

# MALUMADAG – IRRIGATION PRACTICES



50

YEARS

OF SHAPING  
THE FUTURE



# Introduction

- Developments regarding irrigation and nutrition in the fruit industry during the past 20 years must be seen against the background of sub-optimal resources with regards climate, water, soil and nutrition.
- Every area has its own challenges - saline water sources, compacted heavy soils, sand and stone, extreme heat, high summer rainfall, low humidity during flowering, water contains no nutrients or bicarbonates to neutralize acidity, wet winters, changing climate, shallow root systems
- How do we adapt or overcome some of these sub-optimal resources with the aim of optimizing production?
- Many people are and were involved in the development of the industry from producers, irrigation and fertilizer people, consultants, researchers, universities, etc.

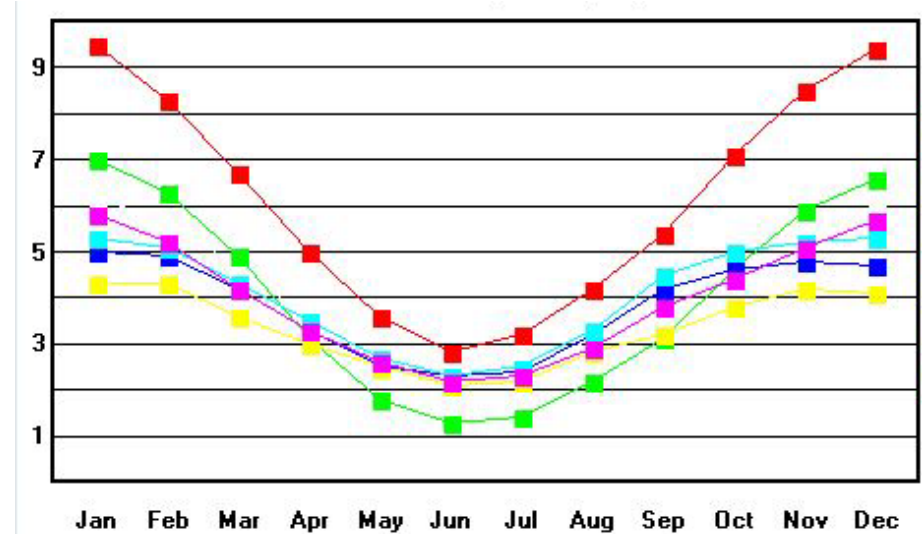
- Factors dominating the decision making process of producers regarding irrigation system of choice changes from year to year.
- This trend will continue and the “Orchard of the Future” will most probably look very different than today.

# Experience – Lessons – Water Use

Climate Condition (ETo)	Peak Crop Requirement (m <sup>3</sup> /ha/day)
12.50	60
10.00	48
8.75	42
7.50	36
6.25	30
5.00	24

