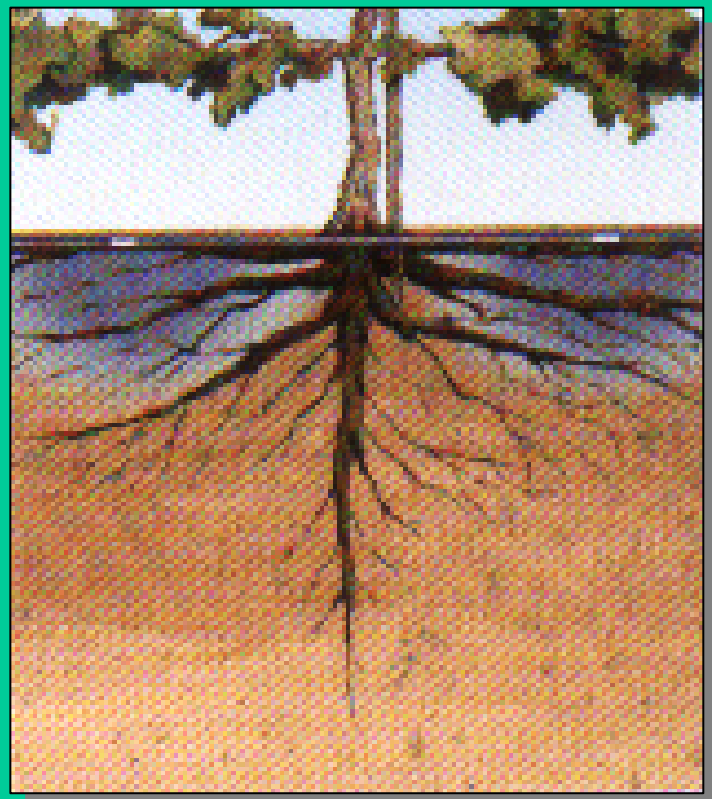
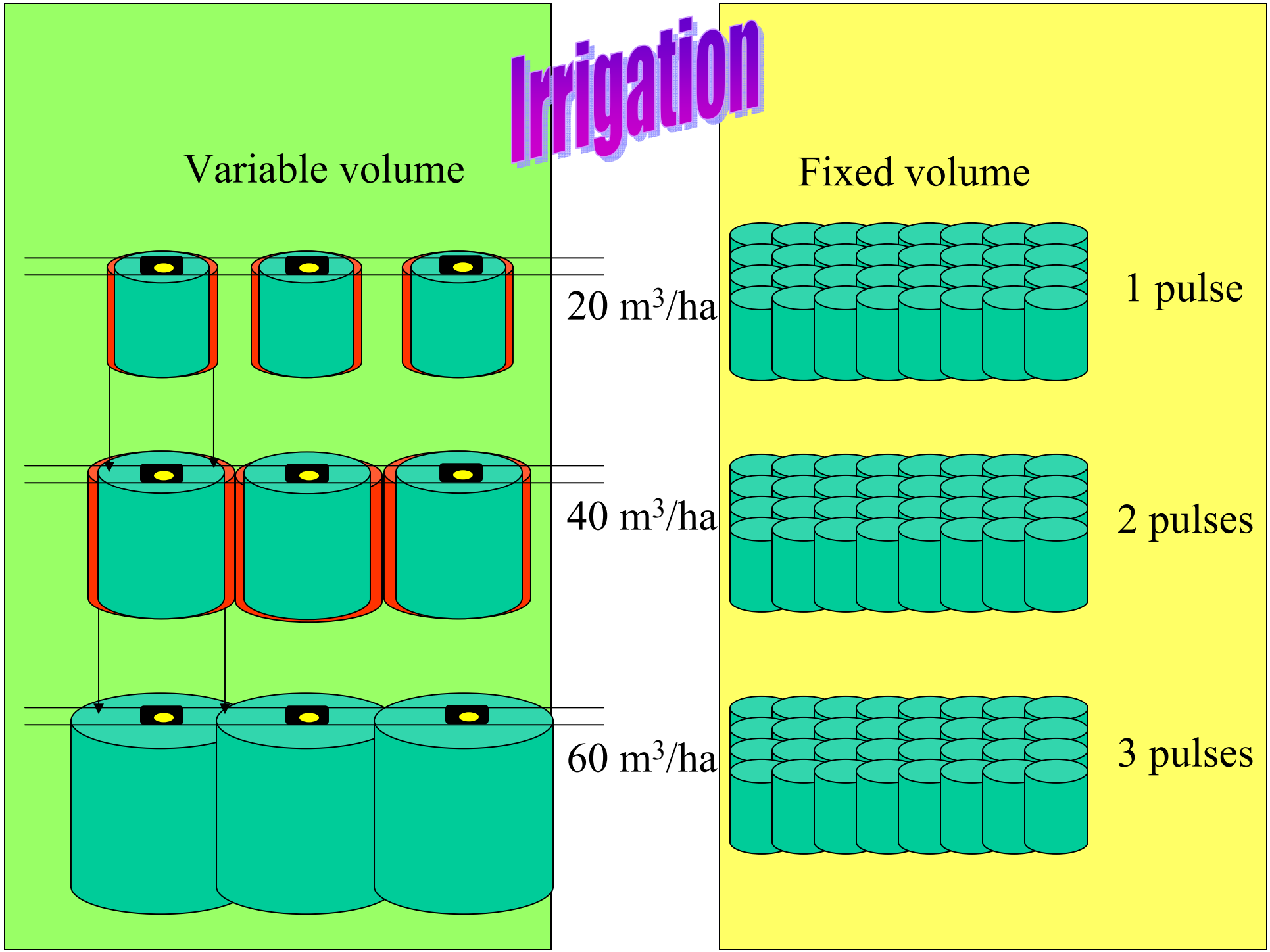

