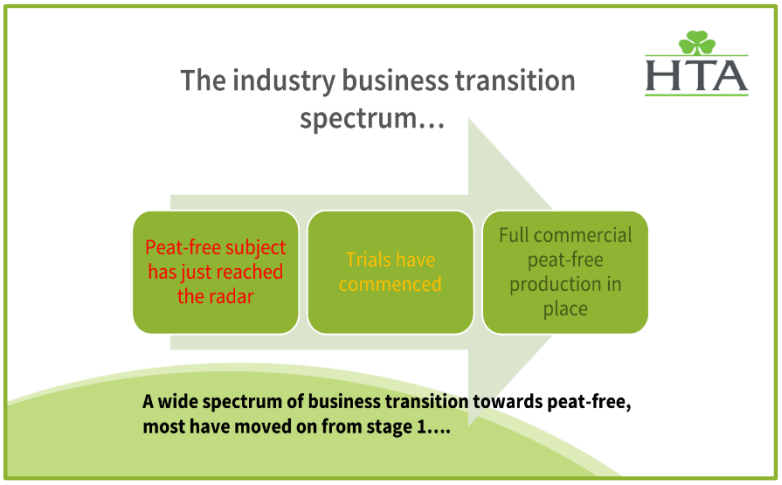
St George's Hall Complex, 16 High Street, Methwold, Thetford, Norfolk IP26 4NT (a.m.) (highlighted on the map) *What3words: ///chosen.happy.seabirds*	**Darby Nursery Stock, Broadfen farm, Severalls Road, Methwold Hythe, Thetford IP26 4QU (p.m.)** (highlighted on the map) *What3words: ///bulky.courier.dislodge*



Building momentum towards peat-free production

Wayne Brough, HTA

Notes



	Actions
1	Define what you need from your growing media
2	Speak to your growing-media manufacturer
3	Attend training events to view results and to network with others
4	Start your own small-scale trials
5	Measure plant performance and other parameters
6	Build up your cultural knowledge from the trials
7	Adjust cultural inputs and plan storage
8	Look at your costs
9	Agree your product specifications and supply with your manufacturer
10	Talk to your customers throughout
11	Analyse and monitor your crops regularly
12	Track performance from year to year

Notes

Quality control

- Really important to get what you require from the start.
- Review the specifications with your growing media suppliers – physical (constituents, AFP, particle sizes, moisture content, fertiliser inclusion, wetters, gels etc.) and chemical (pH, EC etc.) and have detailed discussions about management – buffering capacities, water retention, need for further nutrition etc.
- Take samples of fresh growing media and store in a dark cool place for the duration of the crop.
- Inspect incoming media for moisture distribution and temperatures, if hot (a sign of biological activity) test for EC prior to use.
- Apply active stock control on incoming batches of growing media, don't place new media in front of previous batches.
- Avoid storing in direct sunlight under glass.

Quality control

Composition	70 %	Cocopeat
	15 %	Perlite
	15 %	Wood fibers
Fertilizers	0,5 kg/m³	NPK fertilizer + trace elements
	0,5 kg/m³	N fertilizer
	25 g/m³	Fe
Specifications	pH*	4,7 - 5,3
	EC*	0,8 - 1,2
MPS data (from added fertilizer)	N	138 g/m³
	P_2O_5	70 g/m³
	K_2O	120 g/m³

Management and monitoring

- Avoid a 'pot and forget' mentality.
- Materials are now 'biologically active', so physical quantities in pots can change over time, pHs can drift, individual nutrient levels can rapidly fall (nitrogen) and also be aware of calcium and magnesium levels – especially in small cells.
- Irrigation water which has a high alkalinity will have more impact (but will supply calcium), as will acidifying liquid feeds, and large 'dumps' of high EC feeds.
- Can get build-ups of potassium (with coir and green waste ingredients) and sulphates from fertilisers in general.
- Therefore, there is a need to actively and regularly manage the media throughout production. Take regular analyses and get a quality probe to monitor EC and moisture.

Management and monitoring




Cultivation (1)

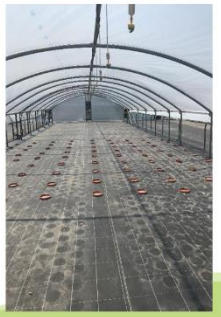
- **Irrigation** – check on uniformity of application by each system, have an idea of the amount of water in a container, and the amount needed to top up, beyond simply looking at the media surface.
- **Nutrition** – it's not a question of throwing more fertiliser at the situation, this can lead to high ECs, build up unwanted elements and compounds and potential pollution. Application of required elements, quickly, this will make liquid feeding more important.
- **Pot fill** – need to allow for any settling or slumping, whilst minimising spilt media, and also allow for corresponding depth of plug.

Cultivation (2)

- **Scheduling** – does the media impact time to finished product (reduce or increase), does it improve rooting and establishment or extend the times.
- **Plant performance** – variation in performance response in the same media between species and even varieties.
- **Overwintering** – will this be better or worse, if media is better drained will this lead to lower root ball temperatures and more root death and plant losses?
- **Vine weevil** – do eggs and larvae survive better, anecdotal evidence to suggest better survival in coir?
- **Weed levels** – is there less liverwort, moss and weed generally.

Notes

Cultivation



Impacts on machinery

- Peat-free media doesn't impact all machinery, machinery with more exposed moving parts and media with a high percentage of long fibres can give rise to issues.
- Exposed chains can be an issue, picking up fibres and jumping or snapping at sprockets.
- Brushes can become blocked and cease to function.
- Media may weigh more and impact motors.
- Spilt media can block sensors on conveyor belts and on machinery.

Impacts on machinery

Notes

Ongoing….