	MAP	Elev		
KAKAMAS	105.9	720	LOSKOP	630.9 945
CITRUSDA	437	198	DURBAN	1003 8
HOEDSPR	514.1	610	ADDO SIT	359.7 85

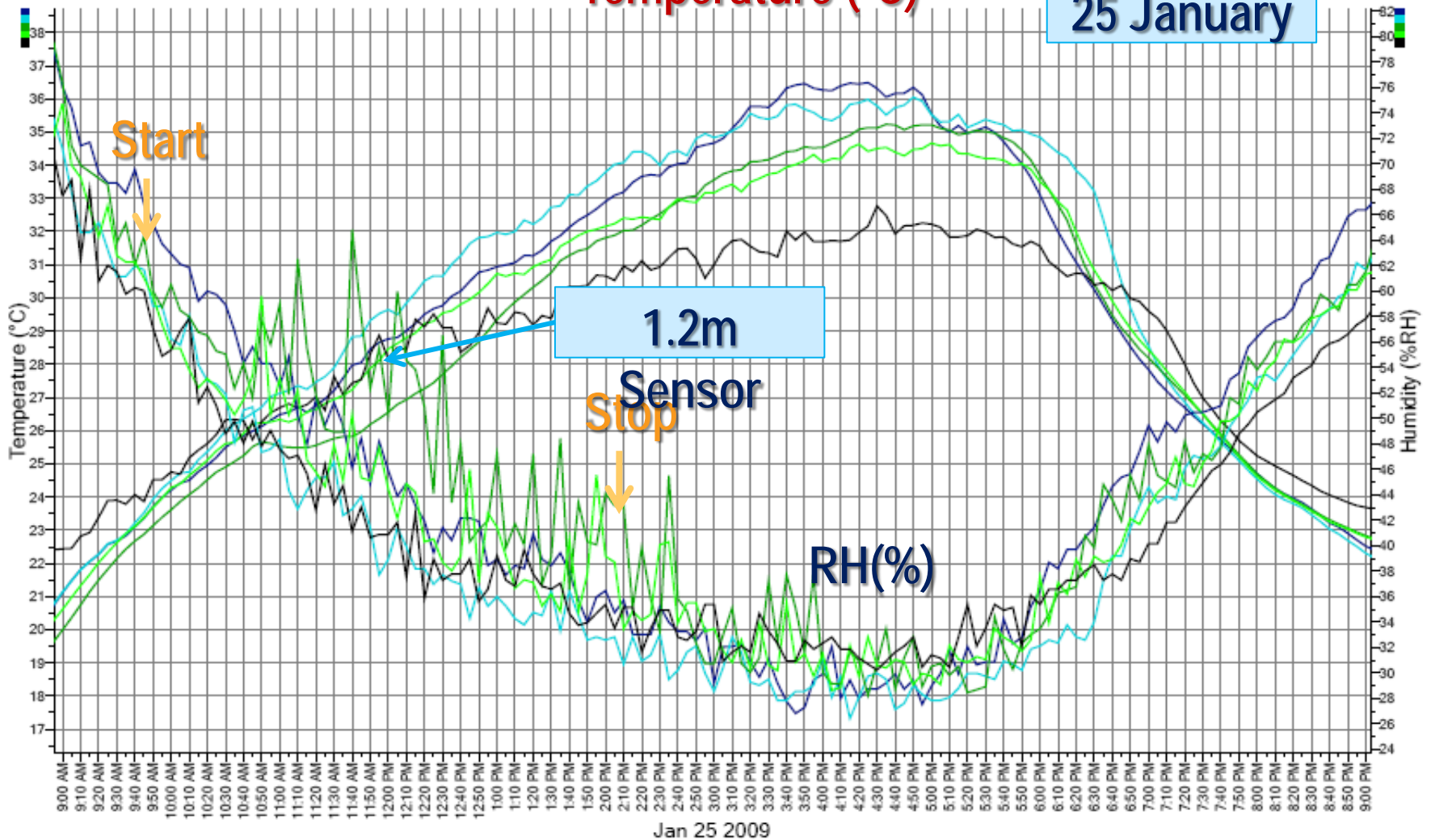
SAPWAT: Reference Evaporation (mm/day)



# Experience – Drip vs Micro - Cooling

Temperature (°C)

25 January



# Experience – Evaporative Cooling

Overhead  
GyroNet Turbo



Misters – LP  
CoolNets Tee's







Misters – LP  
CoolNets Crosses



# Experience – Mulching – Root systems



# Experience – Tree Canopy – Roots

Orchard	Drip – L8	Micro – L24
Canopy	 A photograph showing the canopy of a tree in an orchard under Drip irrigation (L8). The tree has a dense, rounded canopy with green leaves.	 A photograph showing the canopy of a tree in an orchard under Micro irrigation (L24). The tree has a dense, rounded canopy with green leaves, similar to the Drip irrigation system.
Roots	 A photograph showing the root system of a tree under Drip irrigation (L8). The roots are concentrated in a narrow zone around the drip emitter, with a blue drip line visible in the soil.	 A photograph showing the root system of a tree under Micro irrigation (L24). The roots are more widely distributed in the soil compared to the Drip irrigation system, with a yellow stake visible in the soil.

