



Transition to responsibly sourced growing media use within UK horticulture (CP138)

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MECHANICAL
botanical

 **Lowaters Nursery**

Lincolnshire Herbs
- FRESH FLAVOURS -

 **Coles Nurseries**
JAMES COLES & SONS



VITACRESS

the farplants group

Wyevale Nurseries
Est. 1928

EU PLANTS LIMITED

 **NEWHEY**
ROUNDSTONE

DOUBLE H
NURSERIES LTD

Darby
Nursery Stock Ltd

Ivan Ambrose & Co.

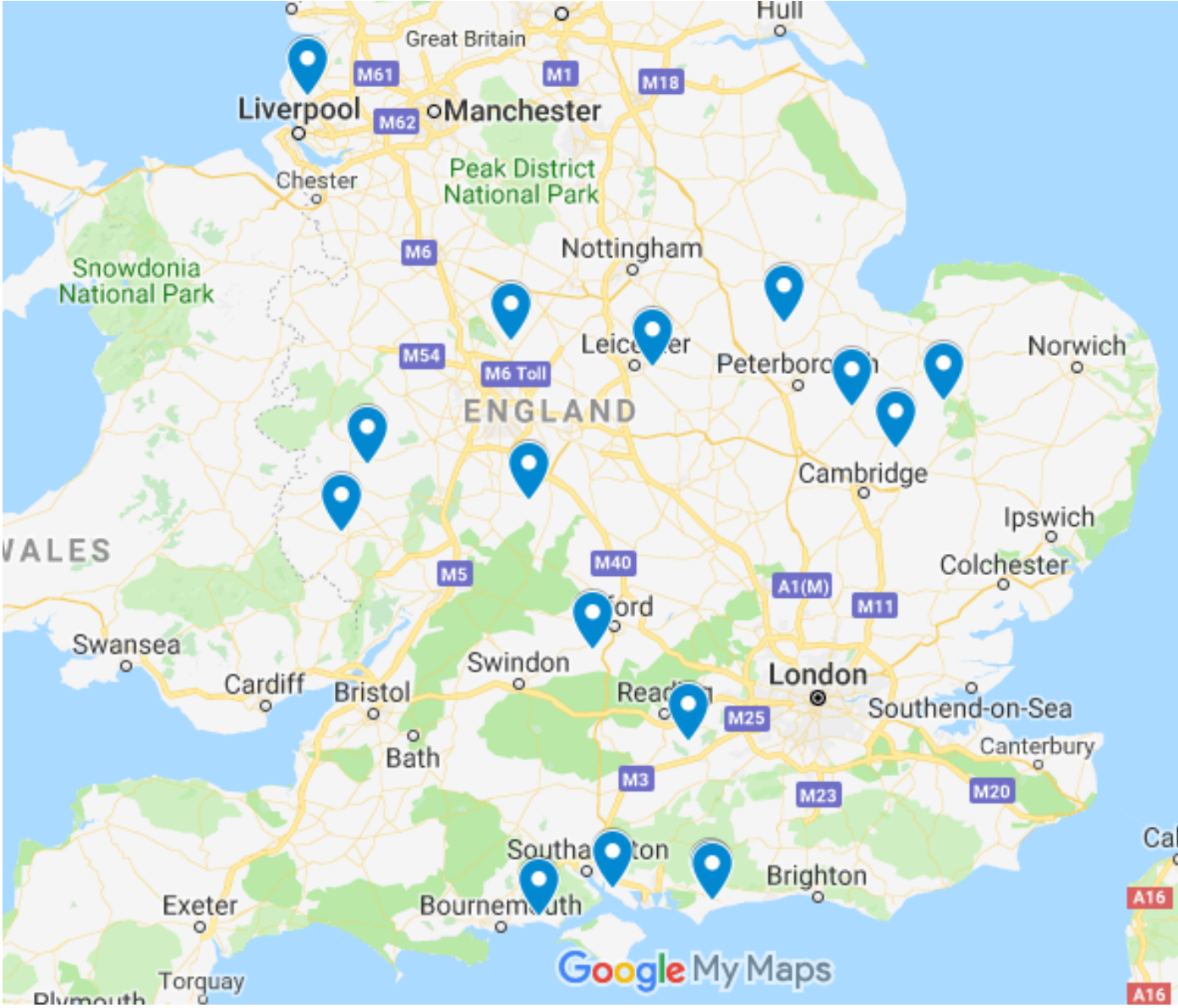
NATURALLY
G's
FRESH

Bordon Hill
Nurseries


FRANK P MATTHEWS
TREES for LIFE

Organic Plants
FOR GARDENS & ALLOTMENTS

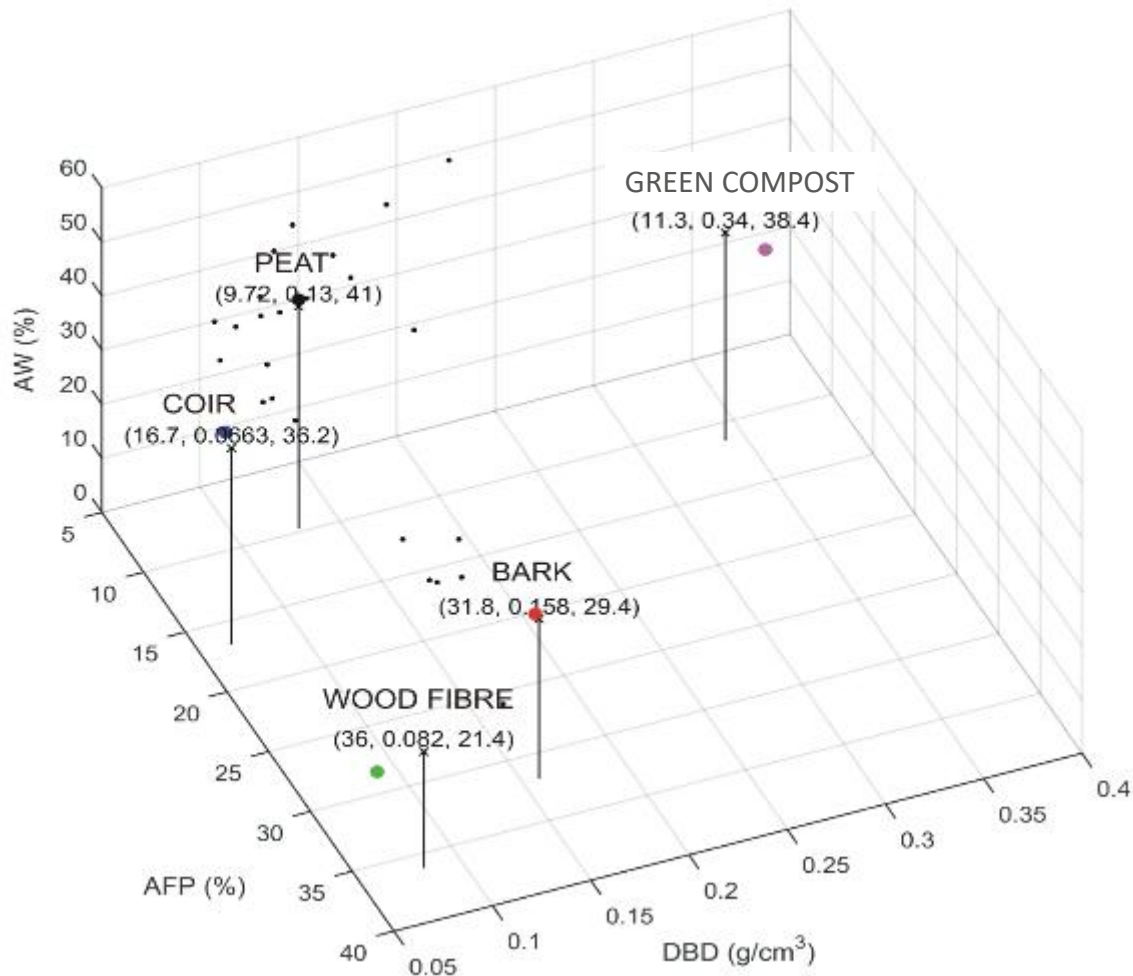
CP138 Nursery locations



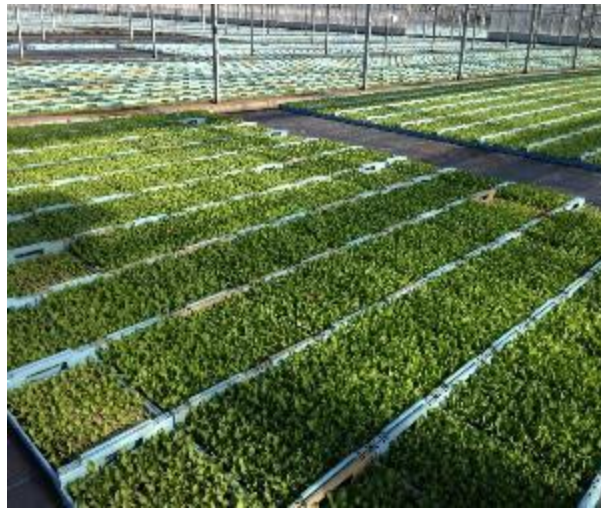
CP138 Aims

- To construct a model that will produce the desired mixes at least cost.
- To evaluate responsibly sourced growing media blends as alternatives to peat in commercial crop production systems.
- By on-site demonstration and effective communication of the scientific evidence base, increase grower confidence to facilitate the uptake of responsibly sourced growing media for commercial horticulture.

Physical variables 2015-2016



Mulholland et al. (2016) Technical monograph: Growing Media Laboratory Methods. ©ADAS, ISBN 978-1-5262-0393-9, 24 pp.



RSGM Trials

