Plant growth and physiology: growth control through nutrition and irrigation management

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What I will cover

- Growth control through irrigation and RDI (regulated deficit irrigation)
- Growth control through nutrition
- Example nutritional products
- Summary

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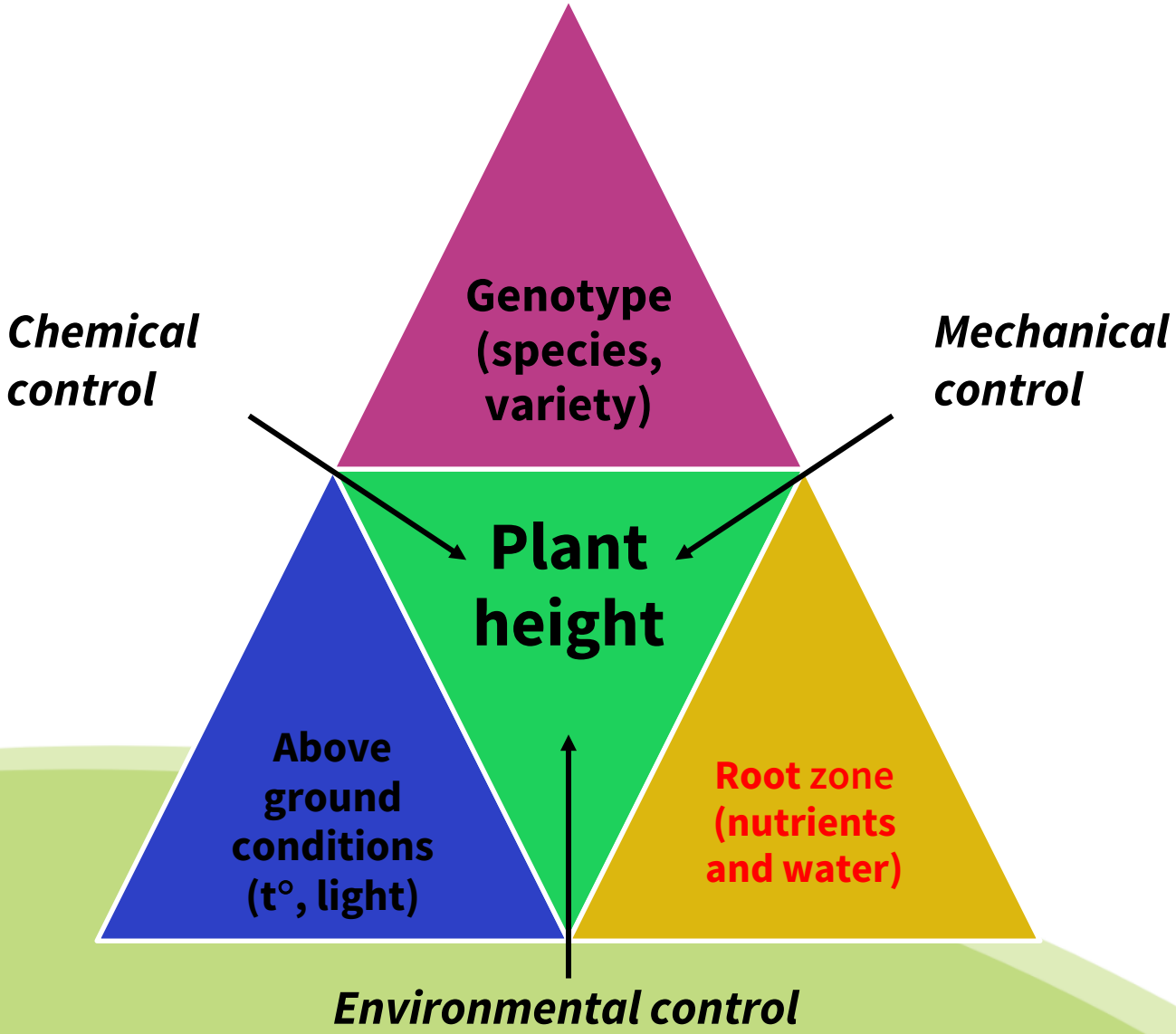
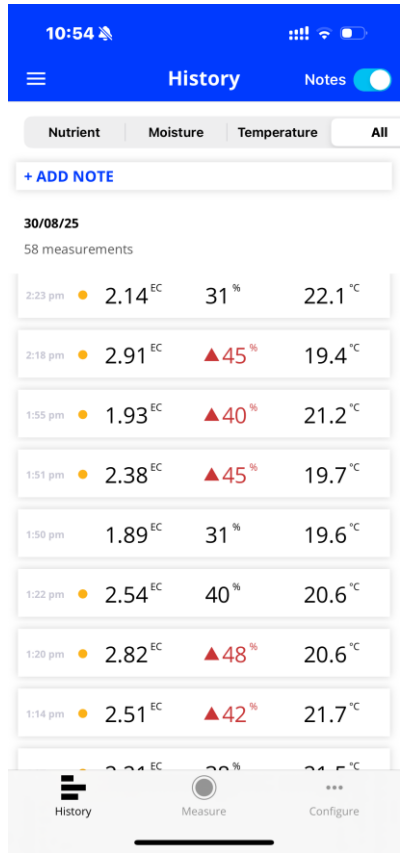
Factors responsible for plant growth