High density orchard
and root restriction in avocado
Leo Winer

Poor Light in Avocado Orchards

- Inefficient maintanance procedure
- Pest and disease infestation
- Low production

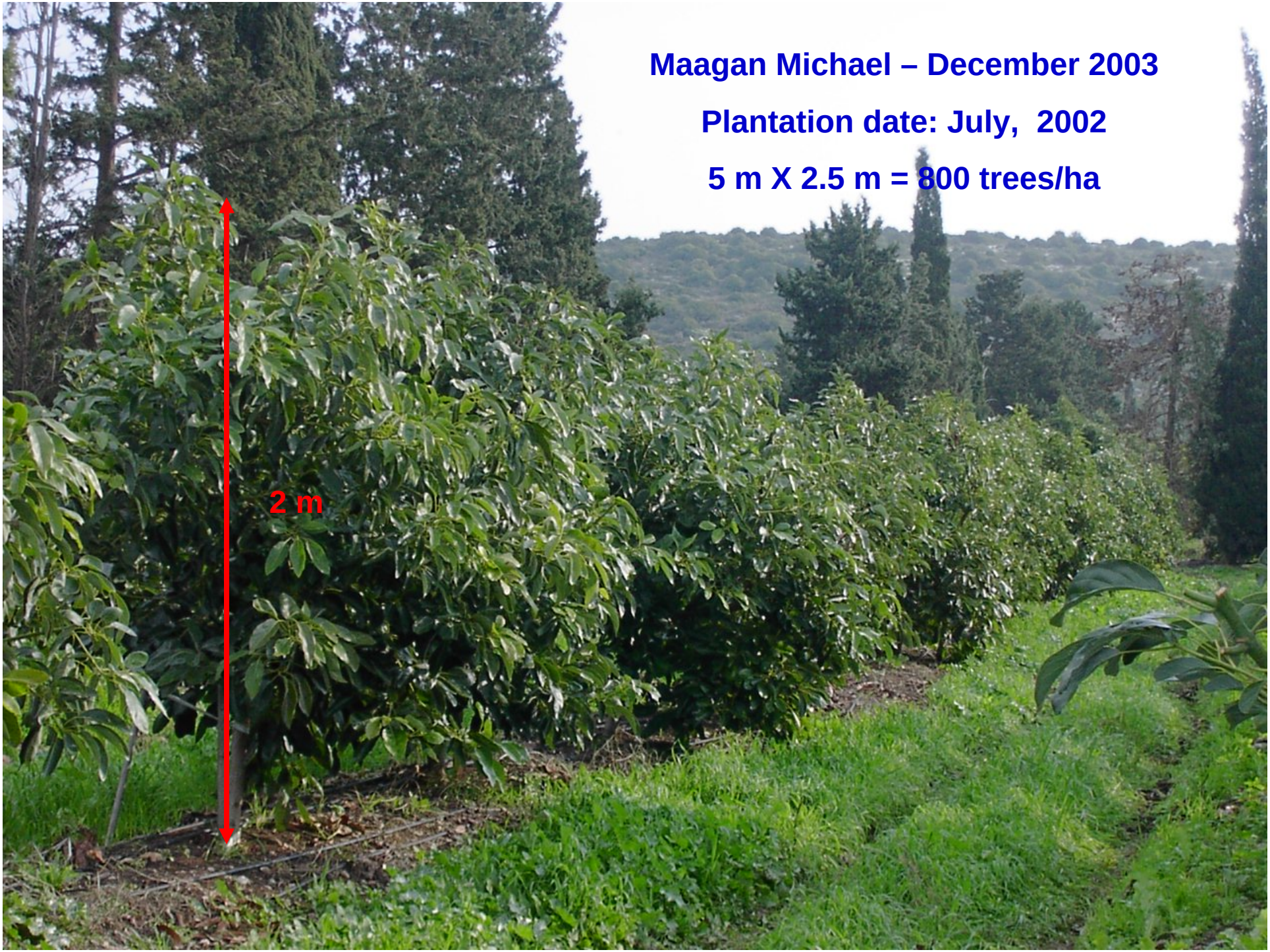



Irrigation
Variable volume
Fixed volume
20 m³/ha
40 m³/ha
60 m³/ha
1 pulse
2 pulses
3 pulses