- There are more physical constituents within blends to deal with.
- Blends are still being developed and supply chains fine-tuned. Therefore, blends will change which may impact performance. *Blend development at the same time as offering commercial product is tricky.*
- Not all species perform as well in the same blend, a range of blends (perhaps even from different suppliers) may therefore be required to produce the range of species offered by many businesses.
- What about the 10-20% of plant species that are proving difficult to propagate/grow in peat-free?

HTA Technical Support Webpages

Growing Media

This section provides guidance and technical information to assist with the transition to peat-free growing media. Most businesses are still on a learning curve in terms of adopting such media, and are in the process of trialling a range of growing media blends and making the necessary cultural changes to get the most out of them.

GROWING MEDIA

going peat-free

GROWING MEDIA

Physical constituents of peat-

GROWING MEDIA

Irrigation of peat-free crops

GROWING MEDIA

Nutrition of peat-free crops

GRO

Mo

https://hta.org.uk/grower-support-campaign/growing-media

Notes

Establishment of crops in peat-free growing media – grower and scientific viewpoints

Alastair Hazell, Darby Nursery Stock and Raghavendra Prasad, RHS

Establishment of crops in peat-free growing media – grower and scientific viewpoints

Alastair Hazell, Darby Nursery
Stock Ltd

Darby Nursery Stock Ltd

Nursery History

- 61 years of container-crop growing.
- Suppling garden centres throughout the whole of the UK.
- Wide range of plants produced.
- Darby Speciality Crops include Lavandula, Clematis and soft fruit.

Growing Medium History

- Trialling and growing batches in peat free for 30+ years.
- 2024, 40% of all potting will be in peat-free growing media.
- Standard mixes are 60% peat-reduced.
- Coir, woodfibre and bark.

Notes

Current Mixes

Mix number (ICL)	Mix number (DNS)	Mix description (2024)
TRPF04024	Mix 4024	Tree PF standard 35% F/A
TRPF04025	Mix 4025	Trees PF Standard 40% F/A
TRPF04026	Mix 4026	Trees Cherry/Prunus
TRPF04027	Mix 4027	Trees Apple/Malus
NSPF04092	Mix 4092	2-3 L Outdoor PF
NSPF04093	Mix 4093	2-3 L Indoor PF
NSPF04141	Mix 4141	Young Plants Long Term PF Fine
NSPF04142	Mix 4142	Young Plants Short term PF
HRGE04201	Mix 4201	Herbaceous 60% F/A
NSGE04532	Mix 4532	Vinca 50% F/A
NSGE04570	Mix 4570	N Stock Indoor 60% F/A
NSGE04571	Mix 4571	N Stock Outdoor 60% F/A
NSGE04601	Mix 4601	N Stock disease control 60% F/A

2024 Peat-Free Trial (Outside)

2024 Peat-Free Trial (Inside)

Notes

Notes

Good Establishment

Poor Establishment

Differences Between Peat-Based and Peat-Free

- Water holding capacity.

Notes

Priming Input Material

Irrigation Controls

Checking Profile

Differences Between Peat-Based and Peat-Free

- Nutrition.

Differences Between Peat-Based and Peat-Free

- Physical structure.

Physical Structure

Notes

Notes

Future Considerations

RHS

Establishment of crops in peat-free growing media – grower and scientific viewpoints

Dr. Raghavendra Prasad

Post Doc Fellow: Transition to Peat-Free Fellowship
Environmental Horticulture, Division of Science and Collections, RHS
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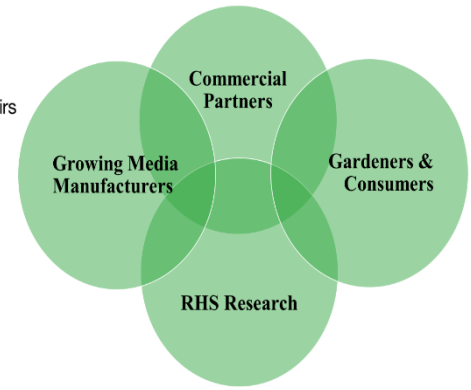
+44 7955439897

RHS Inspiring everyone to grow

Project Partners and Collaborators

Department for Environment Food & Rural Affairs



GROWING MEDIA association

Allensmore Nurseries Ltd.
Hillier Nurseries
hillis
JOHNSONS NURSERIES
Lovania
the farplants group
VITACRESS
Volmary

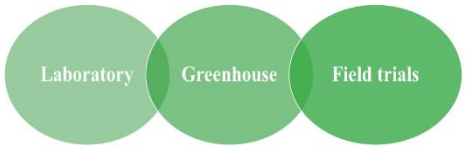
Notes

RHS Inspiring everyone to grow

Research Trials

To meet the practical requirements of the production system in which peat-free substrates are being utilized

RHS and Commercial partners



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Fellowship Progress

Allensmore Nurseries Ltd.	hills	Hillier Nurseries	Johnsons Nurseries
Peat Free Growing Herbaceous Perennials	**Peat Free House Plant Propagation and Growing**	**Peat Free Ericaceous Trials**	**Peat Free Growing** Shrubs
Lovania Nurseries Ltd	the farplants group	Vitacress	Volmary
Peat Free Growing Alpines and Bedding	**Peat Free Propagation**	**Peat Free production of culinary herbs**	**Peat Free Propagation**

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Growing Media Quality Control

In-house QC control:

- Sampling the material
- Archiving some sample for reference
- Interpret key aspects from analysis

Key focus on better understanding:

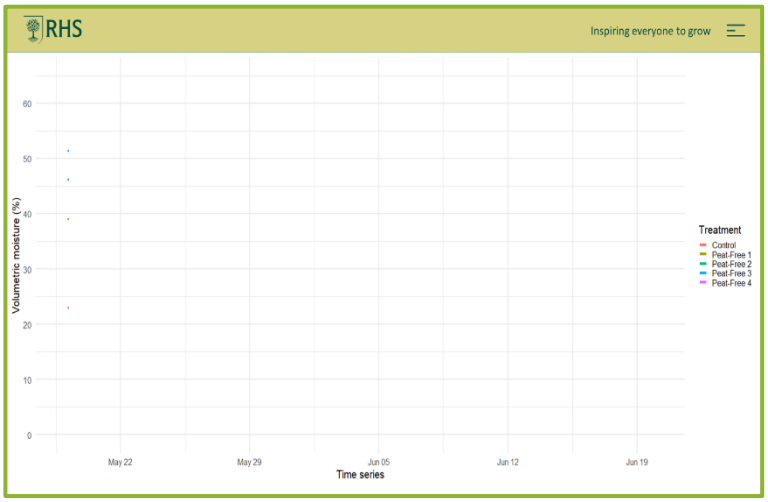
- Irrigation management
- Maturity/stability of the growing media
- Nutritional dynamics of growing media

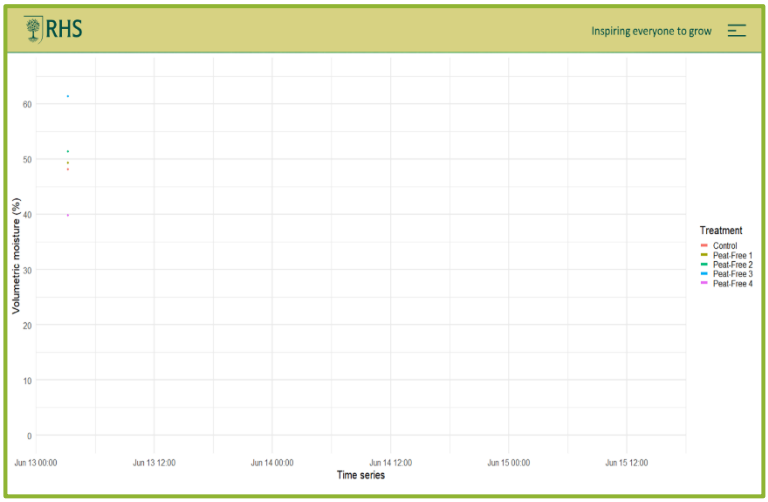
ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units	Determinand	Value	Units
pH	5.3		Cond. at 20 C	129	uS/cm
Density	512	kg/m3	Ammonia-N	16.0	mg/l
Dry Matter	22.7	%	Nitrate-N	36.6	mg/l
Dry Density	116.2	kg/m3	Total Soluble N	52.6	mg/l
Chloride	8.6	mg/l	Sulphate	101.1	mg/l
Phosphorus	17.0	mg/l	Boron	0.19	mg/l
Potassium	54.9	mg/l	Copper	0.05	mg/l
Magnesium	13.9	mg/l	Manganese	0.12	mg/l
Calcium	20.3	mg/l	Zinc	0.15	mg/l
Sodium	5.2	mg/l	Iron	2.77	mg/l

Notes


RHS
Key Challenges: Irrigation and Nutrition


RHS
Inspiring everyone to grow
Volumetric moisture (%)
60
50
40
30
20
10
0
May 22
May 29
Jun 05
Jun 12
Jun 19
Time series
Treatment
Control
Peat-Free 1
Peat-Free 2
Peat-Free 3
Peat-Free 4


RHS
Inspiring everyone to grow
Volumetric moisture (%)
60
50
40
30
20
10
0
Jun 13 00:00
Jun 13 12:00
Jun 14 00:00
Jun 14 12:00
Jun 15 00:00
Jun 15 12:00
Time series
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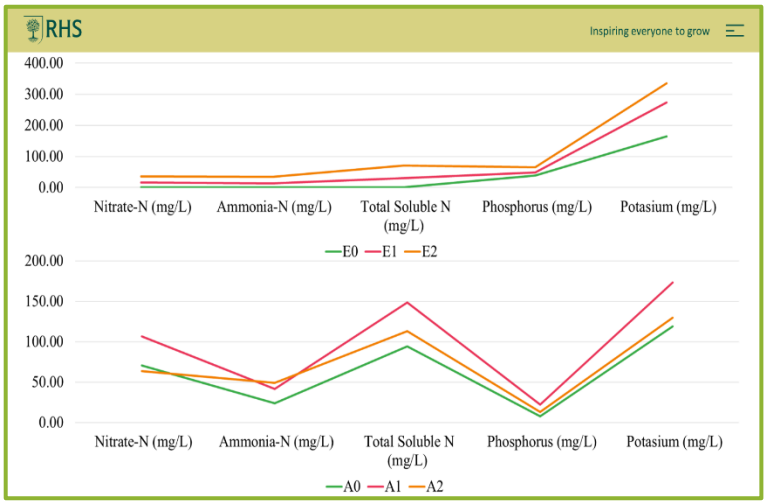
Peat-Free 4

Notes


RHS
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400.00
300.00
200.00
100.00
0.00
Nitrate-N (mg/L)
Ammonia-N (mg/L)
Total Soluble N (mg/L)
Phosphorus (mg/L)
Potasium (mg/L)
E0 E1 E2
200.00
150.00
100.00
50.00
0.00
Nitrate-N (mg/L)
Ammonia-N (mg/L)
Total Soluble N (mg/L)
Phosphorus (mg/L)
Potasium (mg/L)
A0 A1 A2


