

## Effect of regulated deficit irrigation on vegetative growth and production of apple

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## RDI for control of vegetative growth

- The Netherlands: apple on M.9 rootstock
- Vegetative growth level often too high
- Still, water is applied



## RDI for further development DSS "IRRY"

### Description "IRRY":

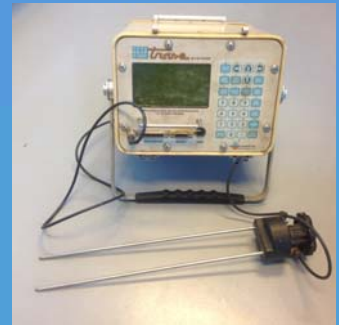
Boshuizen, A.J. and M.P. van der Maas, 1999. IRRY: a decision support system for the water supply in orchards, Proc. 5th Int. Symp. on Computer modeling, Acta Hort. 499, 161-166.

- Mechanistic water balance model for orchards
- Soil water tension is calculated
  - every 5 minutes, per 10 cm layer
  - in+outside the trickle column
  - Physiological relevant average
- Calibration with Watermark



## Indirect estimation of soil water tension (WT) in the experiments

1. Measurement of Volumetric Water Content (VWC) over total rooting depth by TRASE -> (TDR-technique)



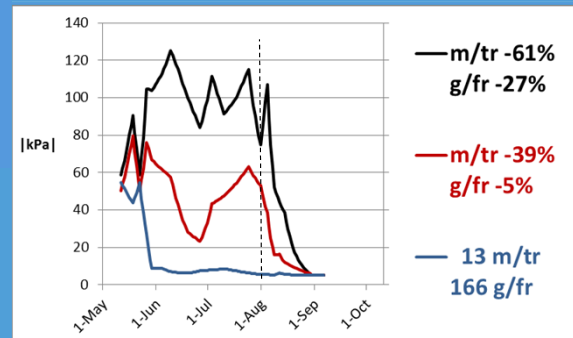
## Estimation of soil water tension (WT)

2. Calculation of WT with WT-VWC-relationship of in situ soil

	Pot	Gully
WT (kPa)	VWC(%)	VWC(%)
-0.5	43	45
-1.0	41	44
-2.9	36	41
-6.9		37
-9.8	29	34
-36.8	19	
-98.1	10	22
-310.1	8	11
-1554.3		8




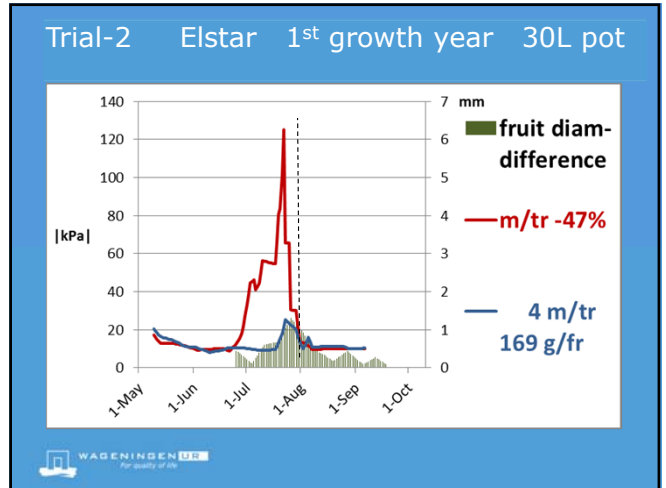
## Trial-1 Elstar 2<sup>e</sup> growth year 30L pot



**Trial-1 Elstar 2<sup>e</sup> growth year 30L pot**

Other results:

- Amount of flower clusters/tree:
  - before pruning highest for "5 kPa"
  - After pruning highest for "50 kPa"
- Quality of flowers for "50 kPa" higher than "5 kPa"
- Higher % regrowth for "100 kPa" (10%)

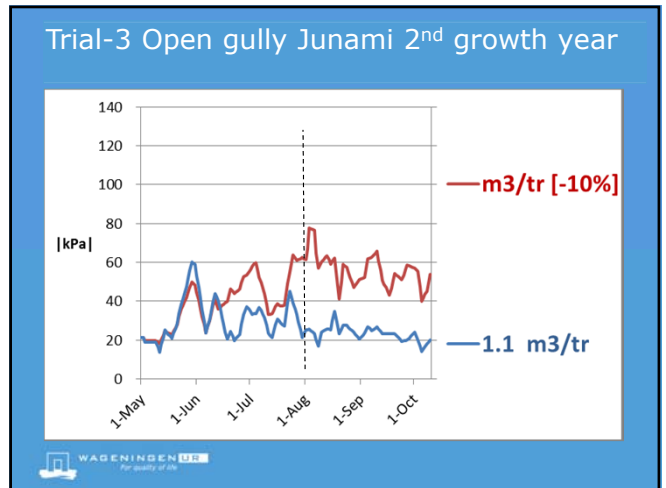



**Trial-3 Open gully Junami<sup>®</sup> 120L/tree**


Planting date 20 June 2011

2nd growth year  
31 July 2012


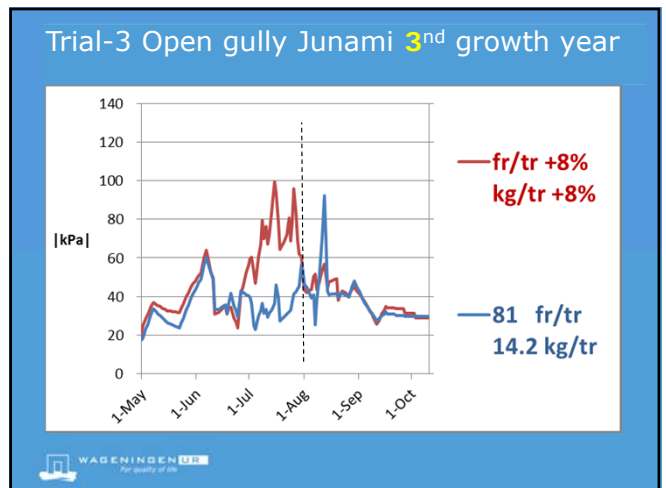


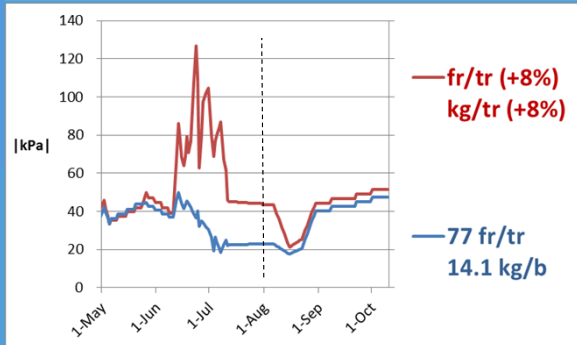


**Trial-3 Open gully Junami 3<sup>rd</sup> growth year**



14.2 kg/tr  
176 g/fr

Trial-3 Open gully Junami 4<sup>th</sup> growth year

WAGENINGEN UR  
Per quality of life

Trial-3 Open gully Junami 5<sup>th</sup> growth year

18.1 kg/tr  
158 g/fr

WAGENINGEN UR  
Per quality of life

## Conclusions

- Results RDI Pot-experiment confirmed:
  - Vegetative growth reduction in year of RDI and number of flowers/fruit load increased in next year
  - Fruit size reduction requires longer stress periods and higher stresses
- Application in successive years results in similar or neutral effects
- Older trees with higher root density might require higher stress levels
- Seasonal VPD levels might interact with WT requirements: room for improvement

WAGENINGEN UR  
Per quality of life