"The roots of education

are bitter,

but the fruit is sweet"…

Aristoteles

Pansy Fertilization trials 2013

prime genetics

Ben Geijtenbeek March 2014

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Why do we need regulate plant growth?

Goal

- plant height in relation to pot size
- plant habit
- basal branching, number of shoots
- control transport costs
- easy handling
- extended sales period

Why is a cultural change a need for all of you:

1. Future expected ban on PGR's at Governments and trade chain / consumers. (In Europe ongoing because of carcinogenicity concerns!!)
2. Increase of plant quality needed to increase customer satisfaction.
   (too much PGR's blocks normal garden performance for months even!!)

At the moment some growers take tremendous risks because of culture mistakes:

a) a wrong EC level and element balance

b) gives a need of the wrong use of PGR

c) which leads to risks on fungi

d) and finally an excessive use of chemicals

Please have a look to these pictures: ……

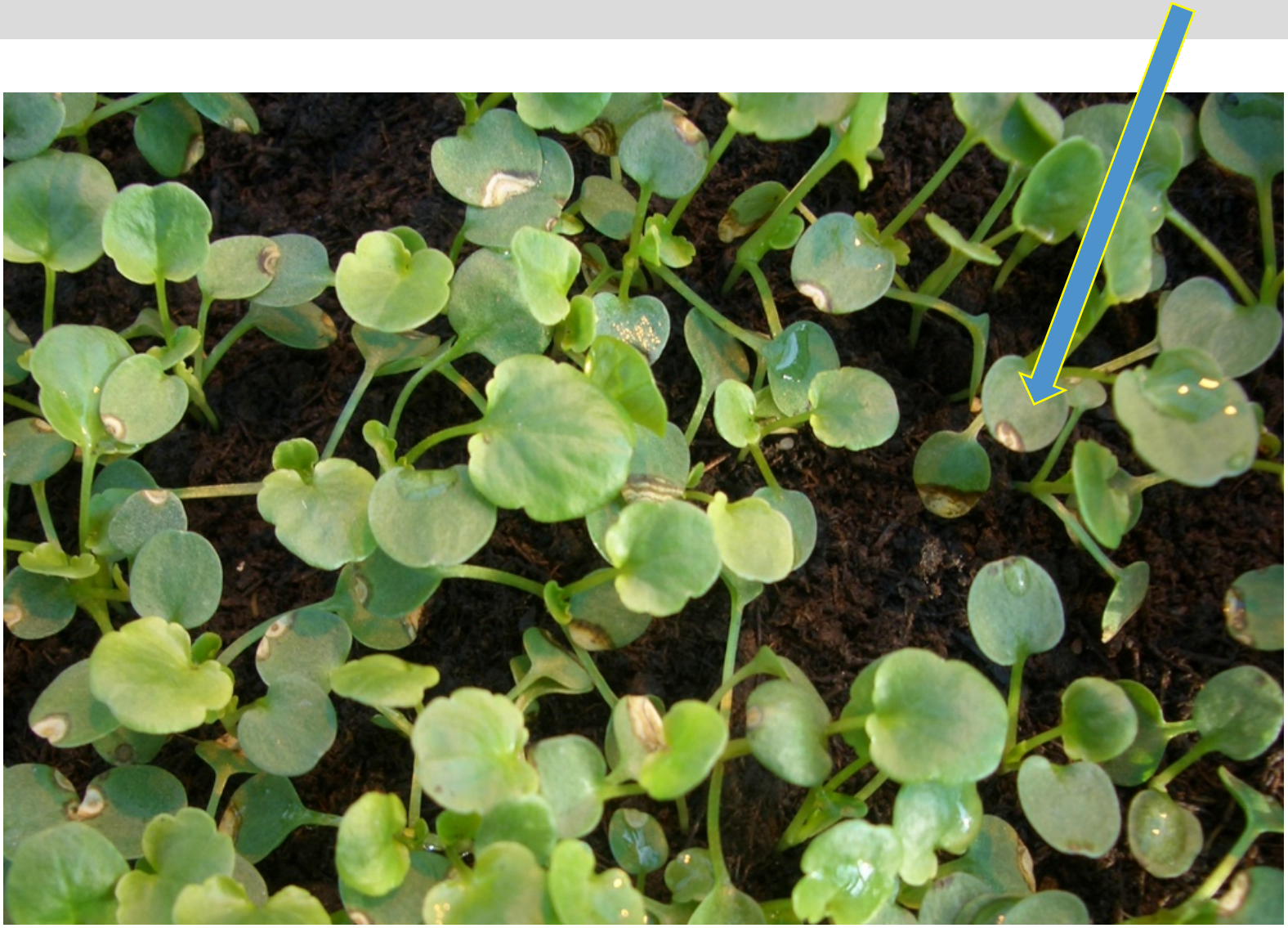
made in Europe!!