- Always a balance between above and underground.
- The root system will mostly reflect the success of the operation.



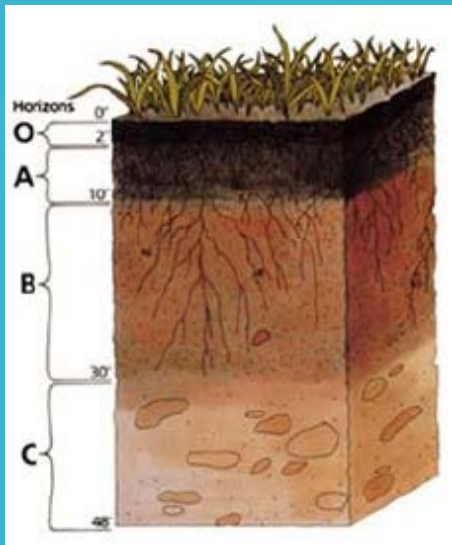
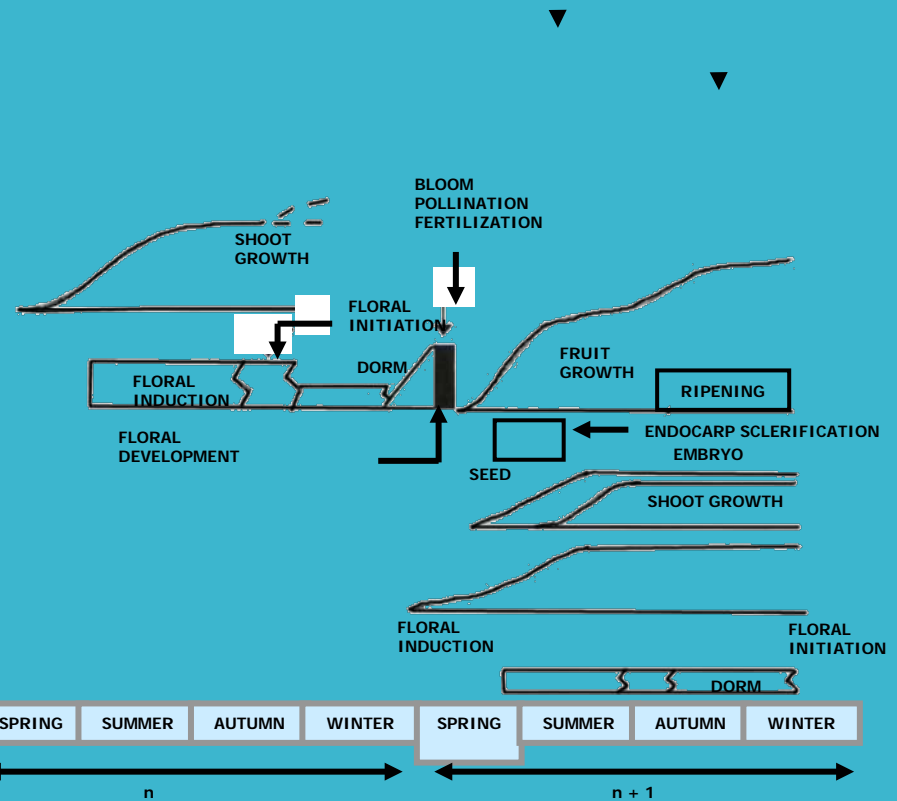
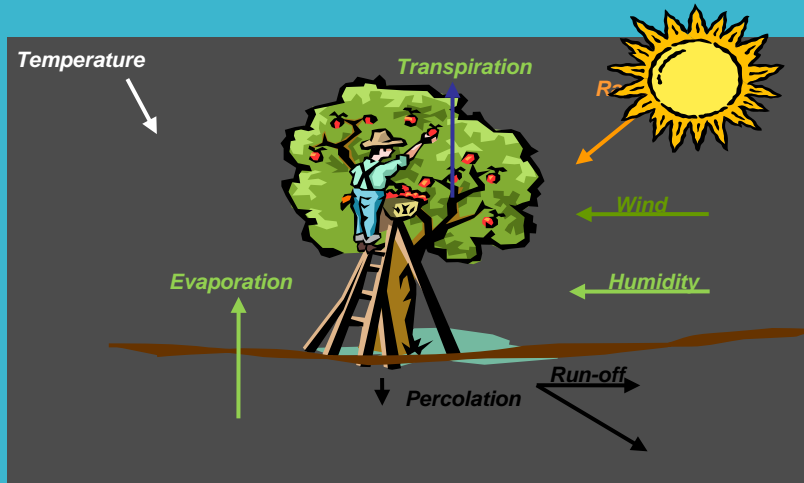
what you see below the ground.....