**On-site growing media testing and development 2016
(Commercial products)**

Liners and finals:

- 6 species; *Berberis*, *Choisya*, *Fuchsia* (finals only), 2 x *Euonymus* and *Viburnum*
- 4 x peat-reduced, 4 x peat-free and 25% peat-reduced control

Propagation:

- *Choisya*, 2 x *Euonymus* and *Viburnum*
- 4 x peat-reduced, 4 x peat-free and peat-free control



Choisya and *Fuchsia* finals week 18

HNS – Wyevale 2016

Species	Set-up week 2016		
	Liners	Finals	Propagation
<i>Berberis Darwinii</i> 'Nana'	16	16	N/A
<i>Choisya ternata</i>	22	16	45
<i>Euonymus fortunei</i> 'Silver Queen'	18	20	45
<i>Euonymus japonicus</i> 'Green Rocket'	18	20	45
<i>Fuchsia</i> 'Tom Thumb'	N/A	12	N/A
<i>Viburnum davidii</i>	22	12	45

- Liners assessed in week 44.
- Finals assessed in week 44 (*Fuchsia* in week 27).
- Prop assessed in week 20, 2017.

HNS – Wyevale 2016

- No significant differences in the quality of the finals of the 6 species grown in the different growing media.
- The quality of the *Berberis* liners was significantly different ($p = 0.017$). One peat free treatment had lower quality, however this was still marketable.
- No significant differences in the quality of the liners in remaining 4 species.
- No significant differences in the quality of the propagation material for any of the species.