a) EC level and element balance

Alternaria in the tray already

Poorness in seed box

Look at color and Alternaria



No food from plug phase

Wrong pH

Young plant quality differences

= EC / NO_3 deficiency

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b) Wrong use of PGR = Tilt damage (propiconazool)

Alar damage. (daminozide)

Bonzi damage (paclobutrazol)

Over application PGR

Bonzi in February (NL)

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Young plant damage.

Stressed completely by PGR use.

No insect damage!

c) Risks with fungi

(damage by preventive chemical drench!!)

f.i. Thiofanaat - methyl

Why?

Big Pythium problem

(invited by culture mistakes….)

Poor plants have no resistance against less favorite growing circumstances.

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Mildew
2007 1 13


Downey
mildew


Alternaria +
Ramularia


Pythium

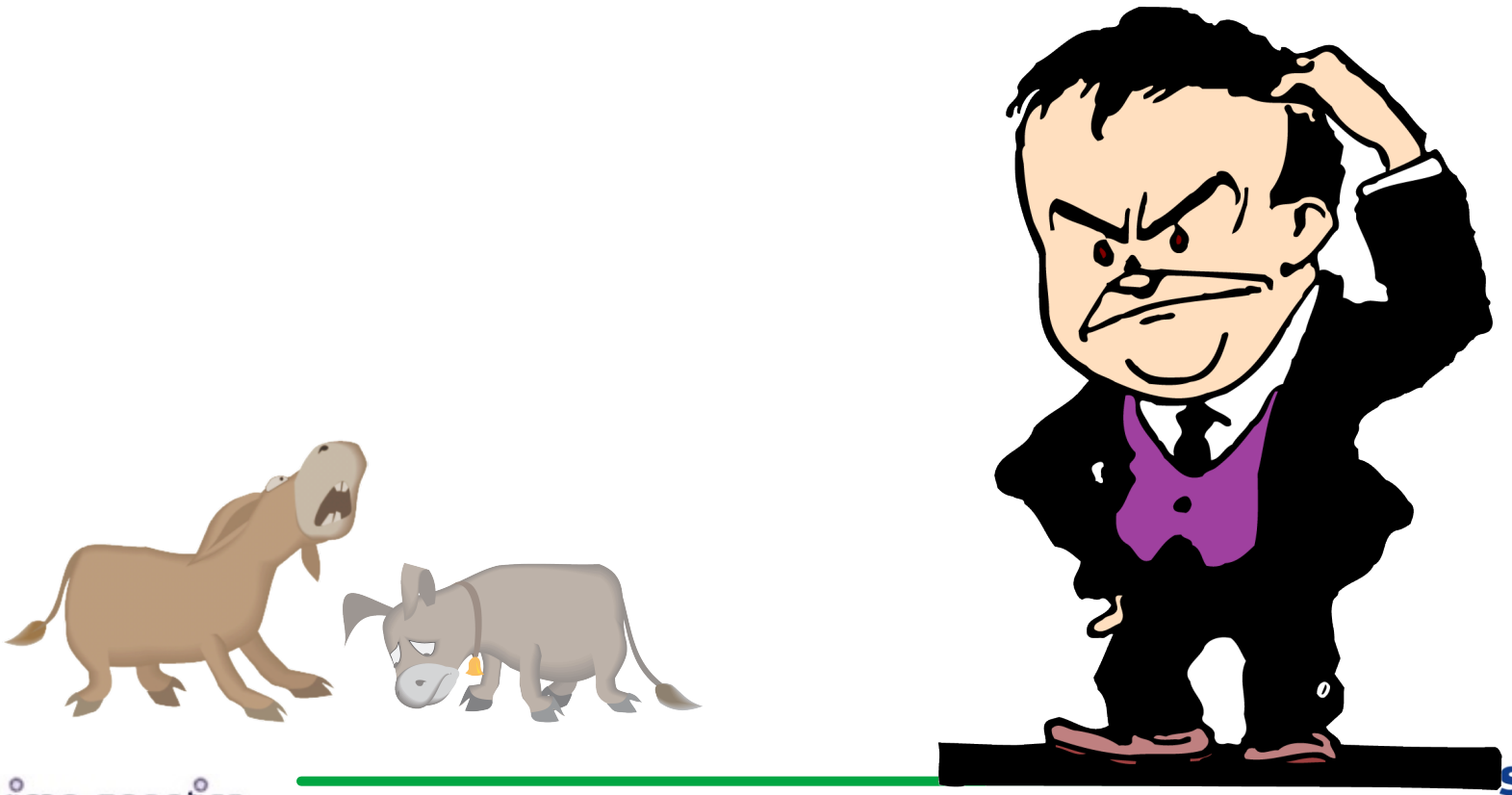
d) Excessive use of chemicals Paper spots:

= over-application of pesticides Look at leaf color!!

Recognizable in your crops?

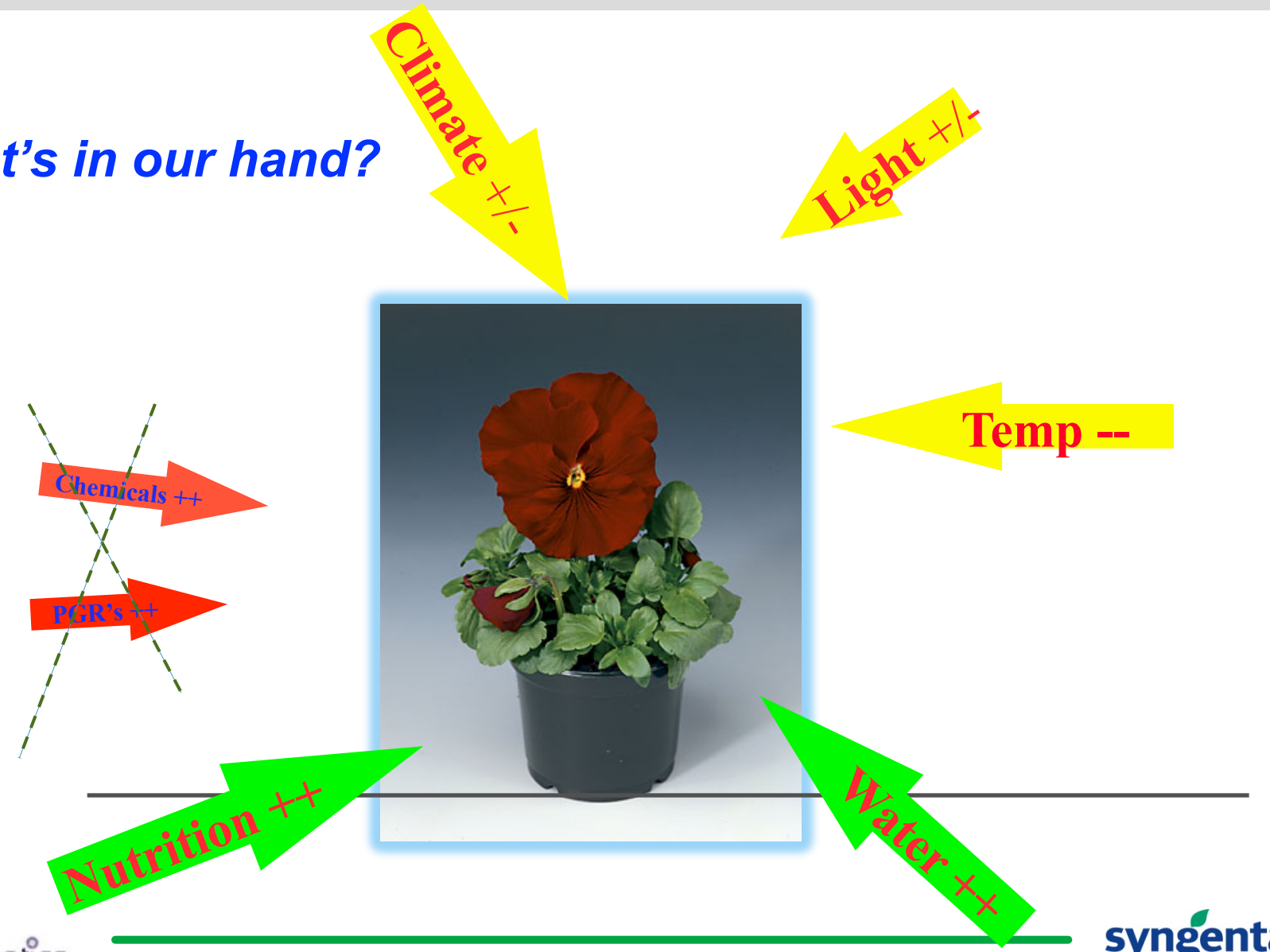
- Only alternative is a focus on avoiding the problems.