RHS
Inspiring everyone to grow
Early Establishment in Peat-Free Media
Questions need to be asked:
- Quality of young plants
- Growing media used in propagation (peat-based, peat-reduced or peat-free) and growing
Physical properties of mixes vary
- AFP, WHC etc. which might have knock-on effect during early stages of establishment
Two scenarios:
Dry plug potted in to wet/moist potting mix
Wet plug potted into a dry potting mix


RHS
Inspiring everyone to grow
Early Establishment in Peat-Free Media
Key factors influencing the perf
- Varying physical attributes of
- Uneven moisture distribution
- Spikes of pH and EC in early
- Higher levels of nutrients in p
Technical interventions:
• Treating incoming materials – irrigation
• Extra care on the first event of irrigation
• Monitoring growing media using hand-held sensors/equipment

Notes


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Acknowledgements
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the farplants group
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Lovania NURSERIES LTD
Department for Environment Food & Rural Affairs
HTA
VITACRESS
Volmary
fargro


RHS
Thank you
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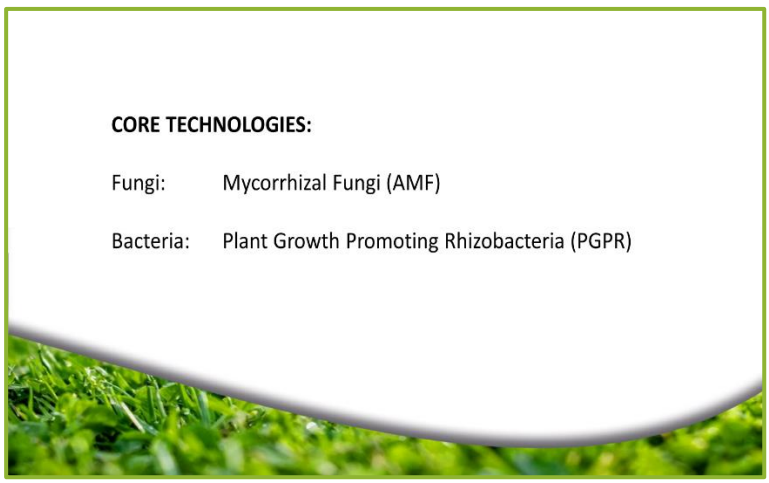
Plant Growth Promoting Rhizobacteria (PGPR) - benefits of incorporation into peat-free growing media

Simon Taylor, Plantworks Ltd

Notes



Notes

IMPROVED SOIL BIOLOGY

=

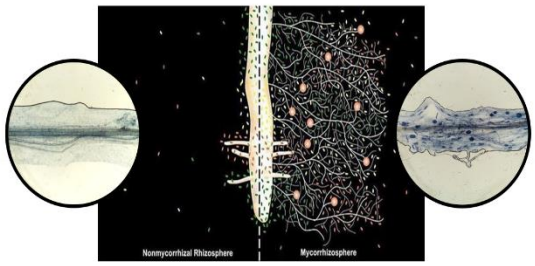
IMPROVED NUTRIENT USE EFFICIENCY (NUE)

Microbiology in action

Inoculation conditions

1. No inoculation – negative control
2. *Sterilised* AMF inoculum
3. PGPR granule only
4. AMF granule only
5. AMF and PGPR

What is plant efficiency?



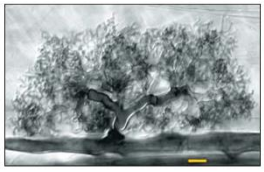
700 X effective root area

Arbuscular mycorrhizal fungi (AMF)

Symbiotic association between a fungus and the roots of a plant

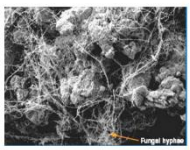
Obligate mutualistic symbiosis with >80% vascular plant families including grasses

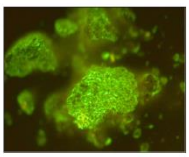




Arbuscular mycorrhizal fungi:

Sticky substance, glomalin (fluorescent green), produced by mycorrhizal fungi helps in soil aggregation and contains of 1/3 of carbon in the soil





Effects of mycorrhizal fungi to their hosts

- Improves establishment and early growth
- Can reduce irrigation and chemical fertiliser application
- Higher resilience to drought and other stresses
- Improves nutrient uptake making plant more efficient
- Increased carbon lock up – Glomalin

Notes

Notes

Plant growth promoting rhizobacteria (PGPR)

Bacillus

Pseudomonas

Rhizobium

Azotobacter

Plant growth promoting bacteria (PGPR) *functions*

Enhanced nutrition

- N-fixation
- P-solubilisation
- Increased iron uptake

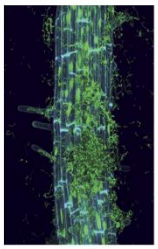
Plant protection

- Competitive exclusion of pathogens
- AMF helper
- Induced systemic resistance

Crop development

- Phytohormone production – stimulating top growth and root development

Rhizosphere bacteria on a root



PGPR and their functions

PGPR consortium	
PGPR ID	**Known plant growth promotion mechanisms**
Bacillus amyloliquefaciens (B)	N fixer, gibberellin, P-solubiliser, K-solubiliser, cytokine and auxin producer, ISR inducer, phychelator producer, etc.
Rhizobium laguerreae (H)	N fixer, P-solubiliser, cytokine and auxin producer, ISR inducer, phychelator producer, etc.
Phyllobacterium brassicacearum (I)	N fixer, P-solubiliser, cytokine and auxin producer, ISR inducer, etc.
Azospirillum brassilense (A)	N fixer, cytokine and auxin producer, ACC deaminase and ABA producer, ISR inducer, etc.
Rhizobium (Agrobacterium) strain (F)	An endophytic N fixer, cytokine and auxin producer, ACC deaminase producer, ISR inducer, etc.