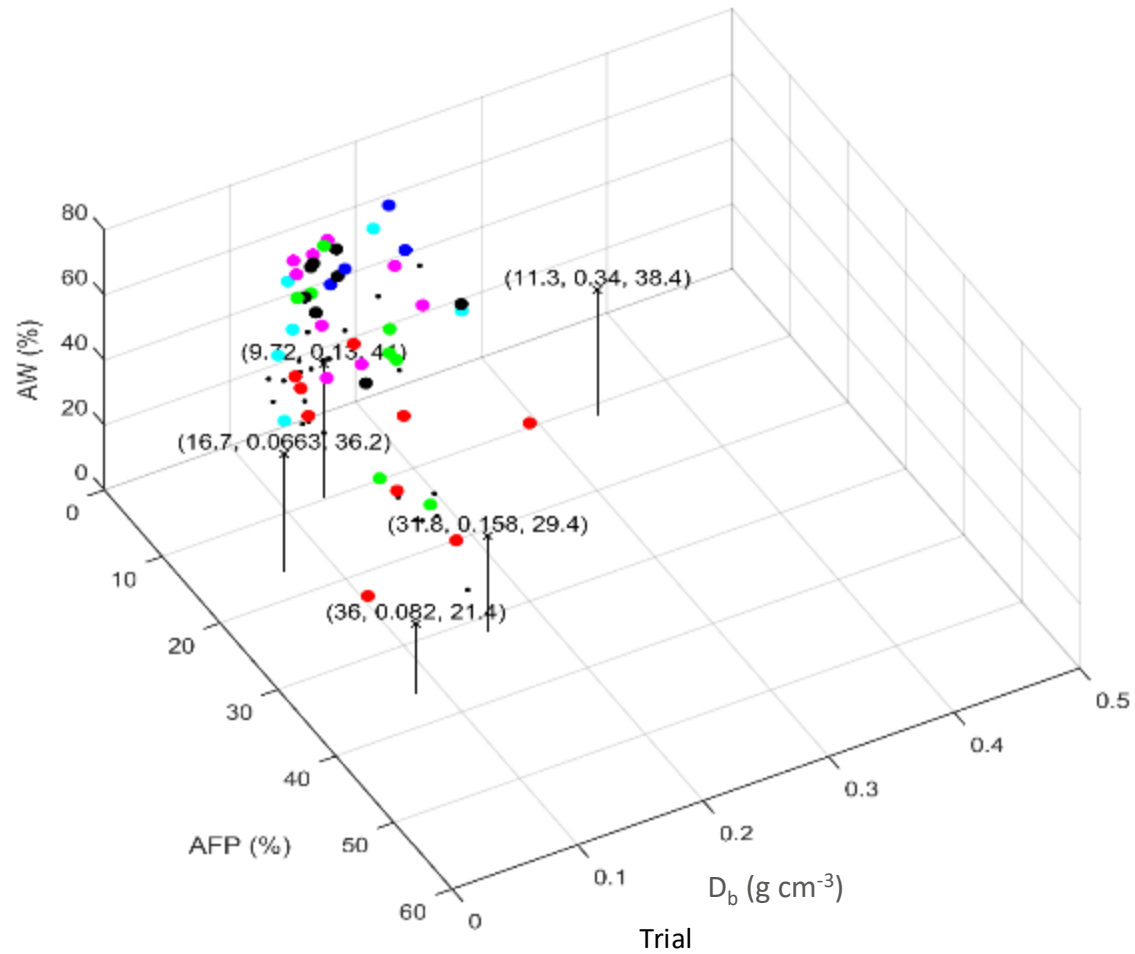


Euonymus japonicus (Green Rocket)
finals week 45



Berberis darwinii liners week 45

Commercial blend analysis 2016



- 1 VEGETABLES
- 2 STRAWBERRY
- 3 HERBS
- 4 HNS
- 5 BEDDING PROP
- 6 BEDDING TRANS





RSGM Prototype Blend Trials 2016

Experimental trials

First generation prototype blends

Hardy Nursery Stock trials

Nursery

2016



Wyevale

Commercially available blends

2017



Lowers

1st prototype blends

2018



Darby Nursery

2nd prototype blends

2019



Coles Nurseries

3rd prototype blends

Experimental



ADAS & STC

1st prototype blends



ADAS

2nd prototype blends



ADAS

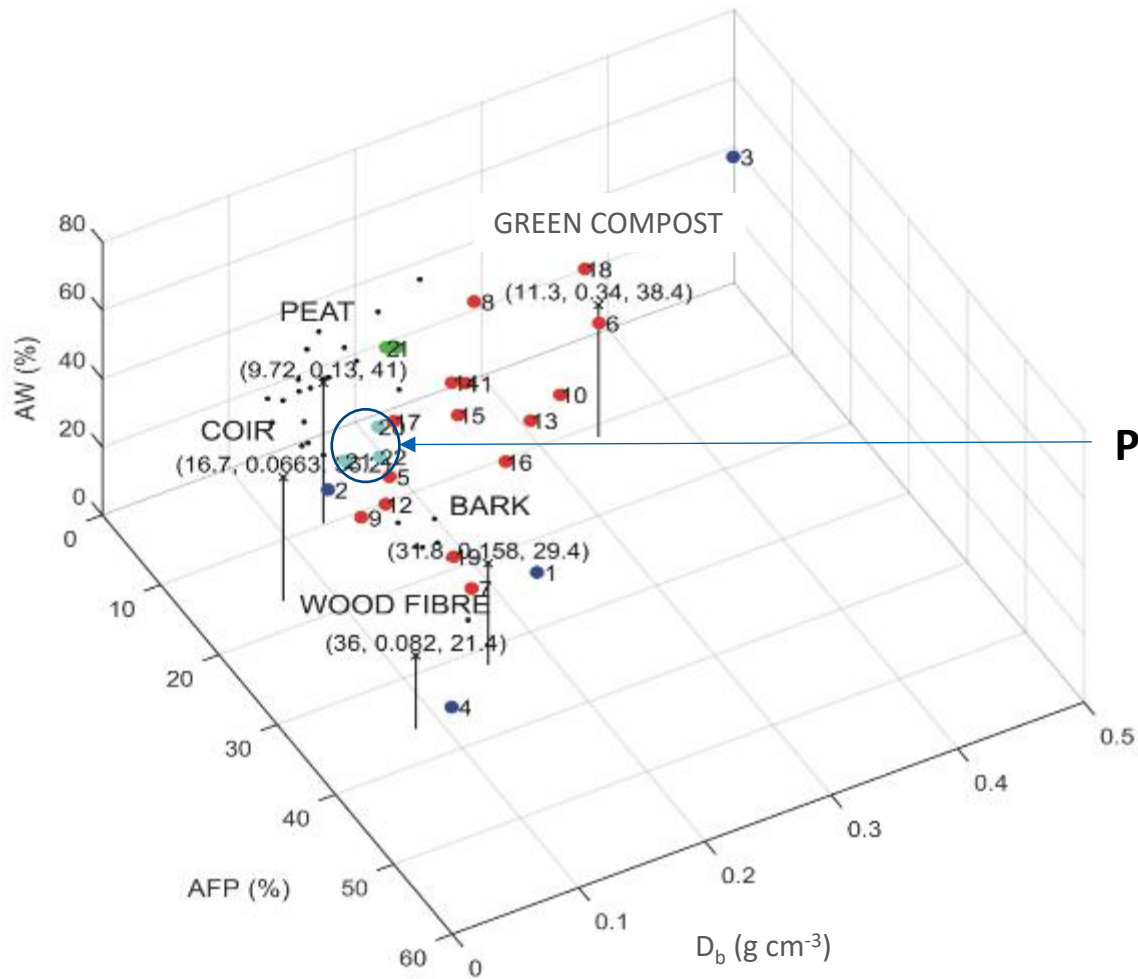
3rd prototype blends



ADAS

Model testing

First generation prototype blends 2016

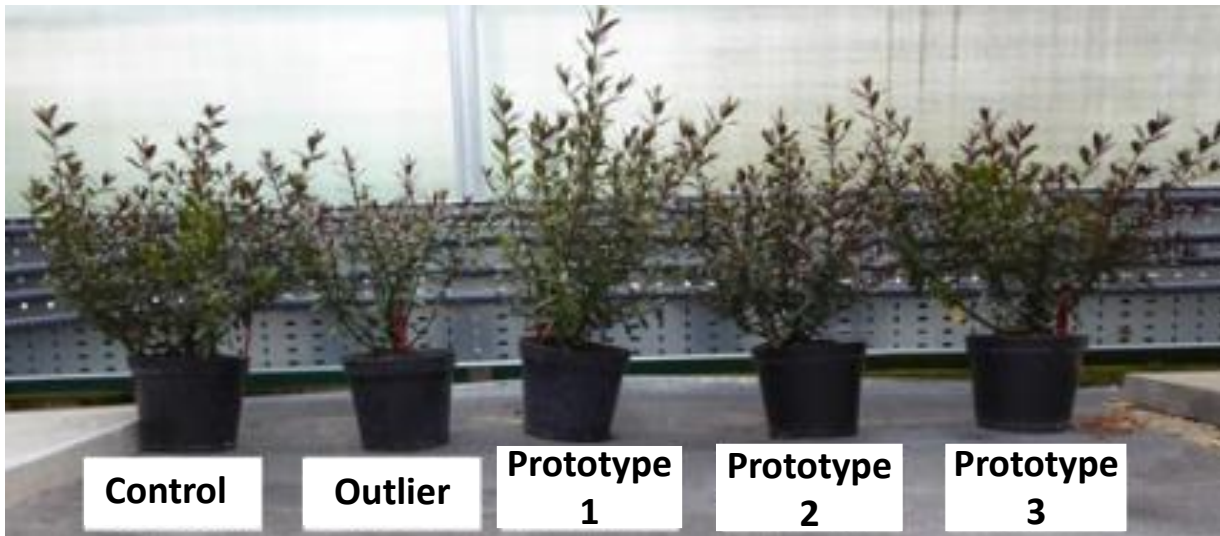


Prototype blends

HNS – Experimental 2016 prior to Lowwaters trial

Boxworth trial

- Hebe 'Midnight Sky' planted into 2 L pots in week 27. Irrigated via ebb and flood.
- 20 treatments (5 x growing media x 4 N / water levels). 5 reps.
- High N plants performed equally well across all blend treatments and were higher quality than low N ($p < 0.001$).
- Outlier blend generally produced smaller and more compact plants.