  How? *Improve growing conditions!*



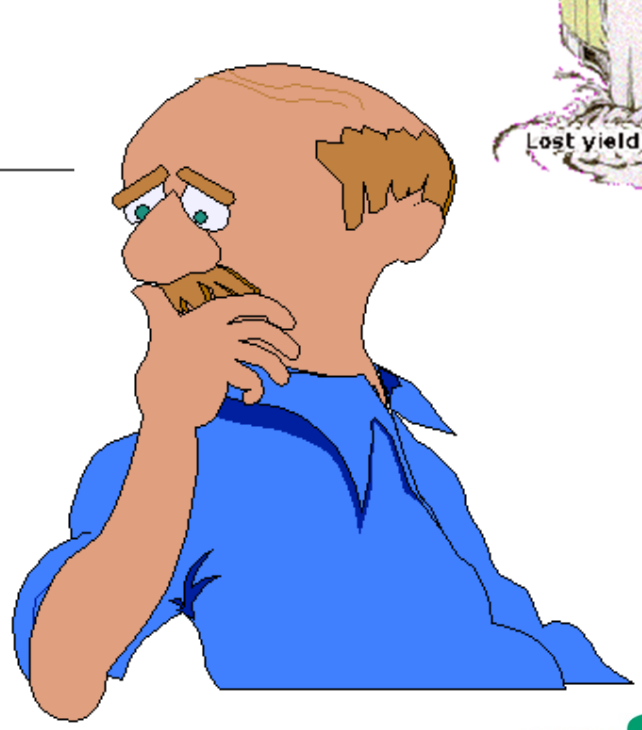
Where do we have the most influence in those growing conditions?

What's in our hand?



Composition and ratio of the dry substance of plants.

N	Nitrogen	1.000.000
K	Potassium	250.000
Ca	Calcium	125.000
P	Phosphorus	60.000
Mg	Magnesium	60.000
S	Sulfur	30.000
B	Borium	2000
Fe	Iron	2000
Mn	Manganese	1000
Zn	Zink	300
Cu	Copper	100
Mo	Molybdenium	1



Example waterquality SA growers

EC	pH	NH4	K	Na	Ca	Mg	NO3	Cl	SO4	HCO3	PO4	Fe	Mn	Zn	B	Cu	Mo
0.10	**4.10**	0.30	0.10	**0.10**	**0.10**	**0.10**	0.10	0.20	0.10	**0.10**	0.07	5.00	0.10	**0.10**	1.00	0.10	0.10
0.50	6.60	0.10	0.30	2.20	0.70	0.70	0.20	1.60	0.70	1.70	0.01	0.20	0.20	0.10	**7.30**	0.20	0.10
1.10	7.50	0.10	0.10	2.00	1.30	4.00	0.90	**1.10**	0.40	8.20	0.04	0.70	0.10	0.20	1.00	0.10	0.20
1.10	7.40	0.10	0.10	**2.30**	1.30	4.10	0.60	0.90	0.30	**10.50**	0.04	0.30	0.10	0.10	1.00	0.10	0.10
1.00	7.20	0.10	0.10	2.10	1.40	**4.10**	0.80	1.00	0.30	7.90	0.04	0.20	0.10	0.20	1.00	0.10	0.10
0.20	7.30	0.10	0.10	0.10	0.50	0.70	0.40	**0.10**	0.10	1.60	0.04	0.20	0.10	0.10	1.00	0.10	0.10
0.30	6.80	0.10	0.20	0.80	0.60	0.20	0.50	0.10	0.10	1.00	0.02	0.90	0.10	**0.50**	1.00	0.10	0.10
0.24	**7.68**	0.05	0.09	0.59	0.62	0.37	0.06	0.37	0.19	0.71	0.00	**0.00**	0.00	0.00	0.93	0.00	0.00
0.23	7.55	0.00	0.09	0.27	0.62	0.33	0.05	0.30	0.16	1.83	0.00	0.00	0.00	0.00	0.93	0.00	0.00
0.40	6.60	0.10	0.20	1.10	0.70	0.40	1.00	0.10	0.20	0.90	0.01	**1.10**	0.10	0.30	**1.00**	0.10	0.10
0.55	6.97	0.00	0.20	1.08	**1.55**	0.62	0.45	0.56	0.31	2.40	0.00	0.00	0.55	0.31	9.25	0.00	0.00

