



# On nursery quality control of peat-free substrates

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# The Farplants group

- ▶ Established in 1972, c.170 acres
- ▶ c.11 million plants per annum, 2000 diff varieties.
- ▶ Glasshouses, polytunnels & outdoor beds
- ▶ Predominately overhead irrigation



# *Peat-free (PF) journey to date*

- ▶ 2021 onwards assessed quality & consistency of peat-free media on market
  - ▶ Large comparative trials: peat-free media vs usual peat-reduced products
- ▶ Determine if crop responses to PF media were similar
- ▶ Match substrate products to crop groups (no one size fits all)
- ▶ Knowledge & confidence grown

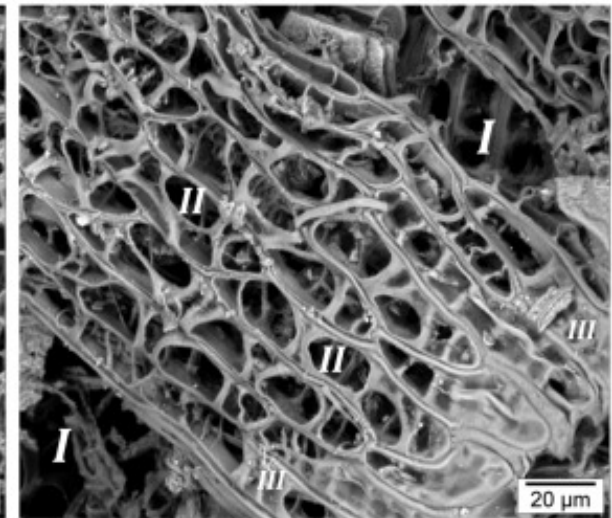
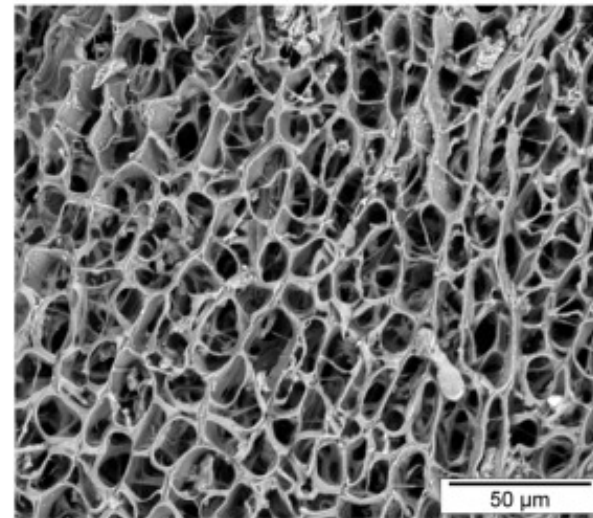
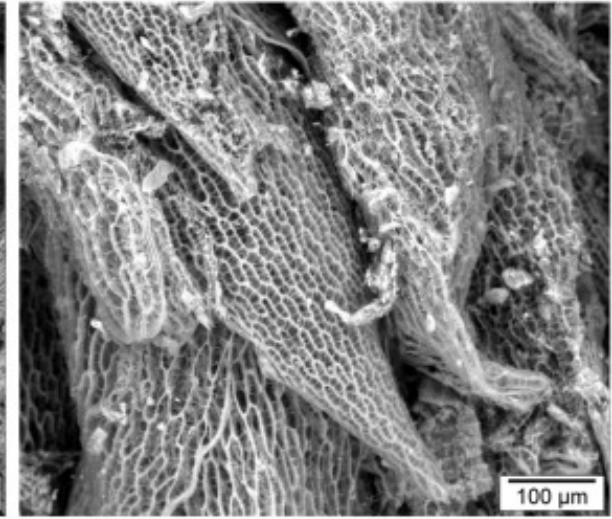
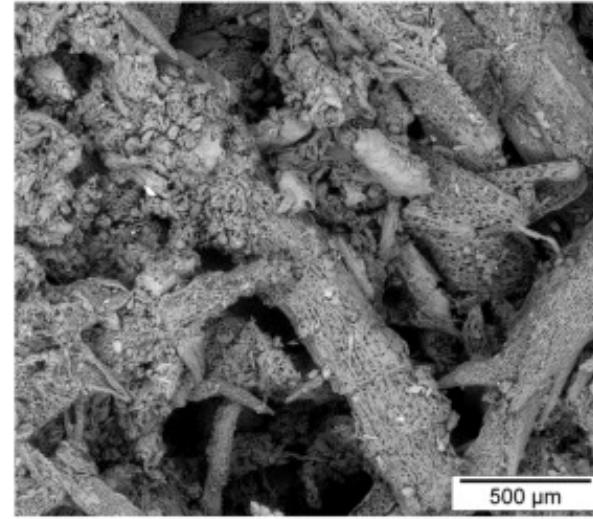
# *Why are PF substrates tricky for commercial producers?*