Notes

How can PGPR help improve peat-free performance?

Challenges	PGPR mitigation
Higher pH than peat media	• Production of the organic acids • Plant roots' uptake of ammonium ions (from N-fixation)
Higher conductivity than peat media	• N-fixers • P, K, Zn solubilisers • Nutrients recycling - therefore, reducing the base level of NPK requirement
Leach nutrients more readily	• More microorganisms generally results in increased carbon content • Bacteria, being at the bottom of the food chain serve as an important sink for NPK elements, as they support the fungal and larger microorganism populations at the top of the food chain that play vital roles in decomposition and nutrient recycling
Lacking beneficial microbes – susceptible to various stresses	• Competitive exclusion of pathogenic microbes • Induction of systemic resistance to biotic and abiotic stresses- ACC deaminase, abscisic acids

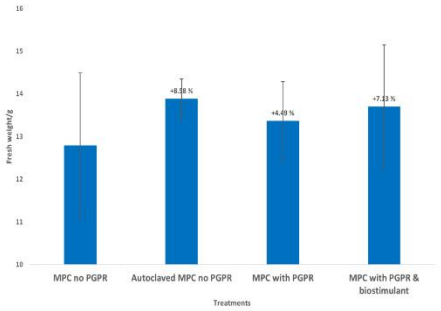
Proving PGPR efficacy in peat-free media

Clover growth exp set up Experimental set up

Treatment reference	Treatment	Clover	Number of replicates	Replicate reference
1	MPC no PGPR	1g	6	a,b,c,d,e,f
2	Autoclaved MPC no PGPR	1g	6	a,b,c,d,e,f
3	MPC with *PGPR	1g	6	a,b,c,d,e,f
4	MPC with *PGPR + **biostimulant	1g	6	a,b,c,d,e,f

*10^8cfu of PGPR per litre of compost ** 0.1ml liquid Biostimulant per litre of compost

Clover growth exp Observations



Notes

Clover growth exp Observations

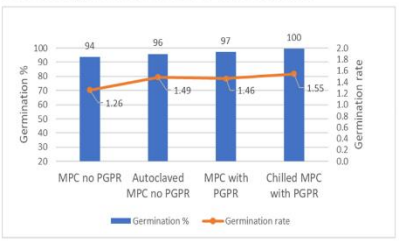
- PGPR treatment yielded heavier plant biomass – *due to phytohormone production, improvement of NPK availability and acquisition, organic acid production etc.*
- Biostimulant and PGPR treatment yielded heaviest plant biomass
- Plant based biostimulant also serving as nutrients for bacterial establishment

Methods of delivery

- Liquid formulation in sterile bags
- Can be applied to inert carriers such as perlite for mixing into media
- Spray directly onto media at production or mixing stage
- Spray onto crops in growing unit – tests underway to look at effects when mixed with adjuvants
- Apply through irrigation lines via Dosatron

Can PGPR survive and function after months of storage in peat-free media

Onion seed germination 3 months after inoculation



- PGPR promoted better germination % and rate in the first 3 months after bacterial treatment - *due to the production of phytohormones*
- The impact of PGPR on germination rate was significantly greater under warmer temperature

Statistics: P<0.05 was observed between MPC no PGPR vs other treatments in both germination % and rate except with the germination % of the Autoclaved MPC no PGPR.

Notes

Results of trial research

PGPR Growth development on carrot

- Treated carrots show more uniformity
- Higher crop weight
- More saleable yield
- Improved stress resistance

Results of trial research

PGPR growth development in tomatoes

PGPR treated plants yielded 7.9% increase in total yield of fruit compared to the untreated control, with 5.5% increase in the total number of fruit

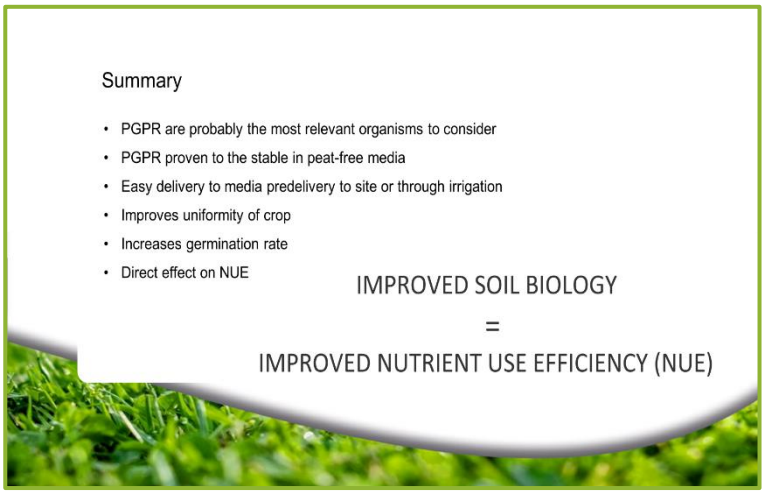
Results of trial research

Cyclamen – Hort Week Report Extract:

Sowing sustainability: Fargro and Ferring Nurseries' peat-free triumph 9 October 2023