Look at quality differences in EC, pH, bicarbonate

Conclusion: Each grower needs his own water adjusted fertilizer schedule.

Drip EC:	2.0	Grower:	Sittig	18-Feb-14
Tank size (Litres):	1000	Country:	South Africa	
Concentration:	100%	Culture:	Pansy etc.	
Water from well:	0%	Soil analysis:	No	
Ureum:	0%	Advice:	standard whole culture	
Potas. Phosphite Y/N:		Water:	Rainwater	
P2O5 +/- :	100%			
SO4 +/- :	100%	Schedule:	F 12 - Group 3 generative	
NH4 /- :	100%			

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	1000 litre A			Tank composition		1000 litre B	
Calcium Nitrate (sol)		80.6	Kg.	Nitric Acid	60%	----	L.
Ammoniumnitrate (liq)	18.0%	7.4	L.	Phosphoric Acid	59%	----	L.
Potassiumnitrate		11.3	Kg	Potassiumnitrate		38.6	Kg.
Nitric Acid	60%	----	L.	Mono Potassium Phosphate		14.5	Kg.
Magnesiumnitrate (liq)		----	L.	Magnesium Sulphate		26.3	Kg.
Ureum		----	Kg.	Potassium Sulphate		23.2	Kg.
Calcium Chloride		----	Kg.				
		101.0	Kg.			102.7	Kg.
Fe. DTPA (sol)	11.6%	705	Gr.	Manganese Sulphate (Sol)		85	Gr.
				Zinc Sulphate (sol)		81	Gr.
% Calcium Nitrate kg`s		*40%*		Borax (sol)		143	Gr.
% Magnesium Sulfaat kg`s		*13%*		Copper Sulphate 25% (sol)		13	Gr.
% Potassium Sulfaat kg`s		*11%*		Sodium Molybdate (sol)		12	Gr.
HCO3 buffer mmol		*0.00*					

	Balance:	N	P	K	Mg	Ca	
		1	0.37	2.0	0.21	1.0	

Drip EC:	2.0	Grower:	Sittig	18-Feb-14
Tank size (Litres):	1000	Country:	South Africa	
Concentration:	100%	Culture:	Pansy etc.	
Water from well:	100%	Soil analysis:	No	
Ureum:	0%	Advice:	standard whole culture	
Potas. Phosphite Y/N:		Water:	Groundwater	
P2O5 +/- :	100%			
SO4 +/- :	100%	Schedule:	F 12 - Group 3 generative	
NH4 /- :	100%			

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	1000 litre A			Tank composition		1000 litre B	
Calcium Nitrate (sol)		58.0	Kg.	Nitric Acid	60%	12.8	L.
Ammoniumnitrate (liq)	18.0%	10.1	L.	Phosphoric Acid	59%	----	L.
Potassiumnitrate		18.9	Kg	Potassiumnitrate		31.9	Kg.
Nitric Acid	60%	4.3	L.	Mono Potassium Phosphate		14.5	Kg.
Magnesiumnitrate (liq)		----	L.	Magnesium Sulphate		12.1	Kg.
Ureum		----	Kg.	Potassium Sulphate		19.3	Kg.
Calcium Chloride		----	Kg.				
		94.7	Kg.			93.7	Kg.
Fe. DTPA (sol)	11.6%	686	Gr.	Manganese Sulphate (Sol)		81	Gr.
				Zinc Sulphate (sol)		78	Gr.
% Calcium Nitrate kg`s		*31%*		Borax (sol)		----	Gr.
% Magnesium Sulfaat kg`s		*6%*		Copper Sulphate 25% (sol)		10	Gr.
% Potassium Sulfaat kg`s		*10%*		Sodium Molybdate (sol)		10	Gr.
HCO3 buffer mmol		*1.00*					