Conventional orchards

Spacement	Number of trees per hectar	Variety
5 m x 3 m	660	Reed, Wortz
6 m x 3 m	556	Ettinger, Pinkerton
6 m x 4 m	416	Ettinger, Haas
6 m x 5 m	333	Hass, Fuerta
7 m x 4 m	357	Ettinger, Haas, Fuerta, Ardit, Arad, Galil

Avocado dense plantations


Maagan Michael – December 2003
Plantation date: July, 2002
5 m X 2.5 m = 800 trees/ha
2 m


2.5 m

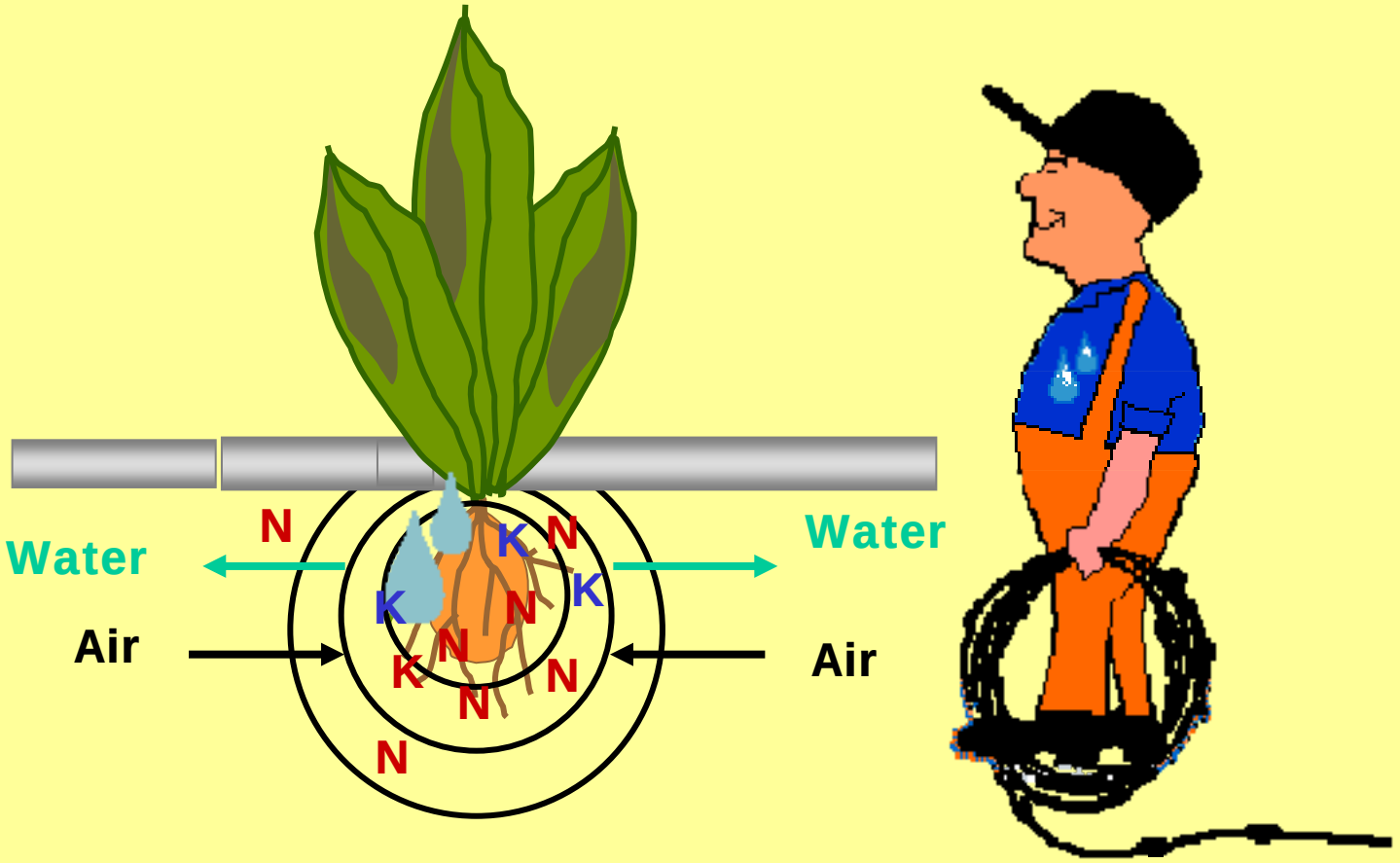

225 cm
Maagan Michael – 23 months after plantation
Plantation date: July, 2002
5 m X 2.5 m = 800 trees/ha
2 5 2004


2 5 2004


Fixed root volume – restriction with plastic
20 11 2002

Fertilizer injection and root restriction

- Efficient use, cost savings.