.....is what you will get on top.



# Experience – Climate – Soil - Phenology



# Experience – Scheduling: Theoretical

**Netafim South Africa**

**uSchedule**

Version: 2.04



Name:   Date printed  Crop Type

Crop:   Date planted  % Crop coverage

Age of orchard (printed year)  Years -  Hours Irrigation time (theoretical)

Application rate (ℓ/h/tree)  ℓ/h/tree (Total)  ℓ/h/tree (Total)  Total Efficiency

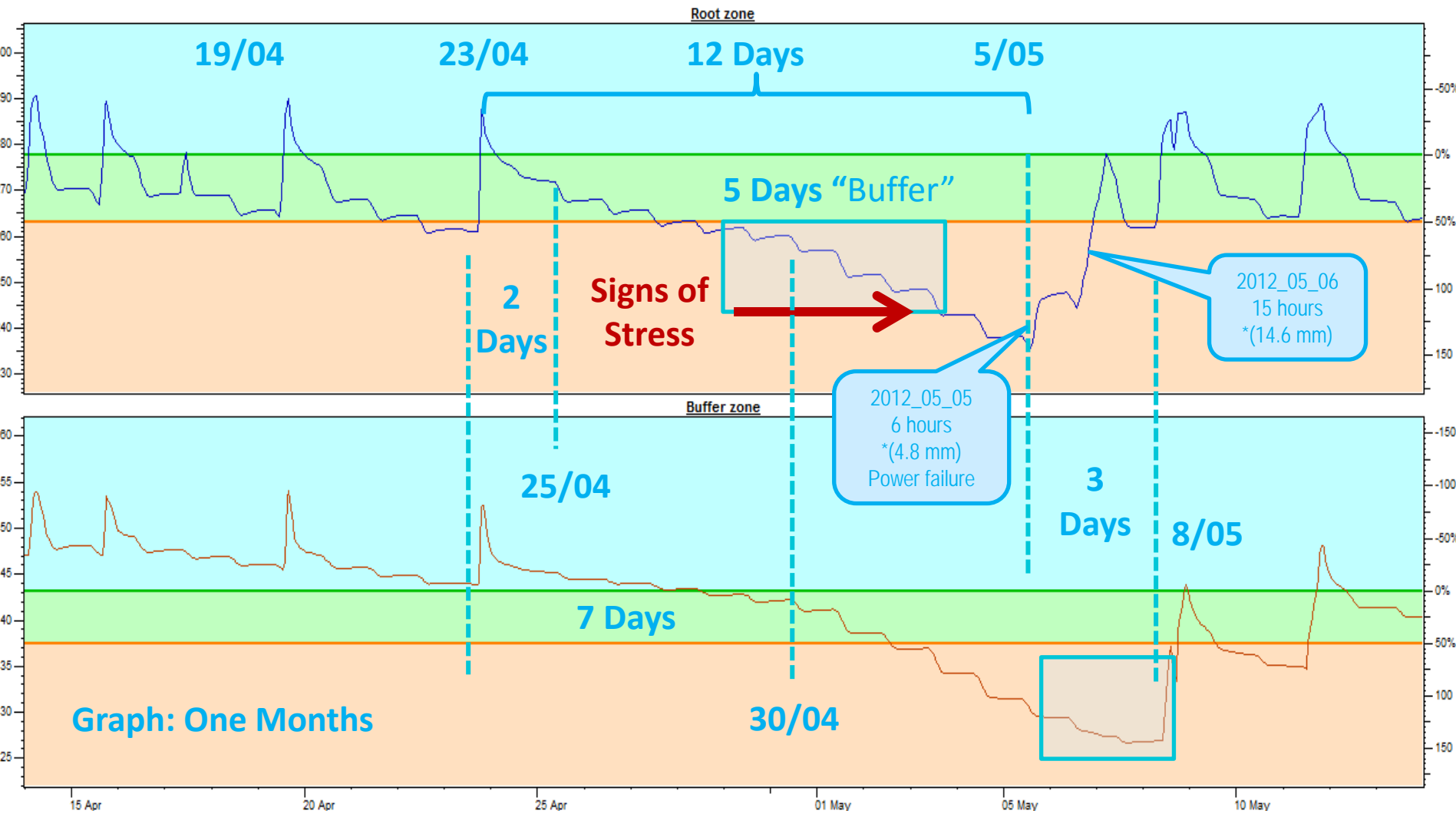
ETo - Evaporation		Litres		Tree Requirement per Day		Irrigation Schedule at: <b>90%</b> of tree potential.					
mm/day	Description	100%	90%	Time		Days	Pulses	Time	Actual	mm/day	
1.5	Early Spring	6.0	5.4	52.8	Minutes	23	1	20.3	Hours	50%	0.5
2.5	Cool	12.0	10.8	1.8	Hours	11	1	19.4	Hours	48%	1.1
5.0	Moderate	24.0	21.6	3.5	Hours	6	1	21.1	Hours	53%	2.2
<b>7.5</b>	<b>Warm</b>	<b>36.0</b>	<b>32.4</b>	<b>5.3</b>	<b>Hours</b>	<b>4</b>	<b>1</b>	<b>21.1</b>	<b>Hours</b>	<b>53%</b>	<b>3.2</b>
10.0	Heat Wave	48.0	43.2	7.0	Hours	3	1	21.1	Hours	53%	4.3