	Balance:	N	P	K	Mg	Ca	
		1	0.35	1.9	0.20	1.0	

Possibilities of Growth Regulation

- Choice of genetic material. (variety)
- Light = distance, space, additional light
- Amount of water
- *Amount of fertilizer (EC level)*
- Balance of elements. N/P/K
- Average growth temperature
- DIF and quick temperature drop
- Chemicals *(last option!)*

Find a good combination.

Goal of the trial: improvement Pansy culture at growers

With increased EC levels we can reach:

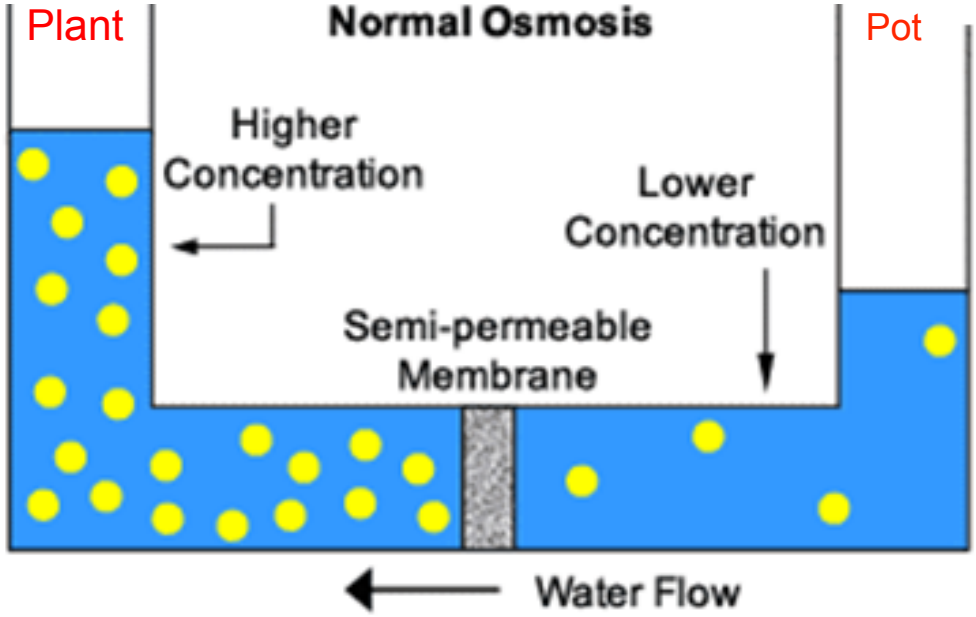
- More compact plants = transport/sales period resistance
- More branching = more flowers
- Less use of PGR = better garden performance after sales
- Less fungi risks = less chemical use
- Better market value = better prices.

The principle of delayed water uptake is osmosis.

- High EC decreases the osmotic value differences between roots and pot, why water uptakes is more difficult. It gives a kind of ‘waterstress’.
- Cell division goes on, but cell elongation delayed
- This stress is rather constant because there always is water available.
- This technique is not as dangerous as a ‘dry’ culture.