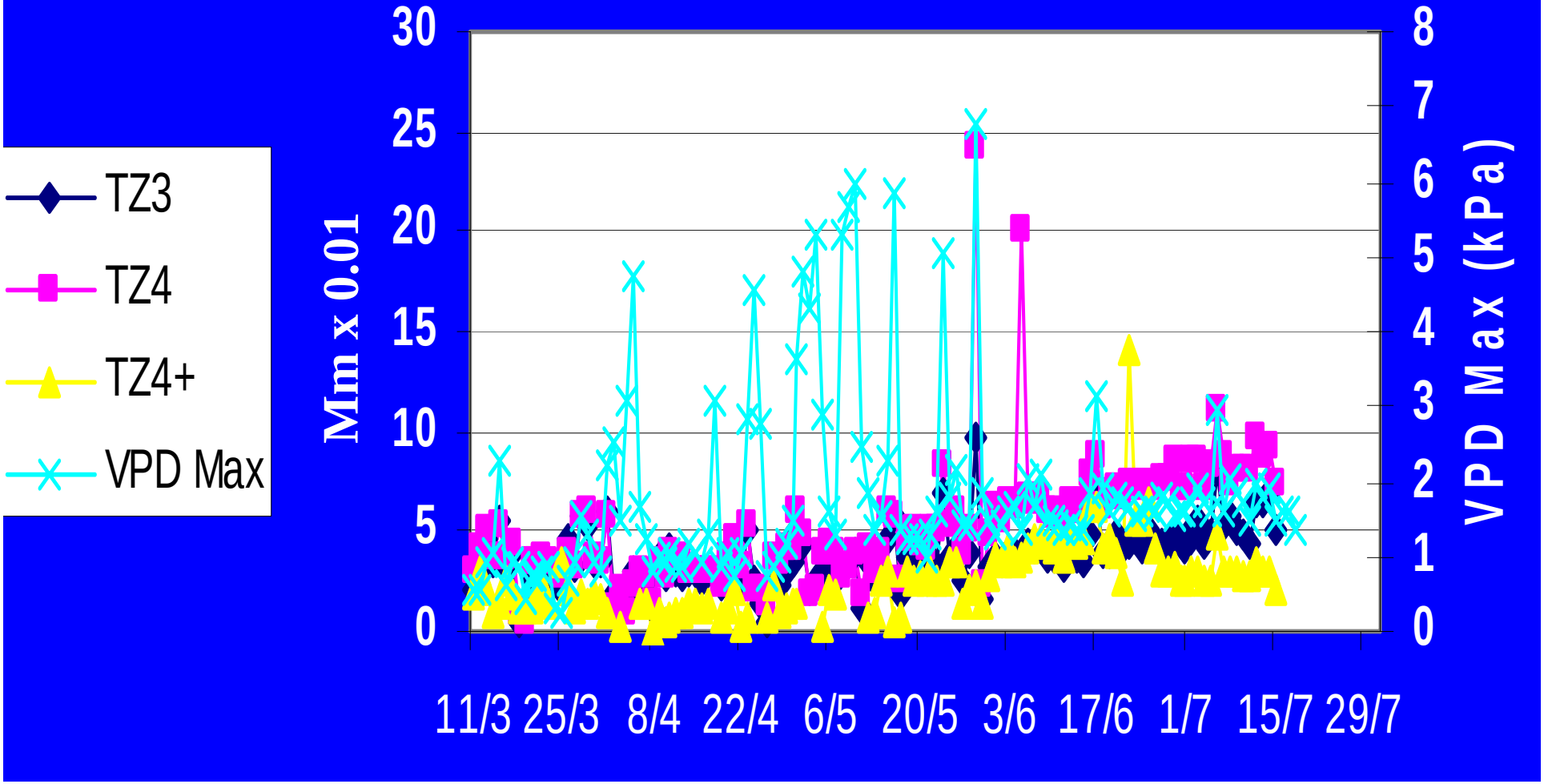

27 1 2003

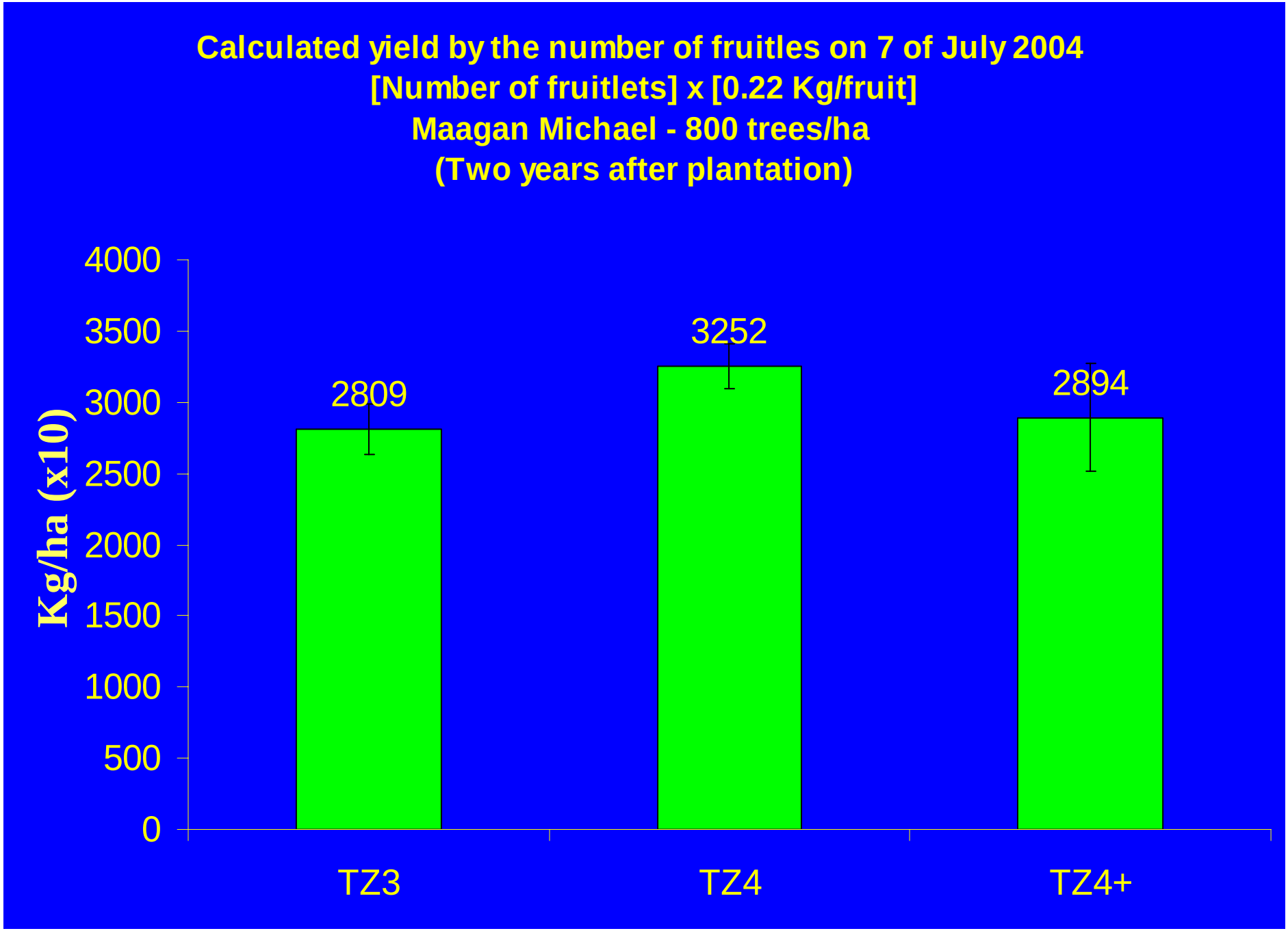

Restricted roots
20 cm
20 cm
20 cm

