Plant sap versus dry matter analysis in a tomato crop

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Wageningen Research Greenhouse Horticulture

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Occasion and motivation for research

- Ongoing debate since ’80-ies
- New impuls by consultancy group and labs promoting strongly as a new method
  - Steering nutrient uptake , crop growth and development /growth
  - Alternative for nutrient solution analysis
  - *“Fertilisation is the “new” plant protection “*

44 groenten & fruit Techniek

Piskijkers werden ze vroeger genoemd, de deskundigen die snuffelend, kijkend, en zelfs proevend aan urine wisten te vertellen wat de bezitter ervan onder de leden had en wat daaraan gedaan kon worden. NgraCrop-Control doet iets met vergelijkbaars met plantsap.

PLANTSAP BRENGT KLAARHEID IN VOEDINGSTOESTAND

Door Joan Timmerman, NovaCropControl

Wil je een topsporter of een volgegeten patiënt in de kas?

‘Te veel nitraat leidt tot obesitas-planten’

Met de gangbare bemesting creëert de teler zwakke planten, zegt Sjoerd Smits van Hortinova. Vooral de nitraatcijfers moeten het ontgelden. Maar plantsapanalyses wijzen nog veel meer zwakke plekken aan in de gangbare bemestingsschema’s. Dat maakt bemesting weer spannend.

Discussion and objectives

- Is plant-sap analysis a robust method for plant nutrient status
- Can plant-sap analysis replace substrate / drainage analyses
- Research questions
  - Relation between plant-sap nutrient analysis and dry matter analyses
  - Dynamics of nutrients (sap and nutrient solution) during crop cycle

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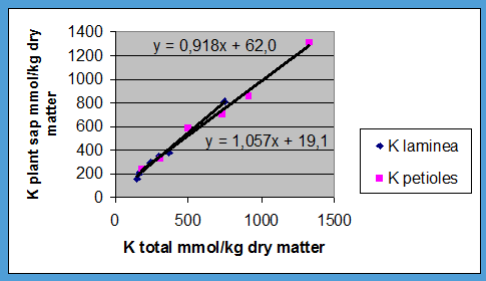
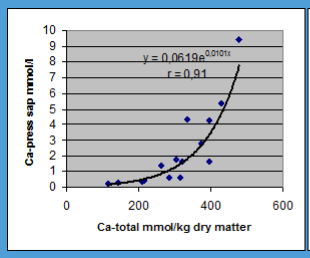
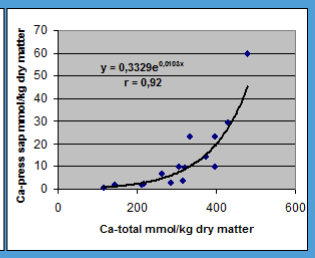
esults from the past







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Sonneveld and Voogt 1986

Material and methods

- Long term tomato crop (okt '15 – aug '16)
  - 'SON-T lighted crop ' Rockwool, free drainage system.
- Two varieties ('Brioso' , 'Komeett')
- 2 weekly plantsap and dry matter : top leaflet, fully grown (during 6 months)
- 2 weekly drainage water analysis
- 4 weeks drip irrigation water

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Results and interpretation

- For comparison, concentrations of dry matter and plant sap should be converted to each other

$$K_d = \frac{100 - DM}{DM} K_p$$

DM = dry matter content of the fresh material

Kp = K concentration of the plant sap

Kd = K concentration of the dry material

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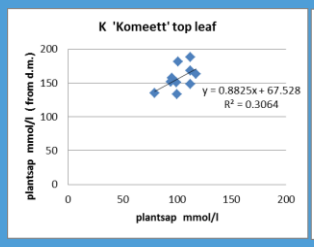
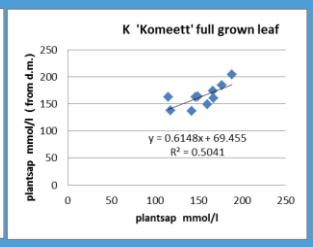
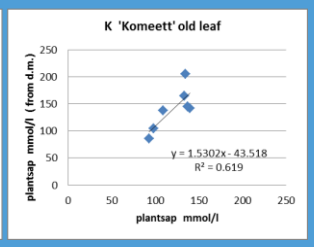
Correlation K –plantsap – K dry matter (converted to sap)







Acceptable correlation, though levels differ per leaf

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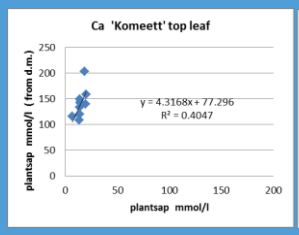
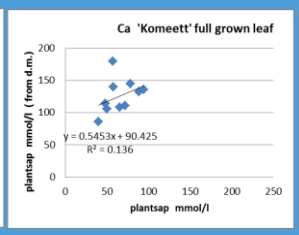
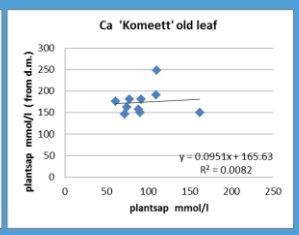
Correlation Ca–plantsap – Ca dry matter (converted to sap)