# Practices - Irrigation Scheduling

- It is often said that fertilizer works only as well as the irrigation scheduling
- We buy expensive fertilizer only to be leached past the root zone
- We struggled to schedule our water correctly with tensiometers and neutron probes – irrigation once or even more times per day
- The continuous logging probes measuring 6 depths were developed.
- We have learned to interpret pictures and manage intensive irrigation correctly



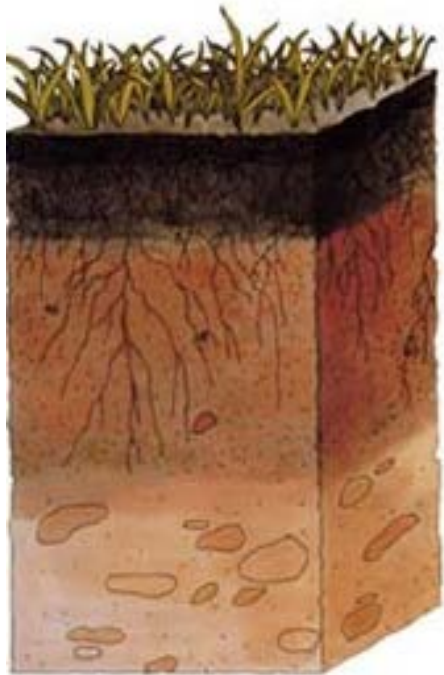
# Experience – Calibration - Probes



# Saturated Sub soil



# Experience – Scheduling: Root Zones



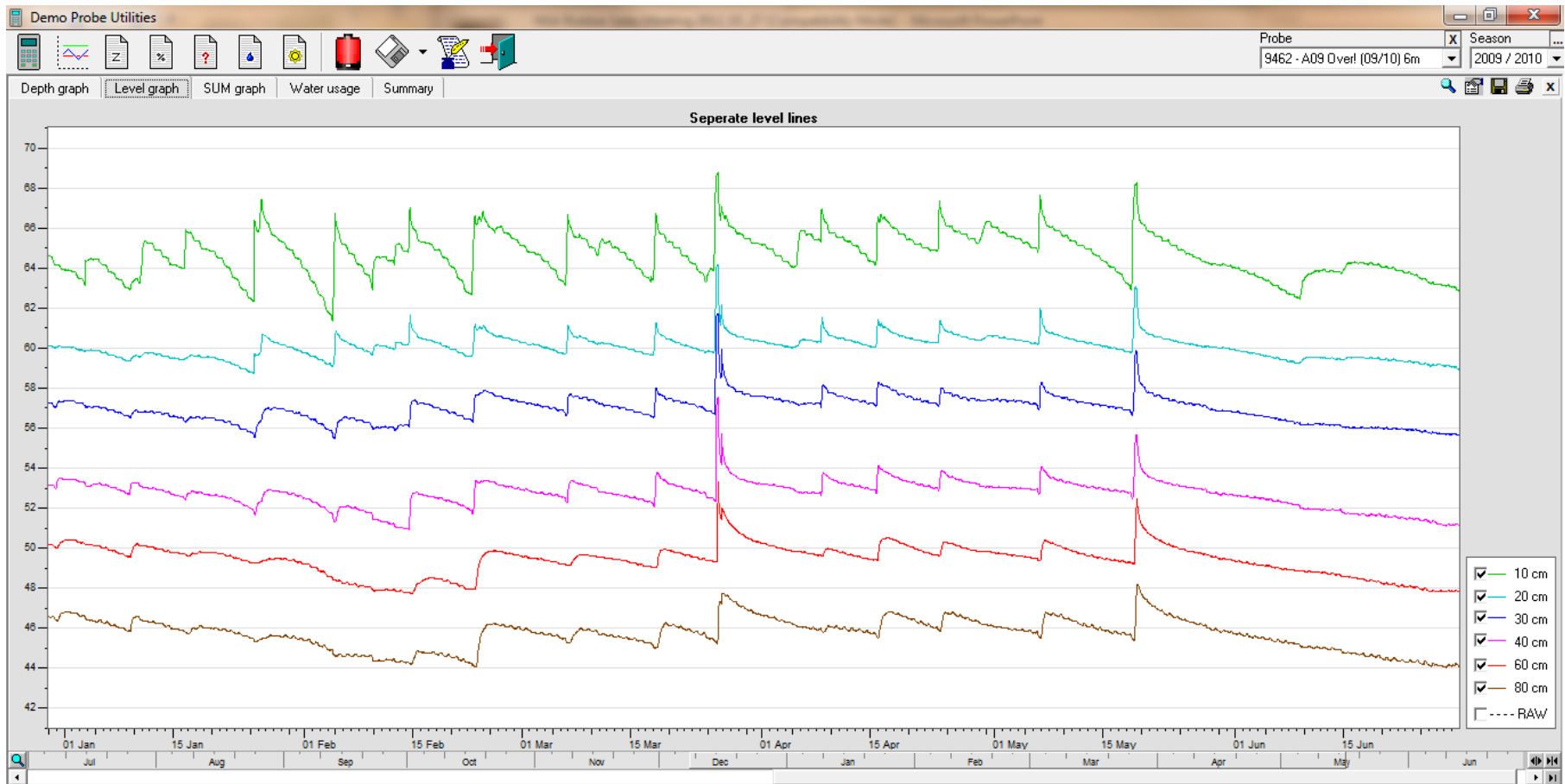
← Zone 1: Soil (A.W.C.) and Roots (%)