Irrigation control on base of vegetal parameters

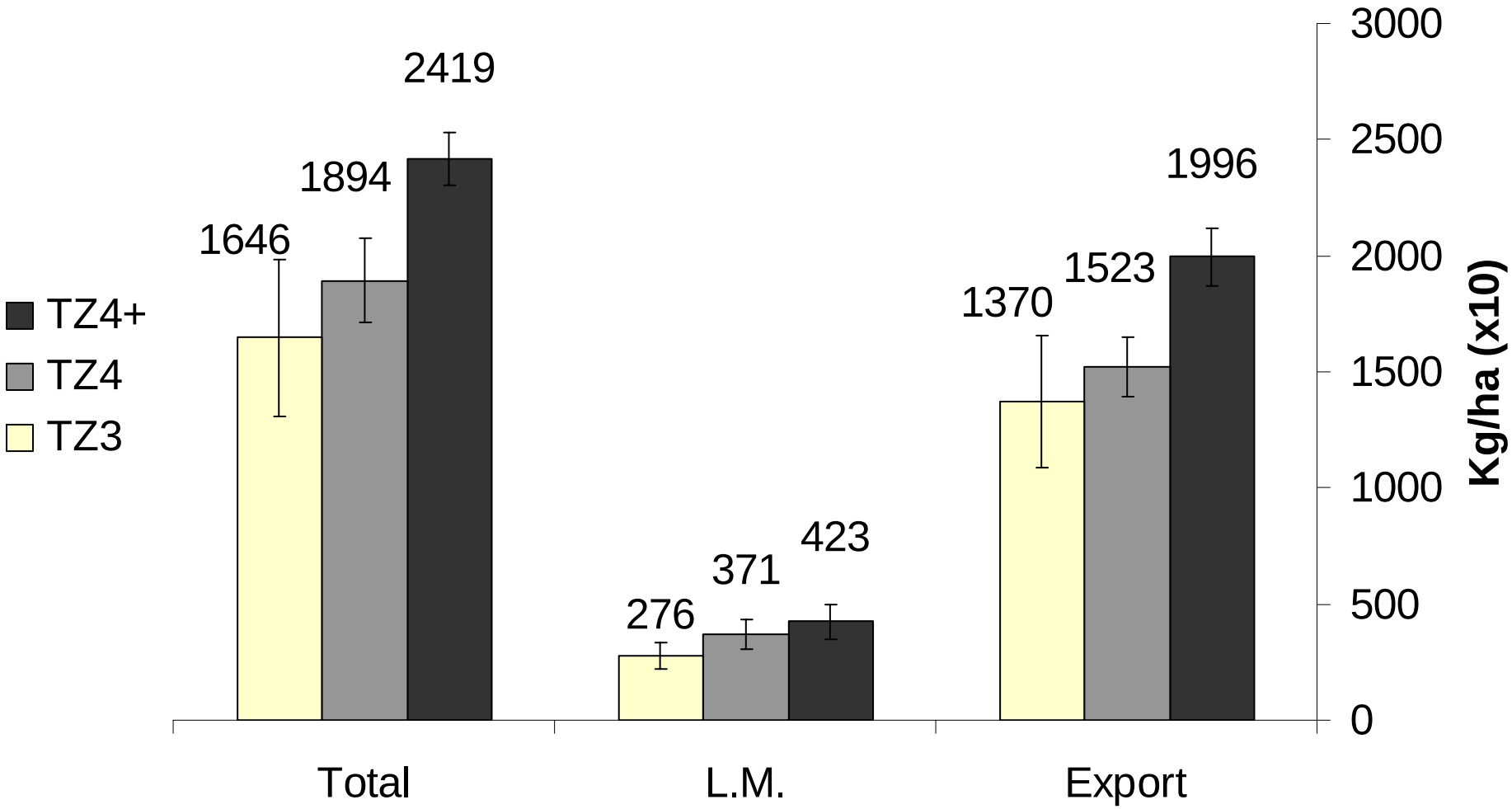
Maximum daily trunk contraction and root restriction in a dense avocado plantation