Hebe 'Midnight Sky', low N, low water, week 42



RSGM Prototype Blend Trials 2017

Grower trials

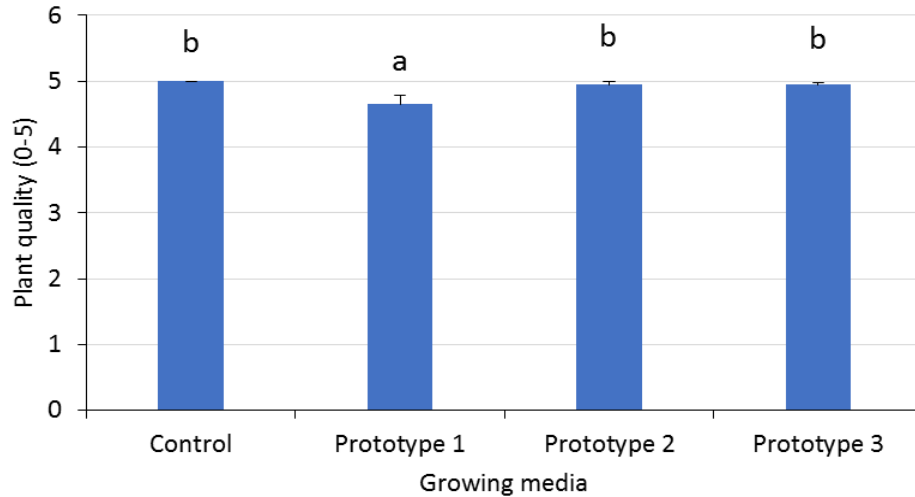
First generation prototype blends

HNS – Lowaters Nursery 2017 - 2018

- *Choisya* ‘Goldfingers’ and *Salvia* ‘Hot Lips’ potted into 2 L pots in week 11. *Choisya* grown under glass and *Salvia* under polythene.
- *Hebe* ‘Heartbreaker’ potted into 2 L pots in week 22 and grown under glass.
- Nursery control (100% peat-free) vs 3 peat-free prototype blends.
- Sub-irrigation.
- Assessments completed at 7 week intervals.
- Final assessment completed on *Salvia* in week 22, 2017.
- *Choisya* and *Hebe* left to overwinter, final assessment completed in week 17, 2018.
- Plants assessed for foliage quality, height/growth and root development.

HNS – Lowwaters Nursery 2017 - 2018

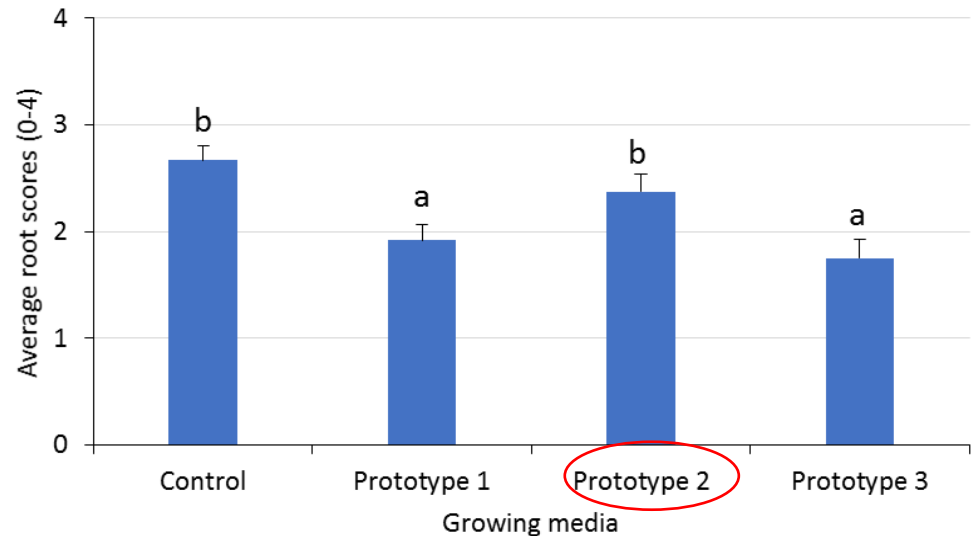
Salvia quality, week 22 2017



Nursery control (left) and peat-free prototype 2 (right), week 36.

Plants grew well in all prototypes, although prototype 2 was slightly better.

Choisya roots, week 17 2018



HNS – Lowwaters Nursery 2017 - 2018



Choisya and Hebe, week 17 2018, and Salvia week 22, 2017.



L-R = Nursery standard, Prototype 1, Prototype 2, Prototype 3.