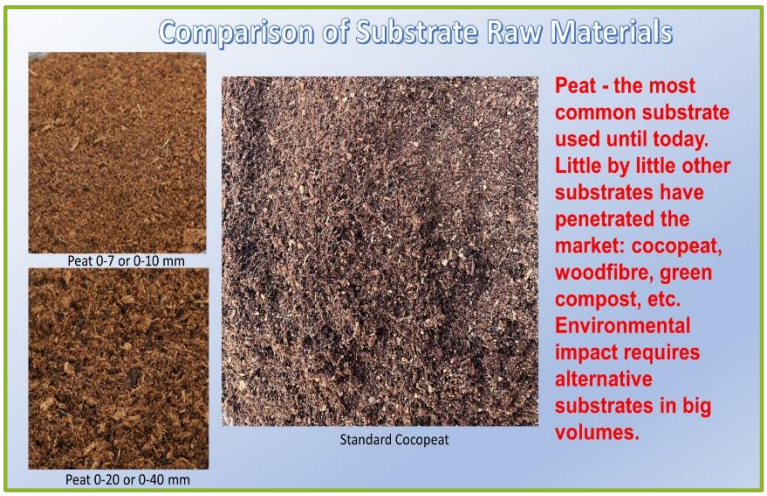
While, organic fertilisers arrive as part of a complex organic matrix, tightly bound and less susceptible to leaching. Yet, the nutrients they contain are not immediately accessible to the plant. Instead, soil microbes play a critical role in breaking down organic fertilisers into their mineral form, which the plant can then absorb. Importantly, this microbial activity closely aligns with the plant's metabolism, ensuring that nutrition was available when needed. This synchronisation minimises the risk of root burn and encourages the development of a robust root system.

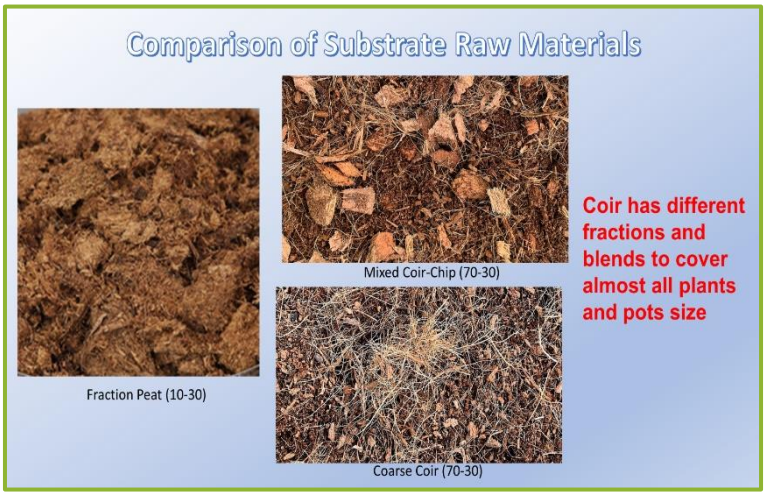
Notes


Summary
• PGPR are probably the most relevant organisms to consider
• PGPR proven to the stable in peat-free media
• Easy delivery to media predelivery to site or through irrigation
• Improves uniformity of crop
• Increases germination rate
• Direct effect on NUE
IMPROVED SOIL BIOLOGY
=
IMPROVED NUTRIENT USE EFFICIENCY (NUE)

Coir as a main constituent of peat-free growing media

Tom de Vesci and Raul Cabrera, Horticultural Coir Ltd





Notes

Comparison of Substrate Raw Materials

Coir, like some other materials, e.g. woodfibre, can introduce more than 60% aeration

Hortifibre from Wood

Crush or Cut Fiber from Husk Coir

Chip from Husk Coir

Other Substrate Raw Materials

Perlite

Other raw materials used as substrates combined or alone:
Some have more difficulty with aeration and water retention

Pine Bark

Turbofibre from wood

Black Peat

Advantages of Coir

1- Natural fibre and from renewable resources

2- Organic product and biodegradable

3- High air-filled porosity + high water retention

4- High cat-ion exchange capacity - to retain nutrients

5- Good stability in long-term cropping

6- Anti-fungus properties

7- Less compaction

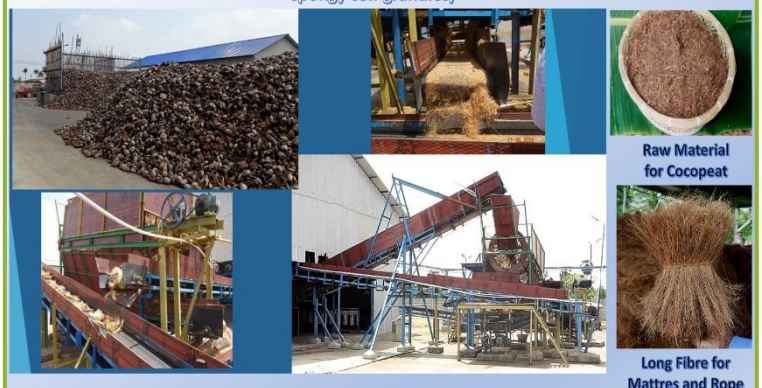
Notes

Notes

Coconut Fruit Stages

The coconut trees are harvested 8-9 times per year. As nuts ripen, husks turn from green to an earthy brown colour. After harvest, the husks are removed from the hard shell and taken for processing for substrate.

Step 1- Decorticator (Breaking coconut husk to separate long fibres from spongy coir granules)



Raw Material for Cocopeat

Long Fibre for Mattres and Rope

Notes

Step 2- Washing the Raw Material

Washing spongey coir granules is very important to remove the excess of salts and make the material more stable.