- ▶ Peat – why has it dominated the commercial industry for so long?



# Peat, *stable peat*

- ▶ Peat IS special – fossilized material
- ▶ Changed chemically over-time, boring for bugs!
- ▶ Inconsistency is **PREDICTABLE & CONTROLLABLE**
- ▶ Physically, biological & chemically predictable
  - ▶ Within & between batches
  - ▶ Between years.



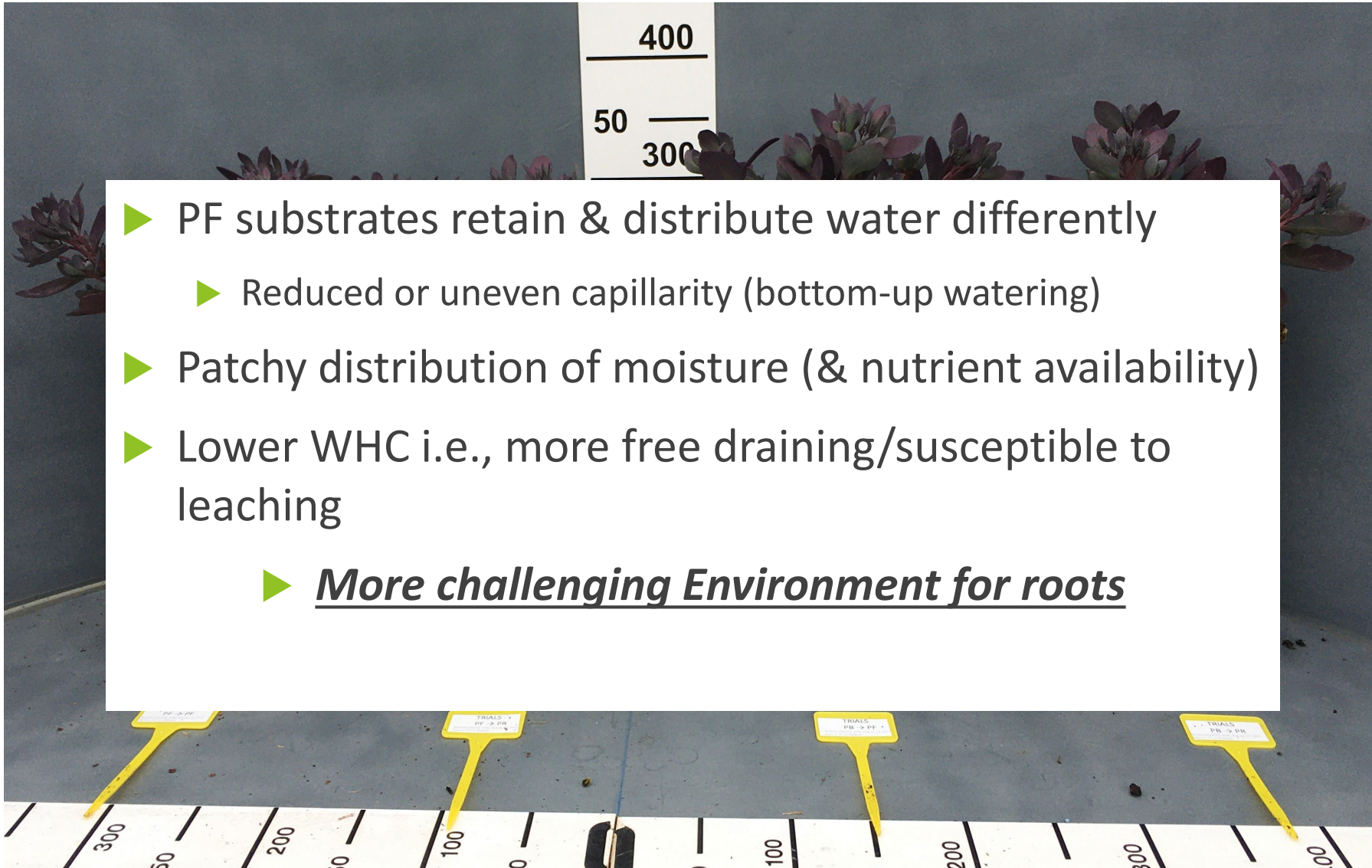
Rezanezhad *et al.*, 2016. *Chemical Geology*, 429: 75-84