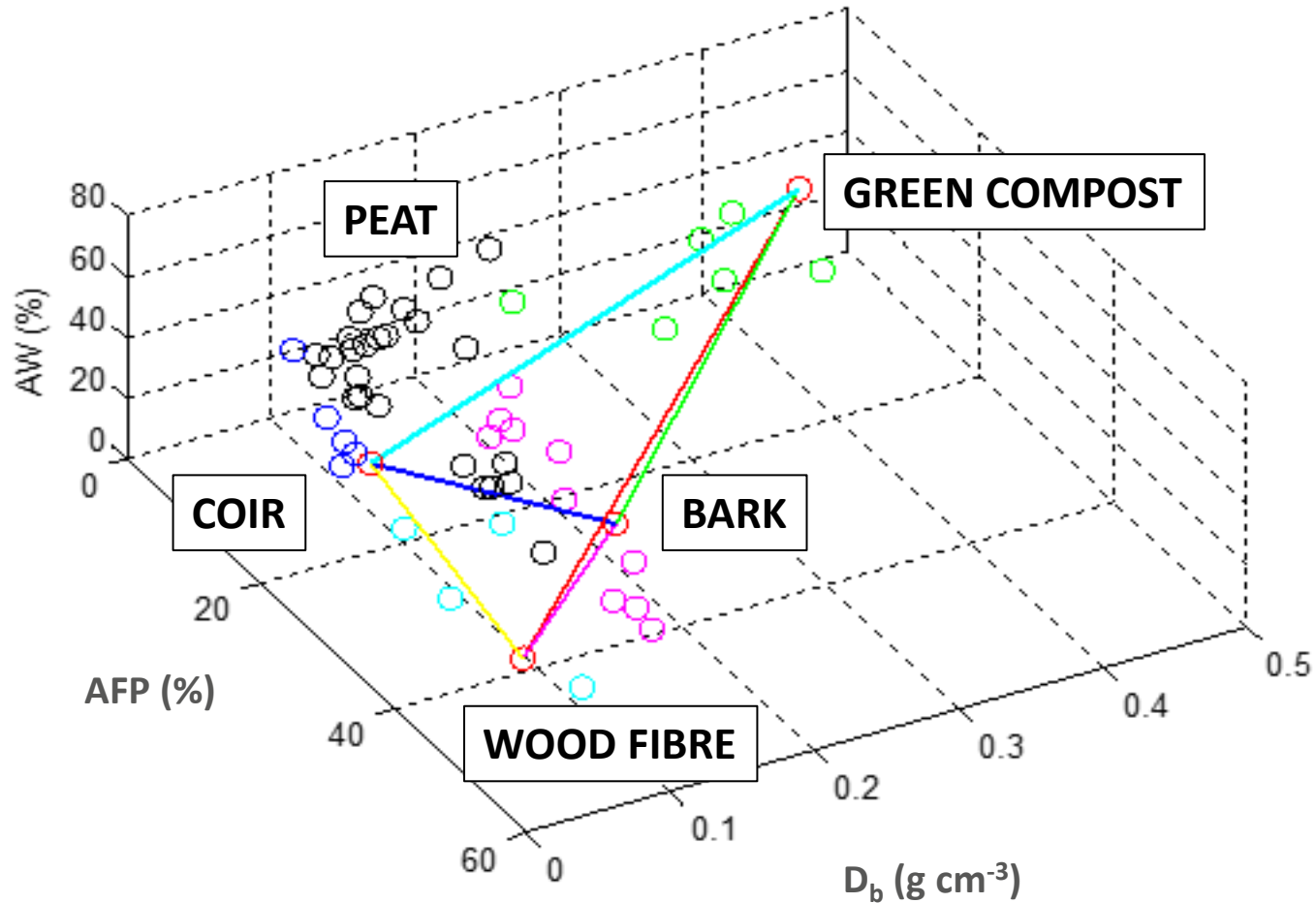


RSGM Prototype Blend Trials 2017

Experimental trials

Second generation prototype blends

Second generation prototype blends 2017



Raw Material type

- 1 COIR
- 2 BARK
- 3 GREEN COMPOST
- 4 WOOD FIBRE
- 5 PEAT



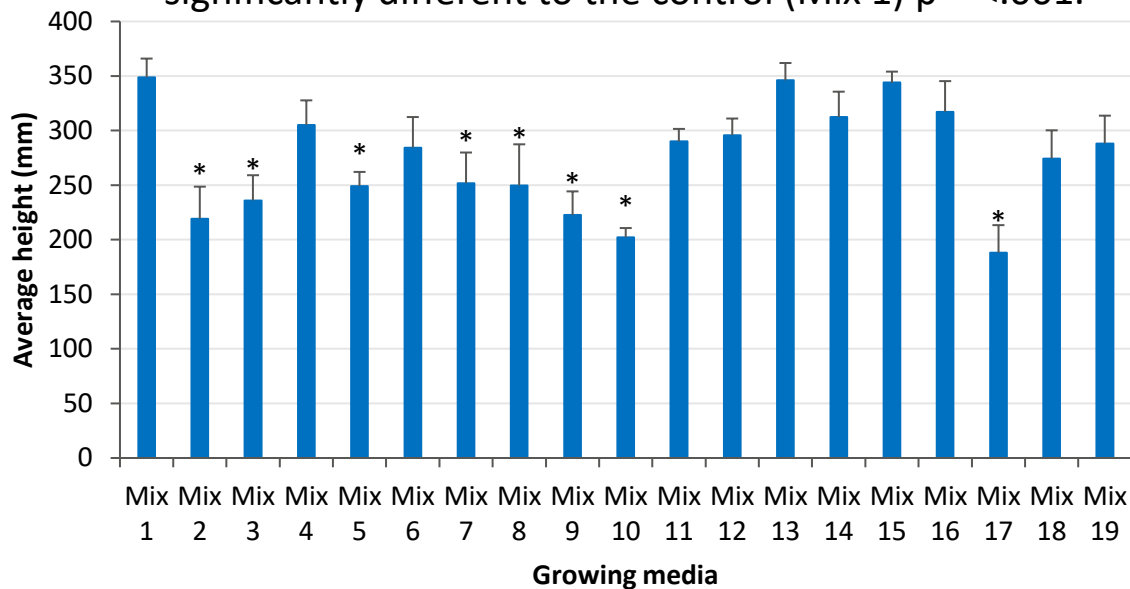
HNS – Experimental 2017 prior to Darby Nursery trial

- *Vinca*, *Lavender* and *Choisya* potted into 2 L pots in week 31.
- Irrigated via ebb and flood as required, 100ppm N.
- 19 growing media treatments. 5 reps.
- Assessed every 4 weeks until week 47, 2017.



HNS – Experimental 2017 prior to Darby Nursery trial

* = significantly different to the control (Mix 1) $p < .001$.



Choisya 16 weeks after potting



Mix 1
(Peat control)

Mix 6 - (Prototype 4)



Mix 12 - (Prototype 5)



Mix 15 - (Prototype 6)



Mix 18 - (Prototype 7)





RSGM Prototype Blend Trials 2018

Grower trials

Second generation prototype blends

HNS – Darby Nursery Stock 2018 - 2019

- **Finals:** *Choisya*, Lavender and *Vinca* potted into 2 L pots in week 20. *Choisya* grown under glass, Lavender under polythene and *Vinca* outside.
- **Liners:** Lavender, *Potentilla* and *Spirea* potted into 9 cm pots in week 20 and grown under polythene.
- Nursery control (30% peat-reduced) vs 5 peat-free prototype blends.
- Sub-irrigation.
- Assessments completed at 4 week intervals.
- Final assessment completed on Lavender finals in week 40.
- *Choisya*, *Vinca* and liners left to overwinter, final assessments completed in spring 2019.
- Plants assessed for foliage quality, height/growth and root development. Fresh weight assessed at the end.