Maagan Michael 2003

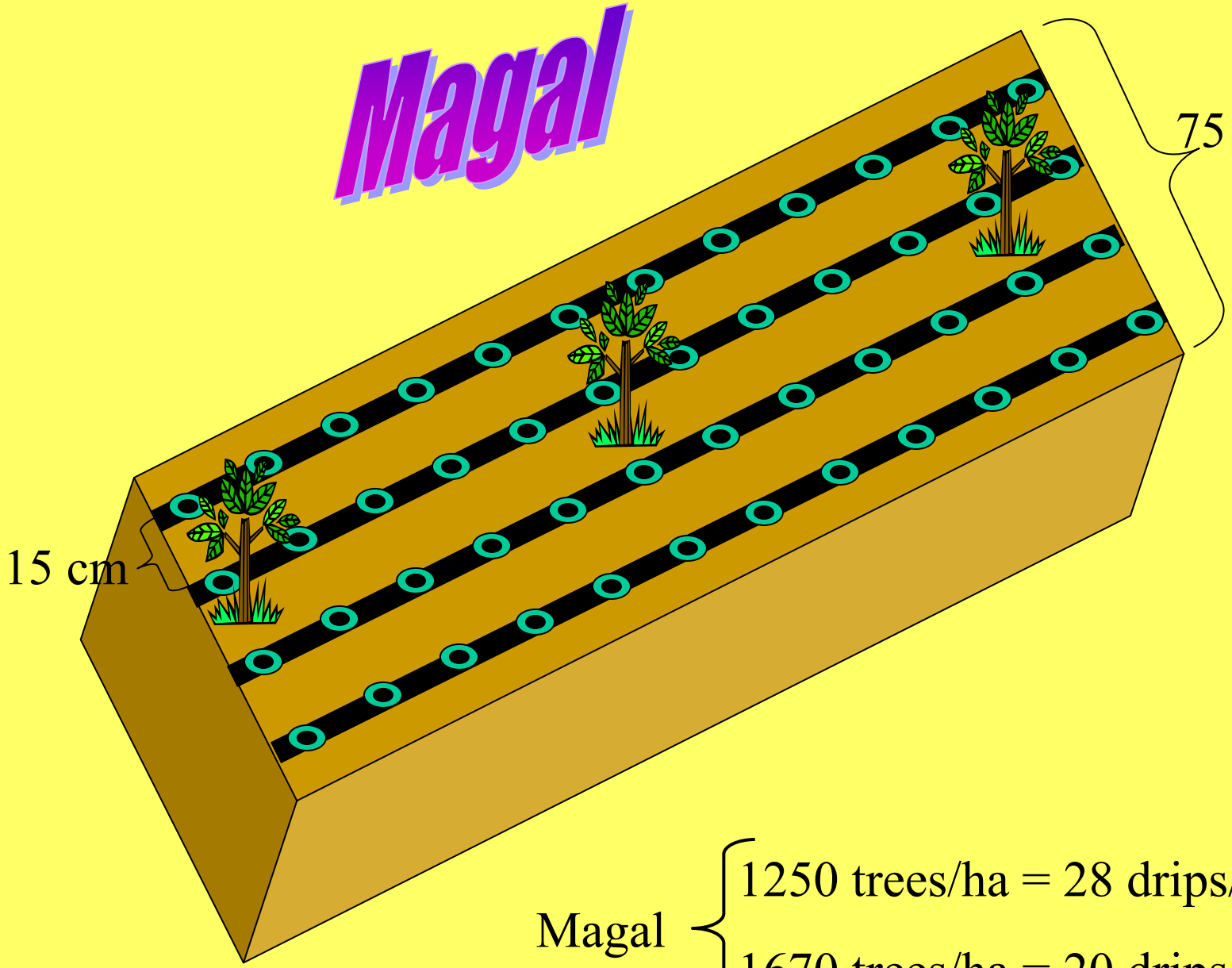



Calculated yield by the number of fruitles on 7 of July 2004
[Number of fruitlets] x [0.22 Kg/fruit]
Maagan Michael - 800 trees/ha
(Two years after plantation)
Kg/ha (x10)
4000
3500
3000
2500
2000
1500
1000
500
0
2809
3252
2894
TZ3
TZ4
TZ4+