Step 3- Drying the Raw Material

Step 4- Sieving and Mixing (Washed dry material passes through several sieves to achieve ideal physical particle size mix)

Notes


Step 5- Controlling and Monitoring the Quality
EC, pH, wetability, water retention, aeration, granulometry


Step 6- Compressing Material into Blocks for Shipping


Step 6- Pressing Material for Growbag

Notes

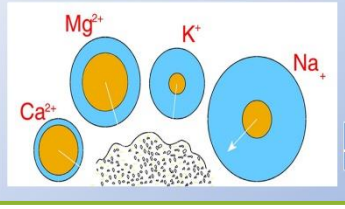
Step 7- Packing and Loading

Flowchart of Coir Production

Key to Coir (Chemical)

Natural Coconut Plant needs a lot of potassium from the soil to produce nuts and mature from green to yellow to brown.
With Potassium comes Chloride & Sodium, Thus high EC content initially in the Husk

	EC mS/cm	pH	NO3	NH4	K	Na	Ca	Mg	Cl	SO4	HCO3	P
Unwashed Husk	2.80	5,80	0.10	0.10	7.5	6.4	0.30	0.60	8.30	1.80	0.60	0.07



Adding 1 kg of Calcium Nitrate/m3 of coir substrate, permits faster removal of excess Sodium and Chloride and opens the Exchange Capacity for added of Nutrient

	EC mS/cm	pH	NO3	NH4	K	Na	Ca	Mg	Cl	SO4	HCO3	P
Washed	0.50	5.90	0.10	0.10	2.80	1,7	1.20	0.30	1.80	0.40	0.60	0.07

Raw Material in Coir

COIR GRANULES COIR CUT FIBRE COIR CHIP

Like peat-moss, coir can be used with all types of plants and can be produced in different blends and particle sizes most suitable for different plants and climates.

Coir Mixing

Properties	Standard	Coarse	SuperCoarse	Crash	Mix Chip 33	Chip	Cut Fiber
EC in relation 1:1,5	< 0,5	< 0,5	<0,5	<0,5	< 0,8	< 1,0	< 0,3
EC in relation 1:5	< 0,25	< 0,25	< 0,2	< 0,2	< 0,3	< 0,5	< 0,15
pH in relation 1:1,5	5,7-6,5	5,7-6,5	5,7-6,5	5,7-6,5	5,7-6,5	5,7-6,5	5,7-6,5
Yield (L/kg dry)	13,5 - 14	14 - 14,5	14,5 - 15,5	14,5 - 15,5	14,0	12,5 - 13	14,5 - 15
Total Porosity (%)	93 - 95	88 - 91	84 - 87	83 - 86	84 - 87	85 - 88	65 - 70
Air Filled Porosity (%)	18 - 20	27 - 29	35 - 38	37 - 40	36 -39	37 - 40	55 - 60
Moisture Retention (%)	48 - 53	42 - 45	33 - 35	31 - 33	31 - 34	35 - 38	15 - 20
Bulk Density (Kg/m3)	77 - 80	70 - 73	60 - 63	57 - 60	60 - 63	55 - 58	42 - 45
Density in Wet (75 %)	310 - 320	300 - 310	255 - 265	250 - 260	260 - 270	250 - 260	130 - 140
Particles > 8 mm (%)	< 1,0	10 - 15	30 - 35	20 - 25	30 - 35	85 - 90	10 - 15
Particles 4-8 mm (%)	5 - 10	20 - 25	45 - 50	50 - 55	45 - 50	5 - 8	10 - 15
Particles 1-4 mm (%)	45 - 50	45 - 50	20 - 25	10 - 15	20 - 25	5 - 8	65 - 70
Particles 0,5-1 mm (%)	40 - 45	20 - 25	5 - 10	5 - 10	5 - 10	> 1	2,5 - 5,0
Particles < 0,5 mm (%)	< 10	< 2,5	< 2,5	0	< 2,5	0	85 - 90
Fibres (%)	5 - 10	20 - 25	50 - 55	55 - 60	30 - 35	5 - 10	90 - 95
Fibre Length (cm)	< 3	< 4	< 2	< 2,5	> 2	< 2	< 2
Chip (%)	0	0	1 - 3	< 5	30 - 33	> 90	0

Seedling

Notes

Notes

Notes


Ornamentals
The aeration and duration of the coir, permits easy cropping for difficult and demanding plants.


Ornamentals


Big Plants

Practical advice and tips for improving crop establishment in peat-free growing media. Experiences from different crop sectors

Selchuk Kurtev, Zest Sustainable ICM

Notes

Practical advice and tips for improving crop establishment in peat-free growing media

Selchuk Kurtev, Zest Sustainable ICM

What I will cover

- **Management of input plant material**
- **Improvements in the potting process**
- **Aftercare of crops after potting/planting**
- **Crop protection inputs**

Management of input plant material

- Health check and goods-in procedure
- Management of plant deliveries
- Consideration of transport shock and time of year
- Assessment of the substrate of the planting material
- Standing down of crops prior to potting
- Irrigation and fertigation of planting material following delivery and prior to potting
- Crop protection management of stood down crops

Notes


Management of input plant material
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Management of input plant material
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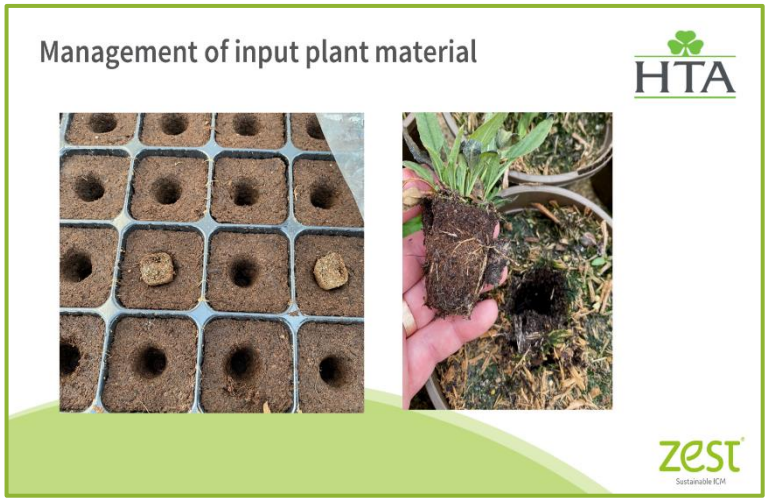
Management of input plant material
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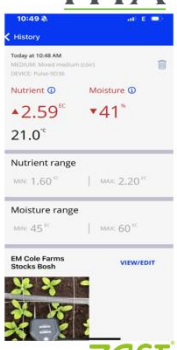
Notes