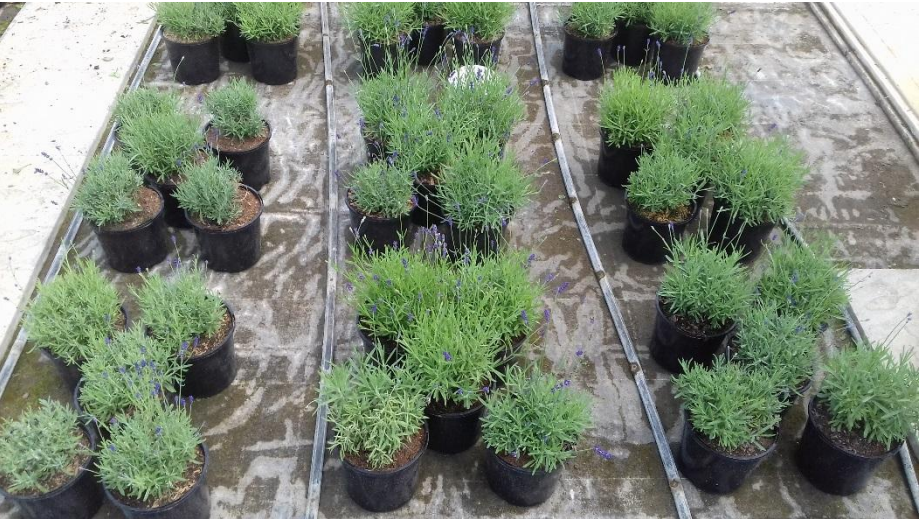
HNS – Darby Nursery Stock 2018 - 2019



Spirea
liners
week 24



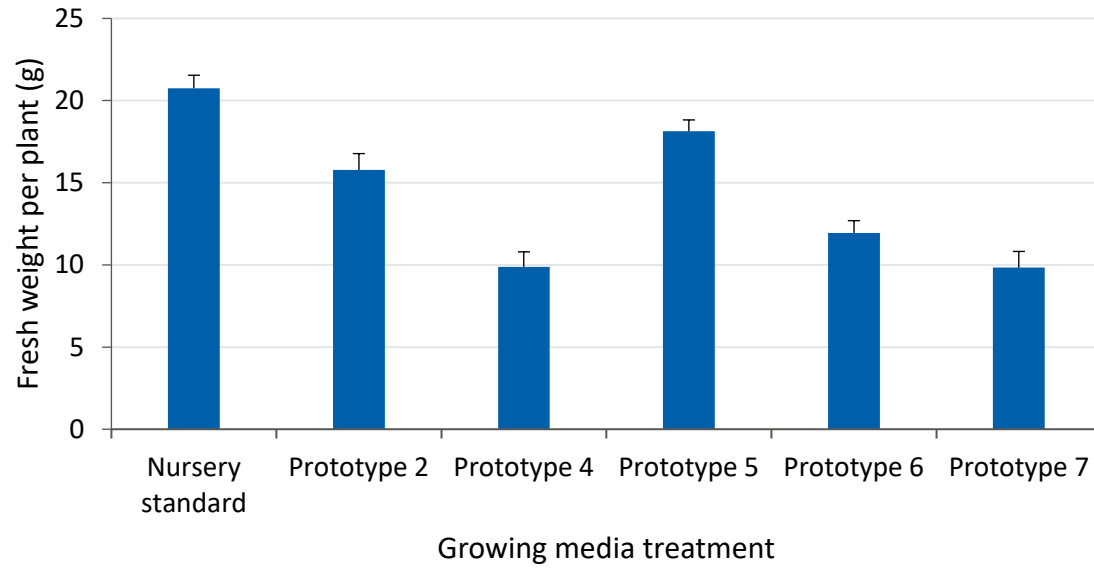
Vinca finals week 32



Lavender finals week 24

HNS – Darby Nursery Stock 2018 - 2019

Liners



Spirea fresh weight – 50 WAT (week 18 - 2019)