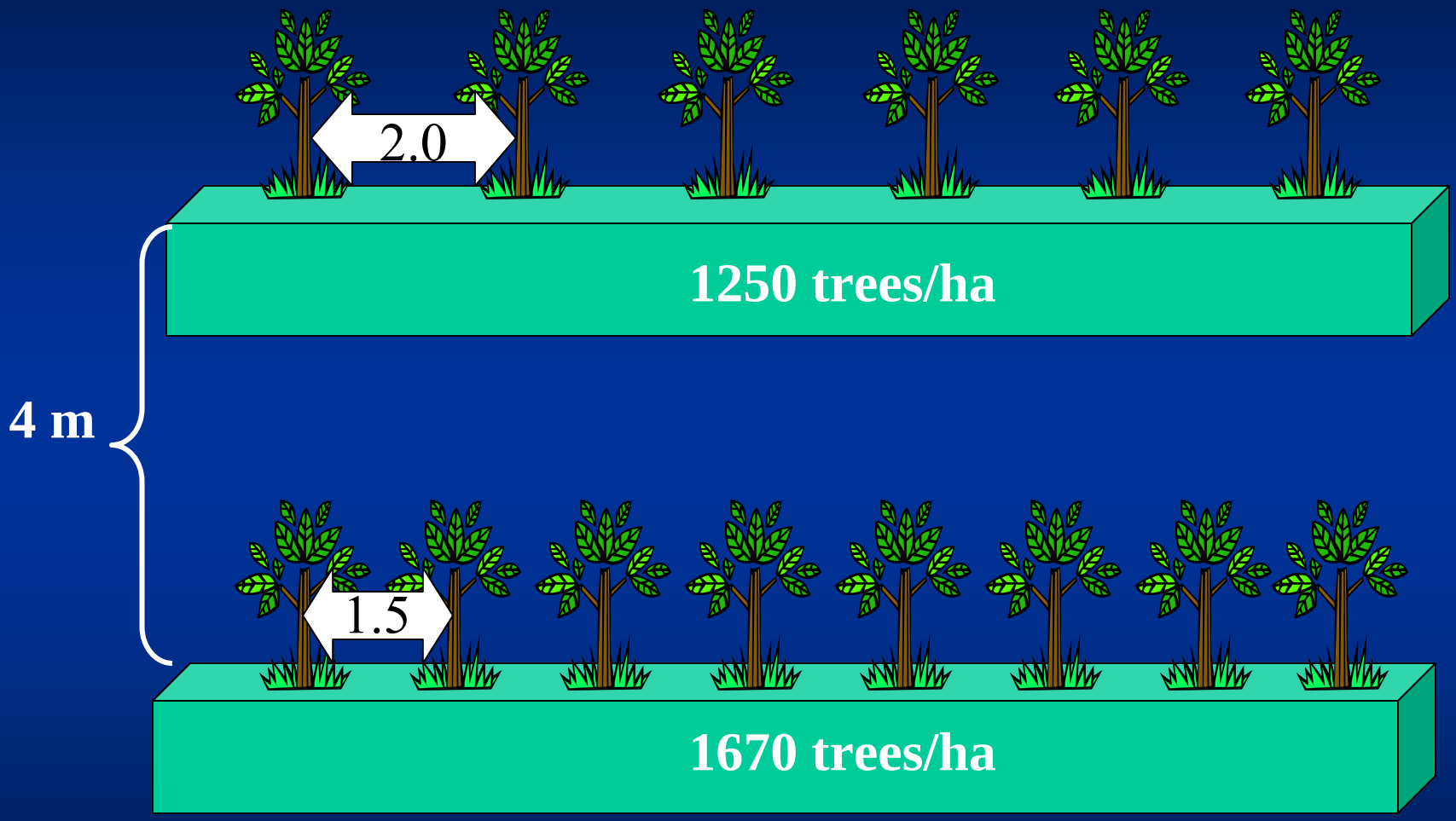
Root restriction and number of drip lines in dense avocado plantation - Maagan Michael 2005/6
Tree and half years after plantation