← Zone 2: Soil (A.W.C.) and Roots (%)

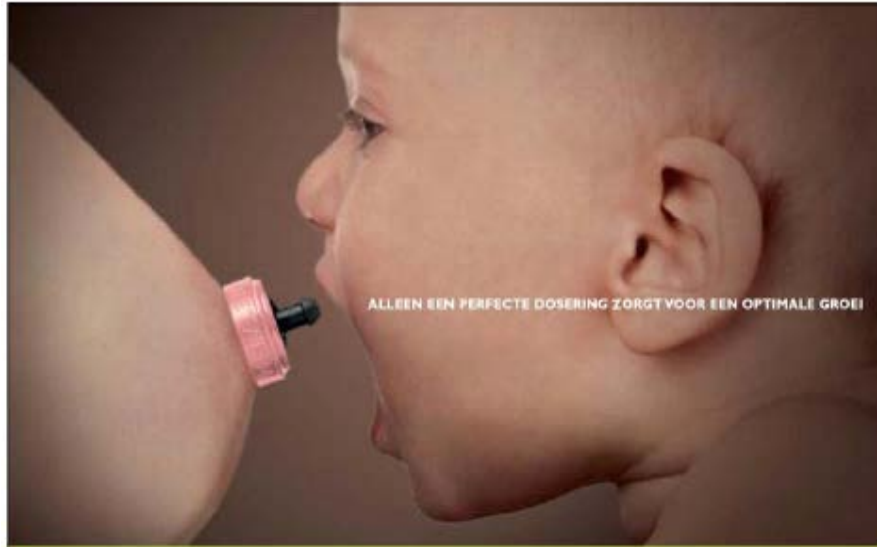
This will require to do all calculations for each zone and then apply the results in your scheduling strategy.



# Experience – Over-Irrigation

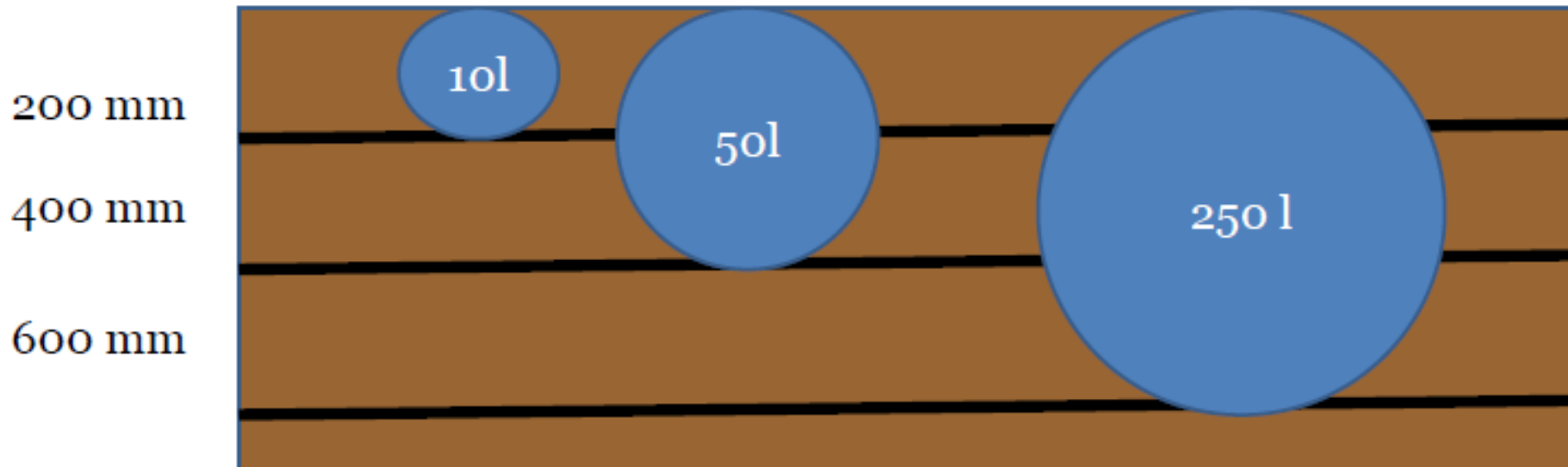


# Experience – Fertigation



# Practices – Soil preparation

- Relationship between rooting depth and tree performance
- Soil preparation of the utmost importance to ensure maximum rooting depth and soil volume wetted.