Nursery standard



Prototype 4



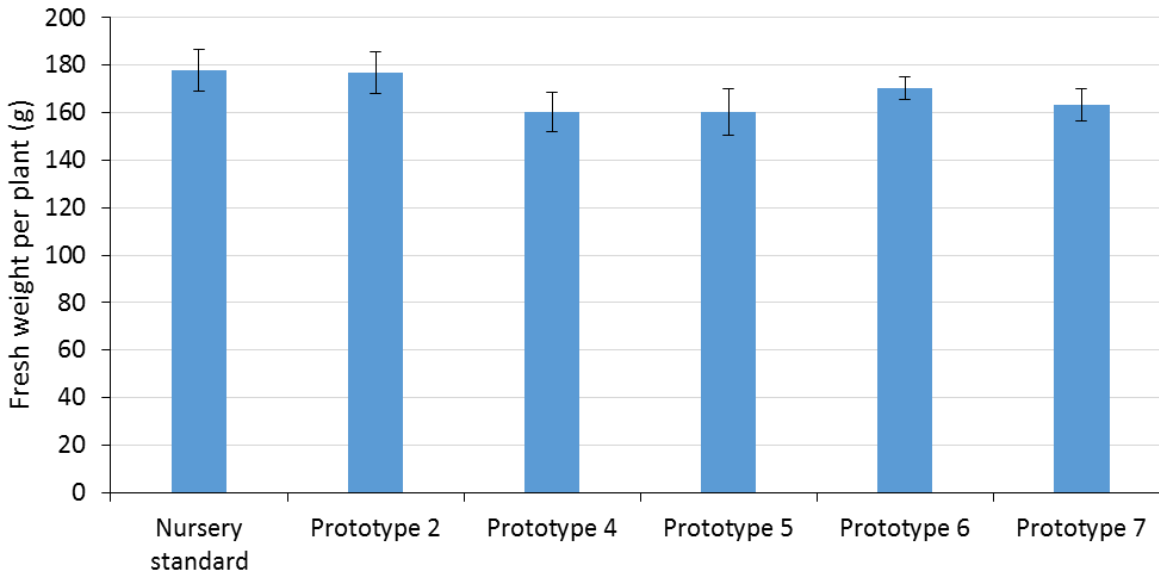
Prototype 5



HNS – Darby Nursery Stock 2018 - 2019

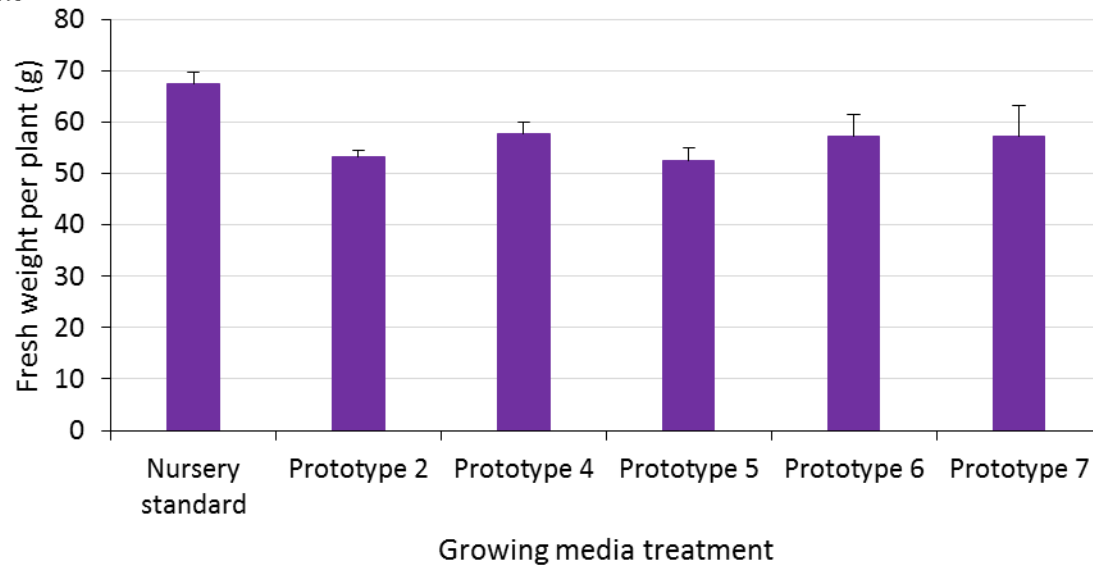
Finals

**Vinca fresh weight – 50 WAT
(week 18 - 2019)**



Growing media treatment

**Lavender
fresh weight
– 20 WAT
(week 40 -
2018)**



Growing media treatment



RSGM Prototype Blend Trials 2018

Experimental trials

Third generation prototype blends

Third generation prototype blends 2018 – 2019

- Third generation blends were designed to test the model.
- ‘Novel’ materials that were not available to the project team in 2015 have been characterised for their physical properties, and 18 blends were tested at ADAS Boxworth. Three chosen for 2019 grower trials.

HNS – Experimental 2018 prior to James Coles trial

- *Griselinia* and *Viburnum* potted into 2 L pots in week 30.
- Irrigated via overhead sprinkler as required, 100ppm N.
- 19 growing media treatments. 5 reps.
- Assessed every 4 weeks until week 46, 2018.



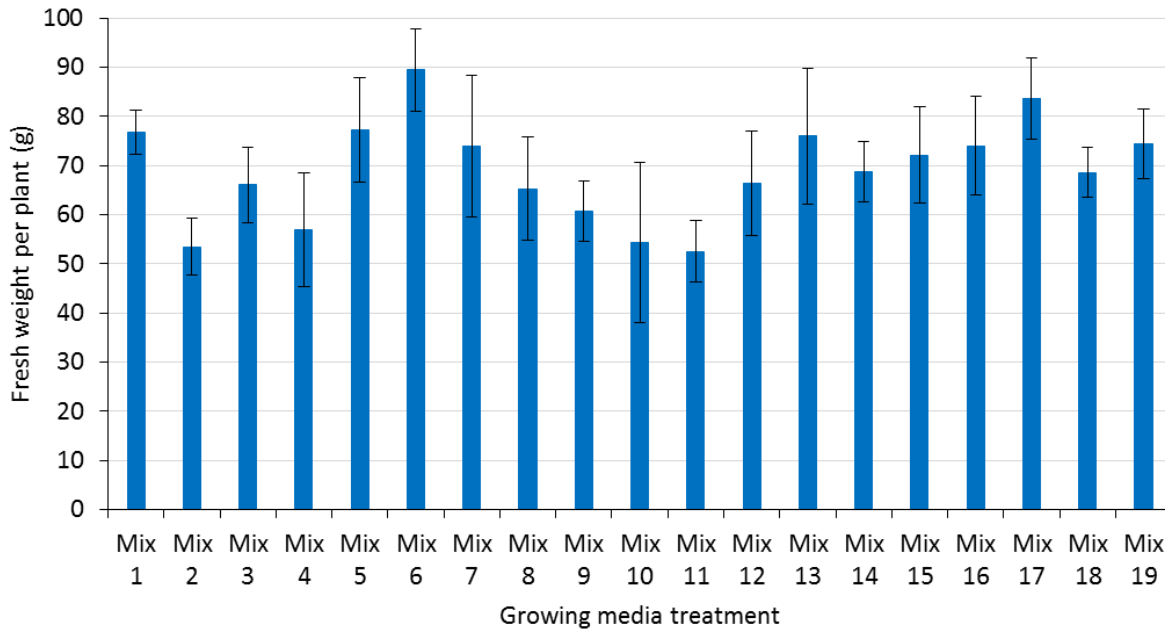
Griselinia week 30



Viburnum week 46

HNS – Experimental 2018 prior to James Coles trial

- Fresh weight – not significantly different to the control (Mix 1) for *Viburnum*.
- Mix 16 and Mix 14 produced best quality plants in *Viburnum* and *Griselinia* after the control.



Viburnum at trial end



Mix 1
(Peat control)



Mix 5
(Prototype 8)



Mix 14
(Prototype 9)



Mix 16
(Prototype 10)



RSGM Prototype Blend Trials 2019

Grower trials

Third generation prototype blends

HNS 2019 – James Coles & Sons

- *Cistus*, *Griselinia* and *Viburnum* (in peat-reduced liners).
- Liners transplanted into 2 L pots in week 20.
- *Cistus* grown outdoors. *Griselinia* and *Viburnum* under protection. All irrigated overhead.
- Nursery standard (peat reduced), 5 peat-free prototype blends.
- Assessments every 4 weeks.
- Fresh weight shall be assessed at the end of the trial.
- Sub-sample will be planted out to monitor establishment.