Growth control with irrigation (RDI)

- **Water stress and RDI**
  - Reduces speed of growth and increases root production
  - Requires careful monitoring
  - Growing media selection is important
  - High humidities cause stretching
  - Uniform starting material is crucial
  - Target moisture levels depend on species and growing media but generally around 12-15%



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Growth control with irrigation (RDI)

- Risk of crop damage and loss
- Impact on immobile nutrients – Ca, B, Fe, Mn, Cu, Zn
- Reduces root pathogen infections
- Reduces sciarid flies and other soil dwelling pests
- Useful for holding crops back
- Needs uniform irrigation
- Challenges with suitability of production beds – highs and lows, drainage etc

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Growth control with irrigation (RDI)

- Scheduling of crop must be considered with RDI
- Possible permanent change to plant habit, colour and growth
- Combination with RDI and environmental manipulation works well
- Caution on using combination of RDI and nutritional intervention
- It requires meticulous monitoring and skilled staff to implement it
- Irrigation system suitability and maintenance is very important

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Growth control with nutrition - nitrogen

- NH_4 vs NO_3 – do we know the difference???
- Antagonism with potassium – good thing!
- In excess in peat-free growing media
- Use less NH_4 in winter
- Substitute with potassium nitrate or calcium nitrate
- Ideally remove nitrogen from base fertiliser for pot and bedding, but supplementary liquid feeding required
- Not influenced by pH of growing media

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Growth control with nutrition - phosphorus

- Involved in the energy transfer of plants
- Insoluble in water and often difficult to maintain low levels of phosphorus without deficiency
- Caution when using Previcur Energy and phosphonate-based fertilisers
- Excess or deficiency leads to imbalance in ‘root vs shoot’
- Lower phosphorus improves shelf life
- Influenced by pH of growing media

Low P **High P** **PGRs**

Impact of P buffer – Compalox (aluminium oxide absorbs excess P)

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Growth control with nutrition - potassium

- Responsible for generative production and control of water movement within plants through ‘potassium pump’
- Mobile within plants and can help with hardening off cells and growth
- Antagonistic with nitrogen, calcium and magnesium
- Not influenced by pH of growing media

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Growth control with nutrition

- CRF not necessarily ‘controlled’ !
- Low base fertiliser is better than high rate of base fertiliser, especially where the media is high in coir
- Avoid ammonium nitrate fertiliser input
- Using phosphonate and low pH can trigger more growth, especially in temperatures above 15°C
- Use of high potassium fertiliser as foliar feed with plant protection products help with hardening off and counteracting nitrogen uptake
- High bark content in growing media absorbs nutrients and can lead to less effective growth regulator applications

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Example nutritional products

- **Omex K50**
  - KCO_3 potassium carbonate based biostimulant
  - Type of salt highly biologically active
  - Mainly through foliar applications
  - Improves the plant tolerance to drought
  - Very strong hardening off effect
  - Phytotoxicity seen, even in trees where high doses used
  - Improves shelf life
  - Max dose 2L/ha in 600L/ha water
  - Minimum 10 days interval

Example nutritional products

- **<u>High K soluble feeds – Peters 9-9-36, Kristalon Orange or Scarlet, Universol Violet and others</u>**
  - Compound soluble feeds for liquid or foliar feeds
  - Helps with increasing potassium levels whilst adding nitrogen and phosphorus
  - Much slower results over longer period
  - Works well in combination with RDI and PGRs
  - Also provides some tolerance to Botrytis infections in autumn and winter
  - No more than 3g/L foliar and 5g/L liquid feeding

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Example nutritional products

- **CalMax Ultra**
  - Compound liquid fertiliser with low nitrogen and high concentration of immobile nutrients
  - It has a formulation technology called AXN acting as ‘pump primer’
  - Mainly used as calcium booster
  - Works well in combination with RDI
  - Improves product shelf life
  - No more than 1ml/L foliar with 10-day spray interval

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Summary

- RDI is an effective way of growth control, however it requires skilled staff and meticulous crop monitoring
- Growing media type, production beds, irrigation system type are all key factors in implementing such growth control strategies
- Nutritional choice for growing media - incorporated fertilisers, liquid and foliar feeds, can supplement RDI or other growth control strategies but not sole strategy
- Timing of nutrient input is equally important

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