Management of input plant material

Improvements in the potting process

- Handling of plant material during potting
- Growing media stock management
- Potting depths for various crops
- Mulching of potted crops
- Moisture content of growing media
- Plant material root ball size and shape
- In-line irrigation system
- Transporting of potted material to production beds

Improvements in the potting process



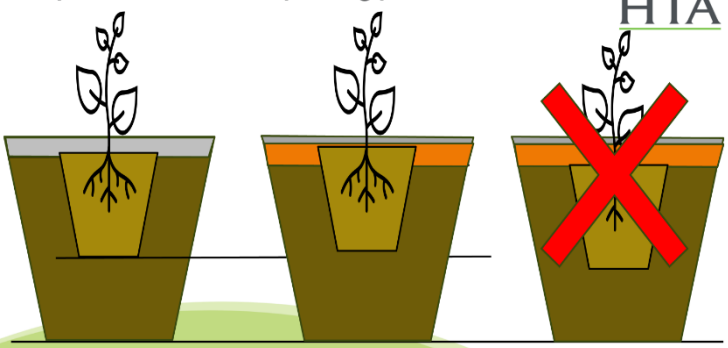
Notes

Improvements in the potting process

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units	Determinand	Value	Units
pH	6.9		Cond. at 20 C	77	uS/cm
Density	412	kg/m3	Ammonia-N	0.6	mg/l
Dry Matter	15.2	%	Nitrate-N	<0.6	mg/l
Dry Density	62.6	kg/m3	Total Soluble N	1.0	mg/l
Chloride	38.9	mg/l	Sulphate	51.5	mg/l
Phosphorus	3.1	mg/l	Boron	0.16	mg/l
Potassium	77.1	mg/l	Copper	<0.01	mg/l
Magnesium	0.2	mg/l	Manganese	<0.01	mg/l
Calcium	0.6	mg/l	Zinc	0.07	mg/l
Sodium	16.8	mg/l	Iron	1.47	mg/l

Improvements in the potting process



Improvements in the potting process

Aftercare of crops after potting/planting

- Getting the conditions the plants require
- Regular wetting up of top inch, inch and a half of growing media is paramount
- Keep moisture content high (45-60%) in top layer for two weeks, or until plants have rooted into the new media
- In summer months, use 'Spraygard' to reduce water loss from plants
- Irrigation water qualities – pH and alkalinity
- Regular EC and pH checks

Aftercare of crops after potting/planting

Aftercare of crops after potting/planting

Notes

Notes

Aftercare of crops after potting/planting

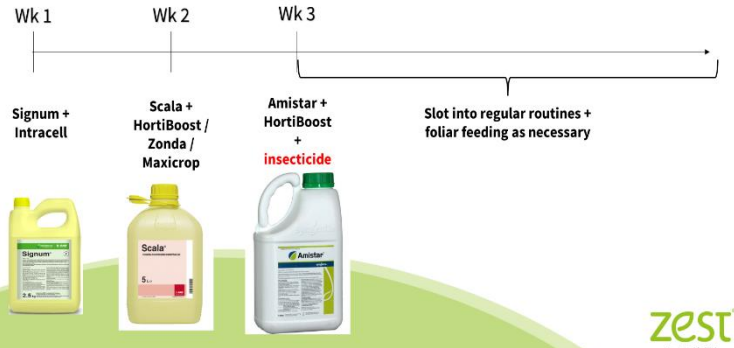


Aftercare of crops after potting/planting


Crop protection inputs

- Maintenance of healthy crops!
- Regular monitoring for P&D
- Impact of herbicide applications
- Use of biostimulants
- Fungicide applications, especially in early spring and late autumn – systemic products in spring and contact/translaminar in autumn
- Regular foliar and/or liquid feeding based on growing media

Crop protection inputs



SUMMARY

- ✓ Increased attention to detail for peat-free growing media
- ✓ Irrigation and nutrient demand is different so keep an eye on these
- ✓ Review goods-in and potting process and adjust
- ✓ In-house training is required, especially if mulching with no set potting team
- ✓ Consider your plant material input size, shape of root ball, health and conditions
- ✓ Using nitric acid to acidify water is beneficial
- ✓ Biostimulants and wetting agents can help
- ✓ Make a programme for your crop protection applications
- ✓ All efforts should be made to reduce potting/transplanting shock!

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Notes

Appendix

1. HTA | Tips for going peat-free (HTA login required for the HTA pages)
2. HTA | Physical constituents
3. HTA | Irrigation of peat-free crops
4. HTA | Nutrition of peat-free crops
5. HTA | Monitoring and managing peat-free crops
6. HTA | Impact of peat-free media
7. A Review and Analysis of Horticultural Substrate Characterisation by Sieve Analysis - HORTSCI16583_proof.pdf (ncsu.edu)
8. Wettability and hydrology of various woodfibre substrates and substrate components - Wettability-and-hydrology-of-various-wood.pdf (ncsu.edu)
9. The latest on growing media research USA - 76-popular-press.pdf (ncsu.edu)
10. Advances in substrate particle characterisation using dynamic image analysis compared to sieving procedure for predicting water retention properties - 80-refereed.pdf (ncsu.edu)

www.hta.org.uk

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