# PF Substrates as 'peat-alternatives'

- ▶ They AREN'T
- ▶ Mixes of materials, each mix has distinct physical, chemical & biological properties
- ▶ Individual components fall along a spectrum of properties depending on supply & secondary processing
- ▶ Consistency is UNPREDICATBLE so difficult to CONTROL
- ▶ Physically, biological & chemically unpredictable
  - ▶ Between batches
  - ▶ Between years.

**DYNAMIC substrates**

# What to Watch - Water distribution & retention



- ▶ PF substrates retain & distribute water differently
  - ▶ Reduced or uneven capillarity (bottom-up watering)
- ▶ Patchy distribution of moisture (& nutrient availability)
- ▶ Lower WHC i.e., more free draining/susceptible to leaching
  - ▶ **More challenging Environment for roots**



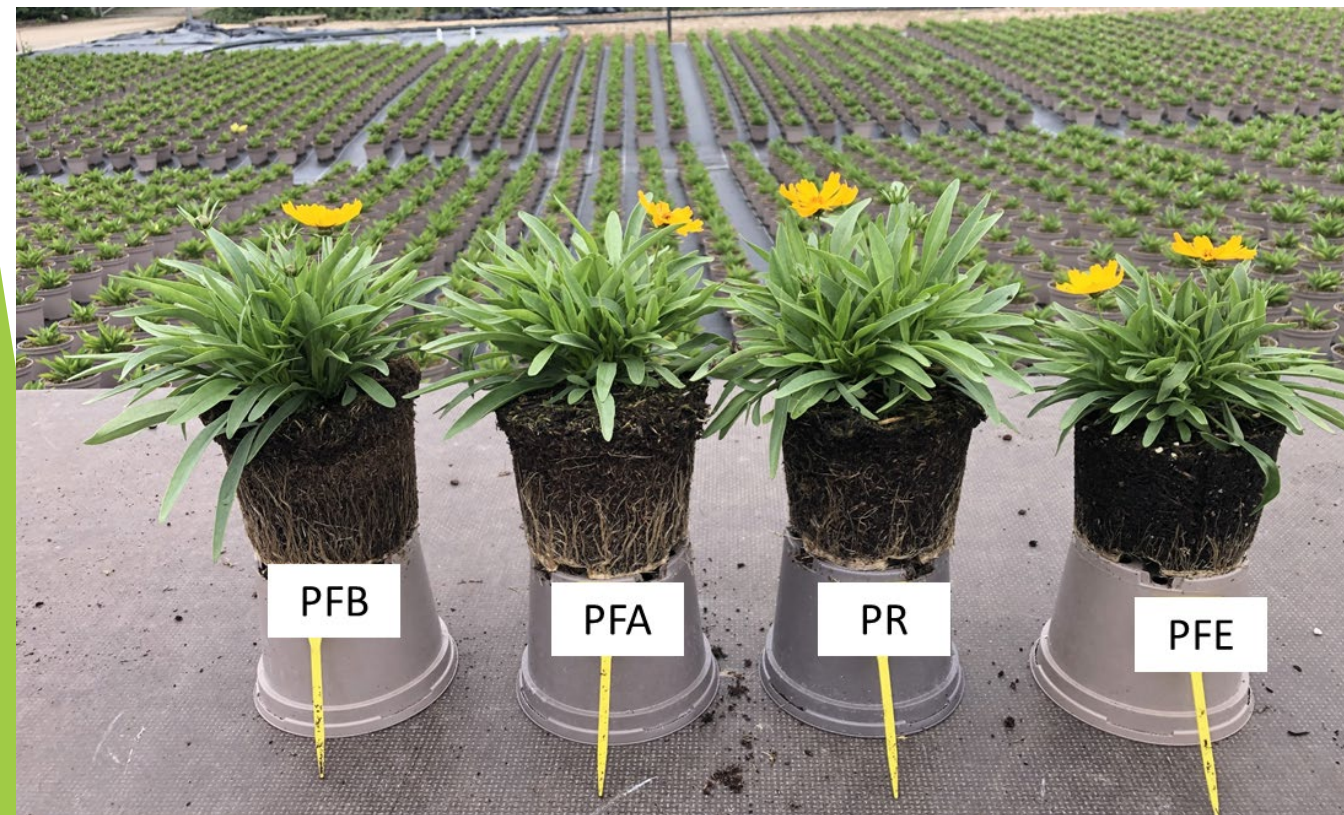
# ***What to Watch - Water distribution & retention***