# Practices – Soil preparation

- Relationship between aeration and tree health
- Ridging has become a standard practice to ensure maximum aeration and root health – regardless of soil type, depth or drainage



# Practices – Fertilization - Spring

- Fertilizer program starts Aug/Sept. According growth stages etc to the closest kg.
- Irrigation starts mid November because of wet soil conditions.
- Apple producers – wonderful growth in first years until you load a crop onto the trees. Tree stop growing and holes does not want to fill up.



# Practices – Fertilization – Summer – High rainfall

- Do not stop fertilization – even when it is not necessary to irrigate
- Design fertigation equipment to apply fertilizer with minimum water application



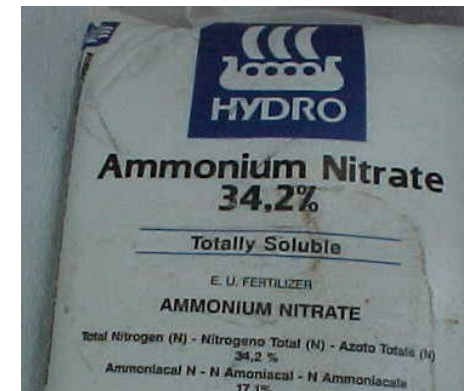
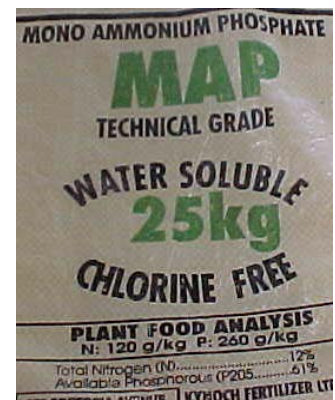
# Practices - Irrigating Young Trees

- We tend to over irrigate young trees – drowning and suffocation – phytophthora in year one. 5 min pulses? System not even under pressure yet. Every day - Not the same as old trees.
- Young trees very little leaf area – nothing to transpire the water.
- Roots not shallow like old trees
- Irrigate to make sure you wet a continuous strip – reach all trees



# Practices - Fertilizers

- Water soluble fertilizers – 15 years ago there were only a few products like Polyfeed, Supafeed Potassium Nitrate.
- These days everything available as straights or blends
- Fertilizer storage rooms looks like a chemist
- Applications according to phenological stages



# Hidrouliese effektiwiteit van Stelsels – Dept Landbou

Stelsels	Mikro 27	Drup 26	Sprinkel 9	Spilpunt 12
Min druk voldoende	4	10	2	3
Drukvariasie vlg norm	3	4	3	-
Instandhouding	18	21	9	8
Uitlaat/verspreidings-uniformiteit	7	15	6	10
Pompkamers	9	11	6	4
Stelsels vlg norm	0	1	0	3
Stelsels met geringe afwykinge	3	12	5	5

# What can we expect?

More efficient use of fertilizer

Improved root development

Improved tree condition

Increased yields

Better control of crop volume

Improved growth of young trees

More efficient use of water

Lower maintenance

Ian Grieb – Paksaam – Patensie - First drip on citrus in the 60's

# Summary

- Netafim SA has since its inception 25 years ago primarily focused on the introduction of drip into the irrigation market
- Many role players from producers, etc. involved
- We do not have all the answers yet
- I want to thank everyone for their inputs, willingness to dare.
- Do the basics right
- Old trees with shallow root systems – stay away from drip – you know it does not work



**THANK  
YOU**



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