Attention points:

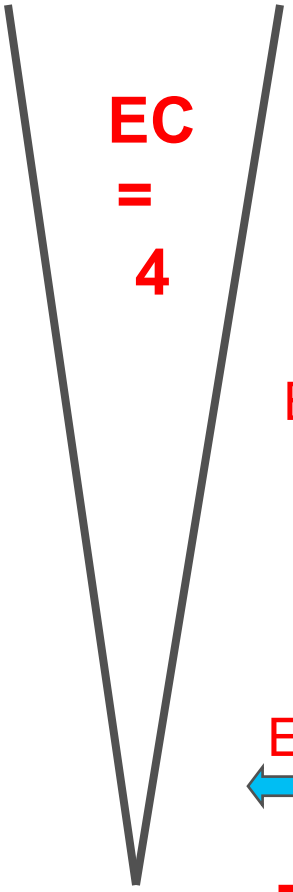
- *Control pot EC regularly (weekly)*
- *Look at plant color*
- *Do tests locally to find the right level*
- *Use less or no PGR*



Relation EC level and plant growth

increasing osmotic value

Example: Root Soil



EC = 1 difference root/soil = 3

Plant can take up water easily = Rapid growth, big cells, weak plants

EC = 2 difference root/soil = 2

Plant can't take up the water easily = Slow growth, smaller and stronger cells = compact plant.

EC = 4 difference root/soil = 0 = balance in and out water

EC > 4 = Plants die

Compare the influence of different EC levels with
balanced fertilizer schedule based on the water quality:

Trial:

- 0.5 EC
- 1.0 EC
- 1.5 EC
- 2.0 EC
- 3.0 EC
- 4.0 EC

		100 litre A		Tank composition		100 litre B	
Calcium Nitrate (sol)		5.8	Kg.	Nitric Acid	53%	1.1	L.
Ammoniumnitrate (liq)	18.0%	0.7	L.	Phosphoric Acid	59%		L.
Potassiumnitrate		2.2	Kg	Potassiumnitrate		2.7	Kg.
Nitric Acid	53%	0.5	L.	Mono Potassium Phosphate		1.5	Kg.
Magnesiumnitrate (liq)			L.	Magnesium Sulphate		2.0	Kg.
Ureum			Kg.)	Potassium Sulphate		2.3	Kg.
Calcium Chloride			Kg.				
		9.4	Kg.			9.8	Kg.
Fe. DTPA (sol)	3.0%	213	ML.	Manganese Sulphate (Sol)		8	Gr.
				Zinc Sulphate (sol)		8	Gr.
% Calcium Nitrate kg's		*30%*		Borax (sol)		13	Gr.
% Magnesium Sulfaat kg's		*10%*		Copper Sulphate 25% (sol)		1	Gr.
HCO3 buffer mmol op 100% water		*0.60*		Sodium Molybdate (sol)		1	Gr.

EC A Tank	Balance:	N	P	K	Mg	Ca	EC B Tank
115.0		1	0.37	1.9	0.21	1.0	115.0

Fertilisation trial Angers (France winter 2012-2013)

Delta potted week 43/44/45 (YPL from week 43)

Wk 43 : direct potting, direct fertilisation in the pot

Wk 44 : kept 4 days in the Xtray with EC 2 in the tray

Wk 45 : potted 10 days after arrival with EC 0.5 in the tray

Deltini potted week 45/46/47 (YPL from week 45)

Wk 45 : direct potting, direct fertilisation in the pot

Wk 46 : kept 4 days with EC 2 in the Xtray

Wk 47 : kept 10 days with EC 0.5 in the Xtray

Product form : Xt264, excellent quality of the YPL from de Lier

EC 0.5 vs EC 4 winterproduction

EC 0.5 vs EC 4

EC 0.5 vs EC 4 winterproduction

EC 0.5 vs EC 4

Slow start of fertilization versus high EC levels immediately.

EC 0.5 in the tray for 10 days, then EC 4 till wk 49

EC 4 from the start immediately

Conclusion: Don't wait with fertilisation, start always immediately

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EC 4 potted later winterproduction

EC 4 potted 10 days after reception = delayed start

EC 0.5 in the Delta Unimix winterproduction

Showing brown edges

EC 0.5 in the Delta Unimix winterproduction

EC 0.5 vs EC 4 = no flowering time delay.

This is the trick!!