- ▶ Trial new substrates across your range of production systems & Genera
- ▶ Observe how pots wet-up, where dry spots develop
- ▶ Monitor how pot dries back
- ▶ Volumes & frequency of irrigation can be varied
- ▶ Wetting agents can help improve infiltration & distribution



# What to Watch - Physical Instability

- ▶ Compressible (wood fibre)
- ▶ Inadequately stabilized (wood fibre, bark)
- ▶ SLUMPING – reduction in AFP/anoxic conditions develop





# What to Watch - Physical Instability

- ▶ Can't correct – crop failure
- ▶ Outdoor grown crops & esp. O/W crops
- ▶ Comes down to the mix – higher composted bark volume outdoors
- ▶ TRIAL, TRIAL again



*Shelf-life - follow manufacturer's guidance*

# What to Watch - Biological Instability

- ▶ PF substrates microbially active
- ▶ Microbial foodstuffs (Labile C)
  
- ▶ Degree to which problematic depends on:
  - ▶ Environment, composition of the mix, leaching rate

## Danger Zones:

- ▶ Post-potting early season (esp. 3-4 weeks in)
- ▶ Early spring outdoors (esp. warm Autumn & wet winter)
- ▶ Early spring Indoors





# What to Watch - Chemical/Biological Instability

- ▶ Trial substrates under range of conditions, match substrates to situation
  - ▶ We have one mix use outdoors, another indoors
- ▶ CRF quantity & release pattern for outdoor O/W crops (less K more N)
- ▶ Indoor grown crops: additional N for early growth
- ▶ BUT plants can grow through
- ▶ Each year is a bit different



# What to Watch - Storage & shelf-life

- ▶ Temperature & moisture (store covered & cool)
- ▶ CRF (release pattern)



## 1. Fertilizer release (Too much N)

- ▶ Toxicity (maybe)
- ▶ Reduced CRF longevity (definitely)

## 2. N lock-up (Too little N)

## 3. Structural instability



Credit ICL

# On Nursery QC

- ▶ EC measures the potential of water to conduct electricity

*Indicator of the concentration of dissolved ions*

- ▶ Measure EC on delivery & pre-potting

- ▶ EC pen or probe – doesn't matter
- ▶ Use same probe in the same way every time
- ▶ Record the data, build up a picture of your normal

- ▶ Looking for large changes (order of magnitude or more)





# *In Summary*

- ▶ No one size fits all solution for those growing a wide range of crops on varied programs
- ▶ Assess each substrate across the full range of growing conditions you have
- ▶ Match the substrate to the situation + extra vigilance & adaptive management
- ▶ Store your substrates carefully & use them quickly
- ▶ Retrain your staff – make them aware & look inside pots often

# Acknowledgements

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