Magal

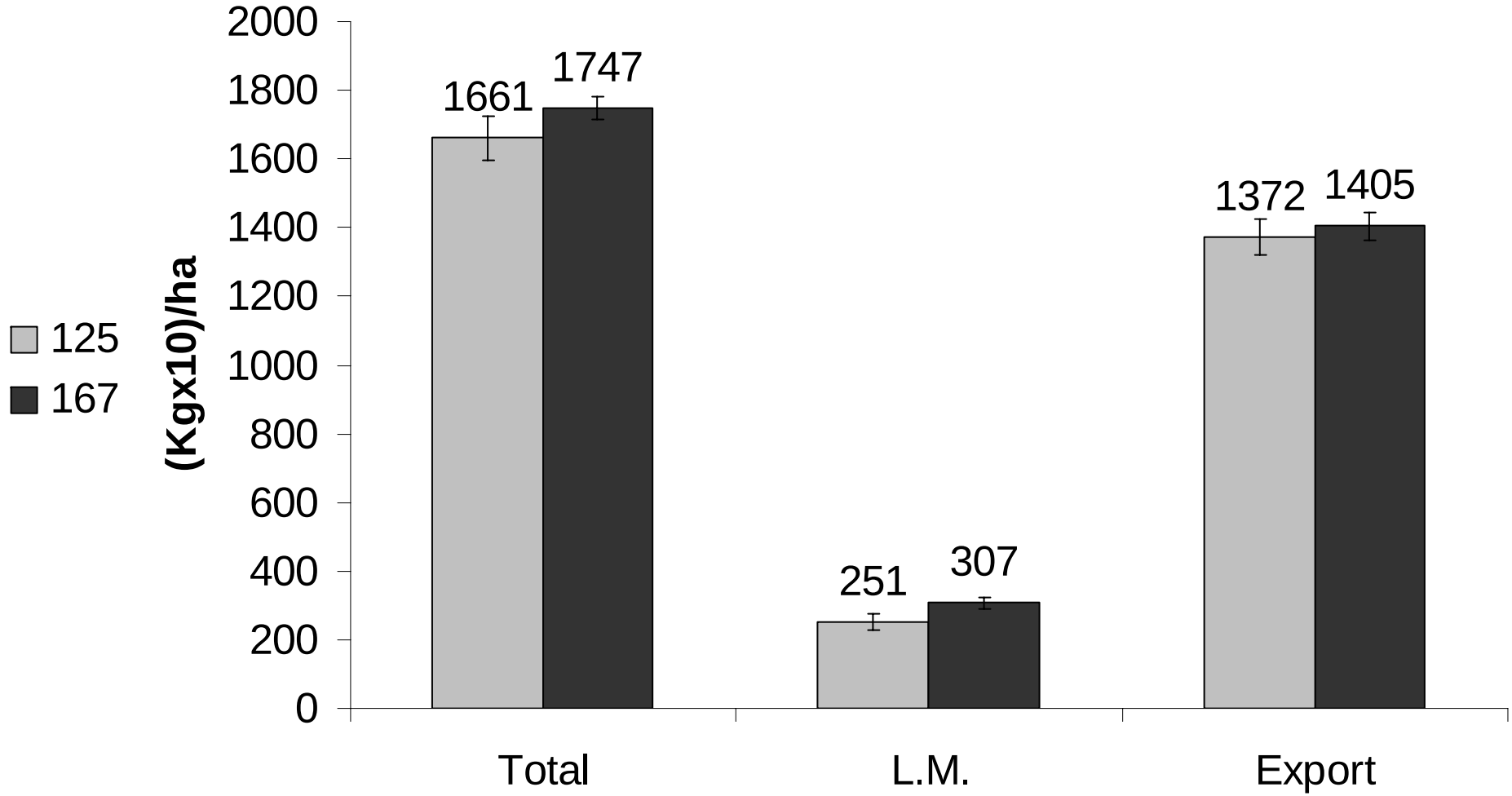


Magal
- 1250 trees/ha = 28 drips/tree
- 1670 trees/ha = 20 drips/tree



The concept is that is necessary to restrict root volume in addition to restriction of the canopy to have a better control of the final size of the tree

Avocado yield in restricted root dense avocado plantation with 1250 trees/ha and 1670 trees/ha planted on July 2003 - Magal 2005/6



Predicted advantages of densed plantations with root restriction and intensive irrigation

1. **Early and high production**
2. **Better control of the vegetation and trees with 2.5m height**
3. **Effective irrigation and fertilization**
4. **Effective ‘washing’ of salts from the soil**
5. **Effective harvest**
6. **Increase in the yield per m^3 of water**

In summary:

There is a tendency to expand the densed platations in Israel

It is still early for a final conclusion about the effect of the root restruction

Thank you for your attention

Leo Winer

The avocado industry in Israel – economic data

Assumptions:

Water price: 0.15 $/m^3

Fruit price at the entrance of the farm: 500 $/ton

Dense plantation	Standard plantation	
800-1,200	400	Number of trees (Trees/ha)
16,000	6,000	Investment ($/ha)
5,500	5,500	Production costs in an adult plantation ($/ha)
30	20	Mean yield (Ton/ha)
15,000	10,000	Profit at the entrance of the farm ($/ha)
9,500	4,500	Profit b ($/ha)
6-7	9	Brake even point (balance)