Acceptable correlation for some leafs, though levels differ strongly per leaf

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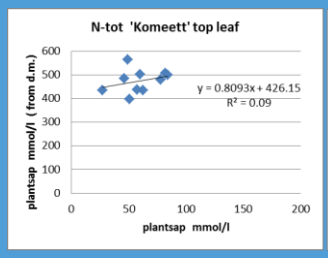
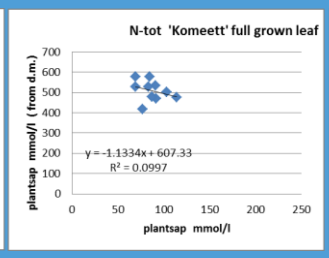
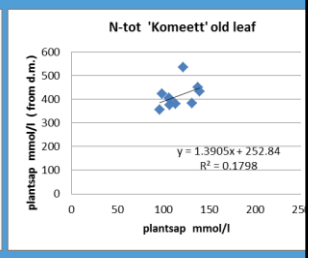
Correlation N-tot –plantsap – N-tot dry matter (converted to sap)







poor correlation, however levels differ not very much per leaf

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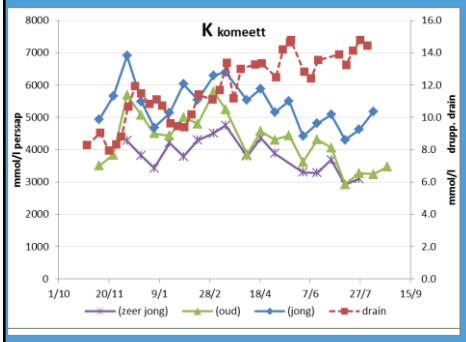
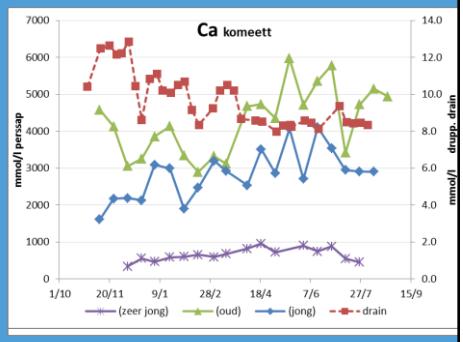
Plantsap concentrations during cropping season





With drainage analyses

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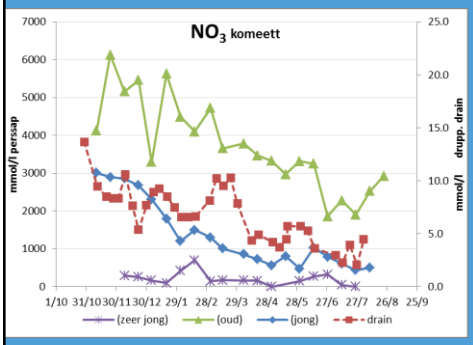
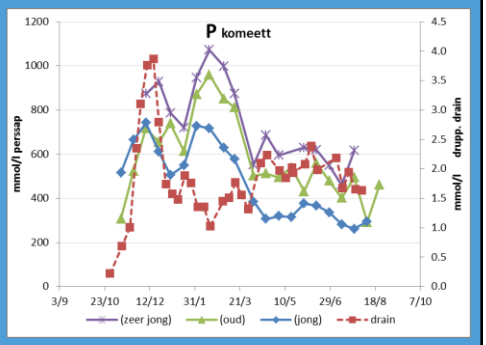
Plantsap concentrations during cropping season NO3





With drainage analyses

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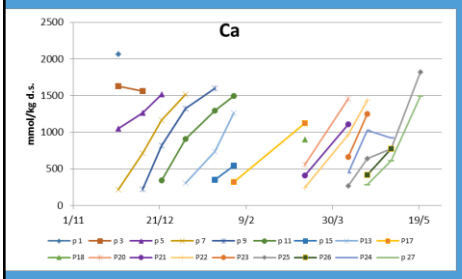
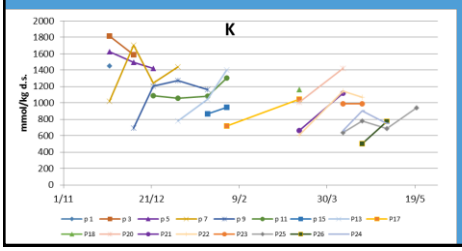
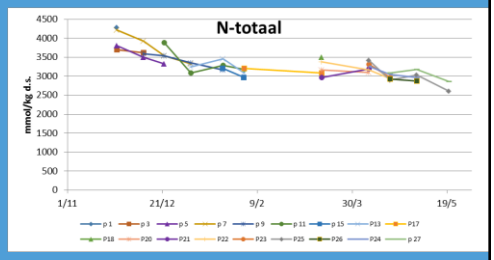
Development of Ca, K , N-tot content during life cycle of leafs







To summarize

- Recovery of nutrients in plant sap analysis, differ quite a lot between elements: K high, N-tot , NO3 high, Ca low
- Correlation with total differs between leaf age / cultivars
- Actual nutrient status varies seriously with leaf age
- For some elements, plant sap analysis is representatve for concentration in root environment: K, NO3

Conclusion:

- Plant sap can play a role in checking nutrient status of crops :(NO3, K)
  Not for Ca, Fe, Mn, Cu, Mo (so whats the benefit ?)
- Specific reference values for crops, leafs/time/(cultivar) must be developed
- Well defined samplng procedures required

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