HNS 2019 – James Coles & Sons – week 36



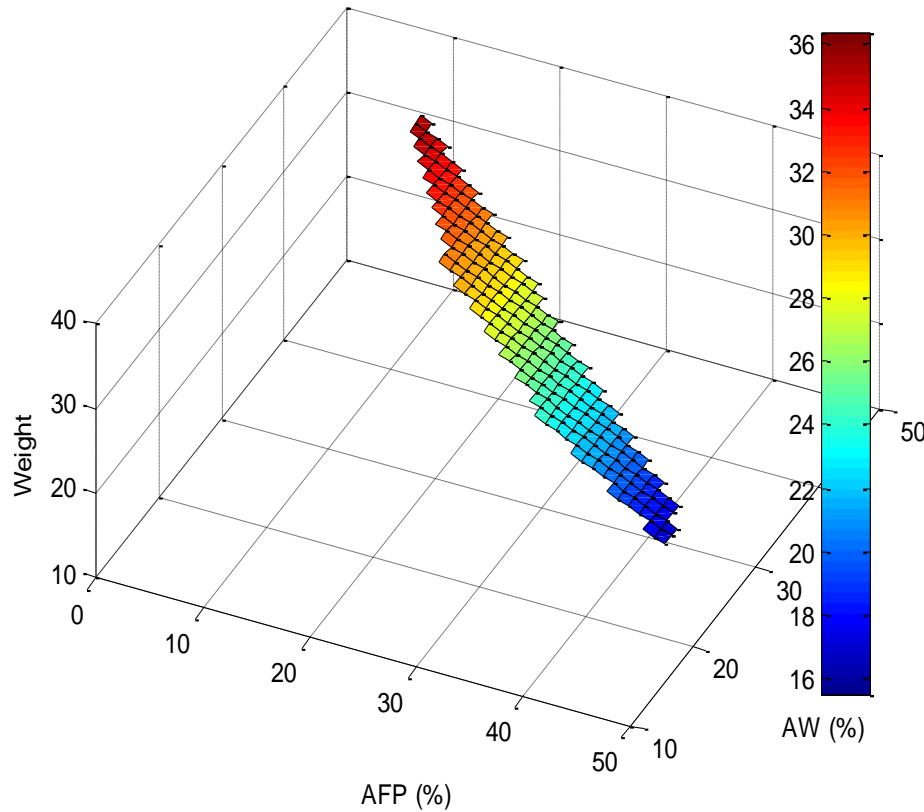
Mechanisation – Mechanical Botanical

- 500 L of each prototype blend (1-10) tested in a potting machine (2 L pots) and a tray filling machine (84 and 345-cell trays).
- Blends tested in their raw state, then wetted up and re-tested.
- No issues with the potting machine.
- Prototype 4 and 7 caused some issues with the tray filling machine, with the material clogging up the recycling section of the machine.

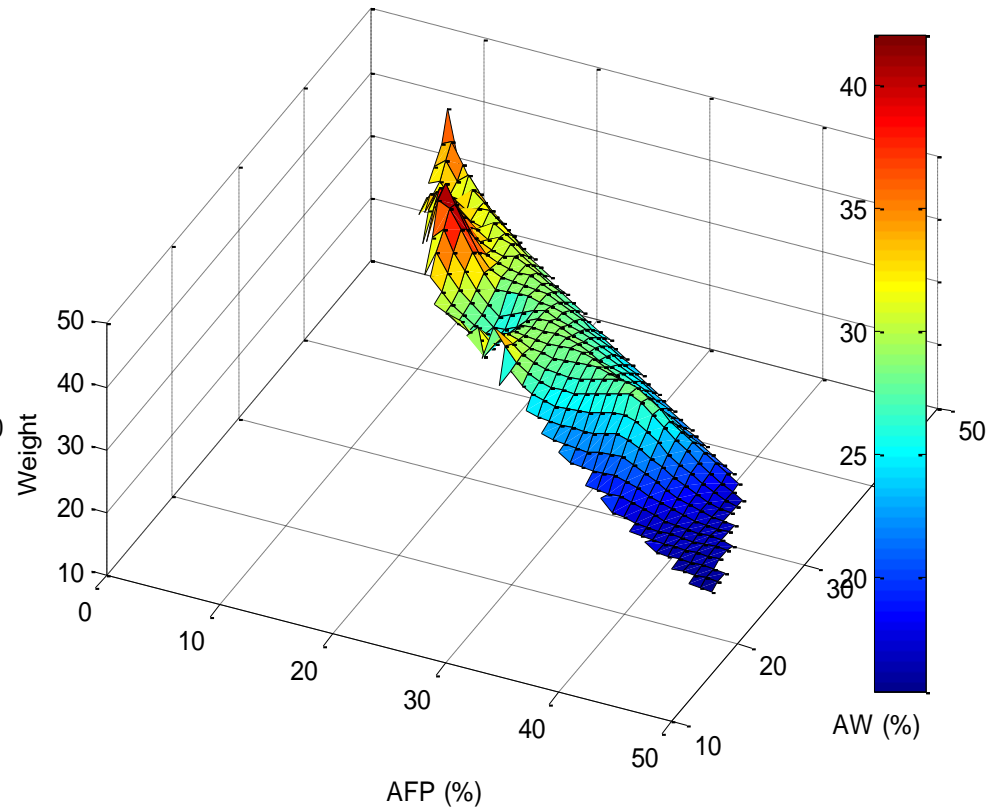


Developing the model

- All the data gathered so far goes into developing the model.
- The model will be a useful tool which can be used to develop growing media blends with particular characteristics to produce plants of a certain specification.



Predicted fresh weight Chinese Cabbage



Actual fresh weight (mean) Chinese Cabbage

Summary

- Grower trials in 2016 showed that the physical properties of current commercially available peat-reduced and peat-free blends are similar to peat.
- First generation prototype blends performed as well as peat in the experimental trials in 2016. Grower trials in 2017 using these prototypes were successful, echoing the results from 2016.
- The second generation prototype blends performed well on grower sites in 2018, although there were more noticeable differences between the prototypes.
- The results in the third generation experimental trials so far are encouraging, showing that it is possible to take a new material and create blends which will be successful using the modelling approach
- Year 5 (2019) is focusing on strengthening and refining the model through grower trials and experimental trials.

Implications for growers

- Peat-reduced and peat-free blends can be obtained from growing media manufacturers that produce good quality plants.
- Very few issues with nutrition or watering during the project
 - Monitoring watering is very important – peat-free is easy to overwater as the surface dries out more quickly than peat
 - Blends may need some nutritional modification, but as noted in CP 095 many will not
- All peat-free blends tested at grower sites were suitable for potting machines
 - Flow rates may need altering to get the best fill
 - Reduce recycling of material where possible
- Have a trial area to test new blends - learn the best practices for the blend.
- Store all growing media in a cool, dark place and use as soon as possible.



Acknowledgements

- Steve Reed and the team at Wyevale Nursery
- Stephen Carr and the team at Lowaters Nursery
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- Bulrush
- ICL
- Sinclair
- The ADAS Scientific Support Team
- AHDB Horticulture and Defra

Thank you for listening



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