- Variation in fertilizer which makes a complete schedule (all elements)
- High levels
- Continuing and increasing from the start

Comments during the trial

Pansies

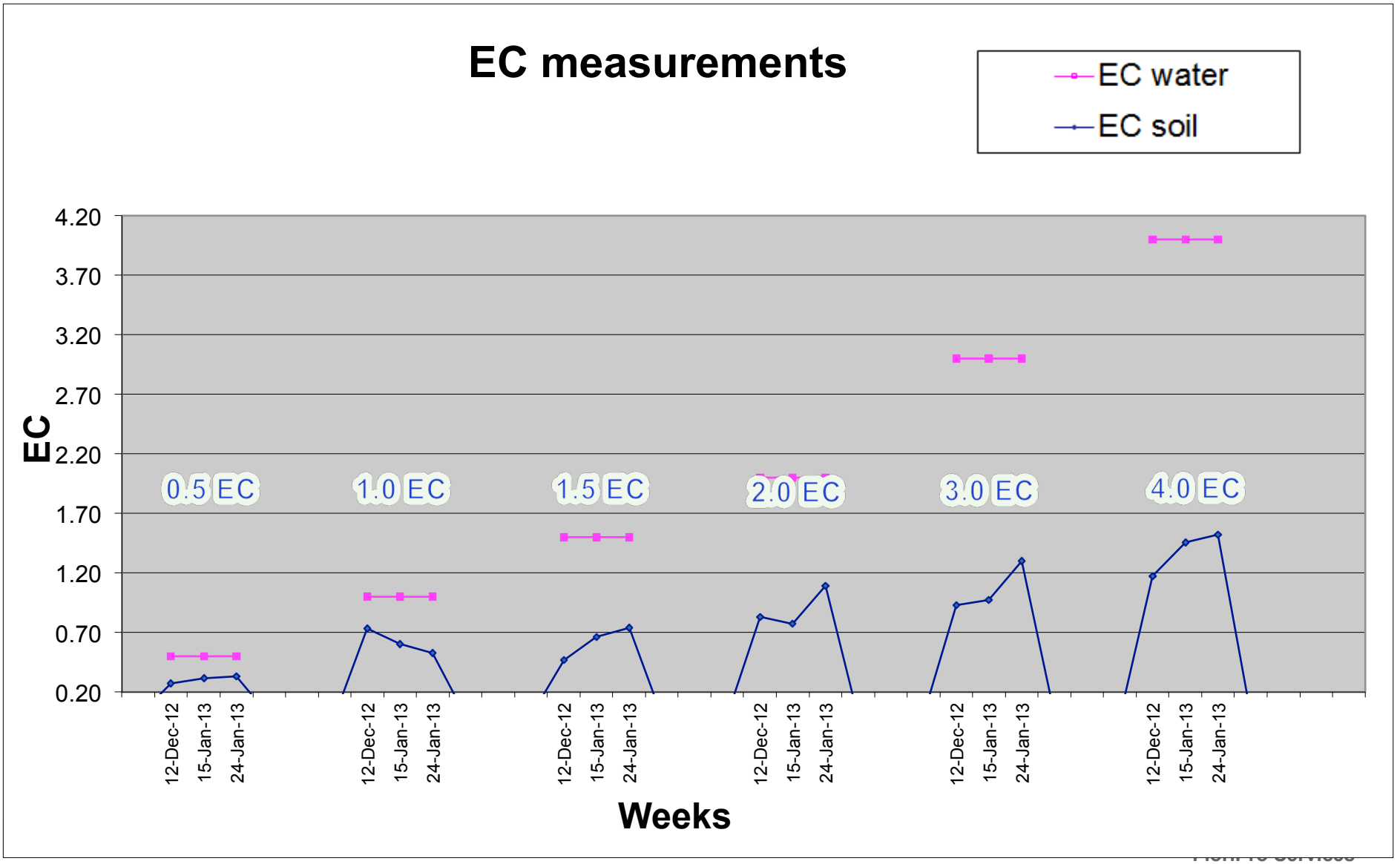
- Clearly EC 0.5 water plants are smaller, showing some deficiency with brown edge leaves for certain colors in the mix. Also later (one week ?)

- When you start to fertilize with EC 1, already it is better, and more or less acceptable from the first vieuw. **EC 4 is in NL the best, but all need local trials.** Here the internal quality and garden performance is far better.

- The YPL which have been potted 4 days after the delivery with EC 2 in the Xtray are catching up with the ones potted immediately with immediate watering in the pot. Conclusion: Fertilise trays in case you can not pot immediately.

- *The YPL kept 10 days in the tray with clear water shows clearly the plants are smaller and do not catch up*

EC change in the pot. *Winter* production



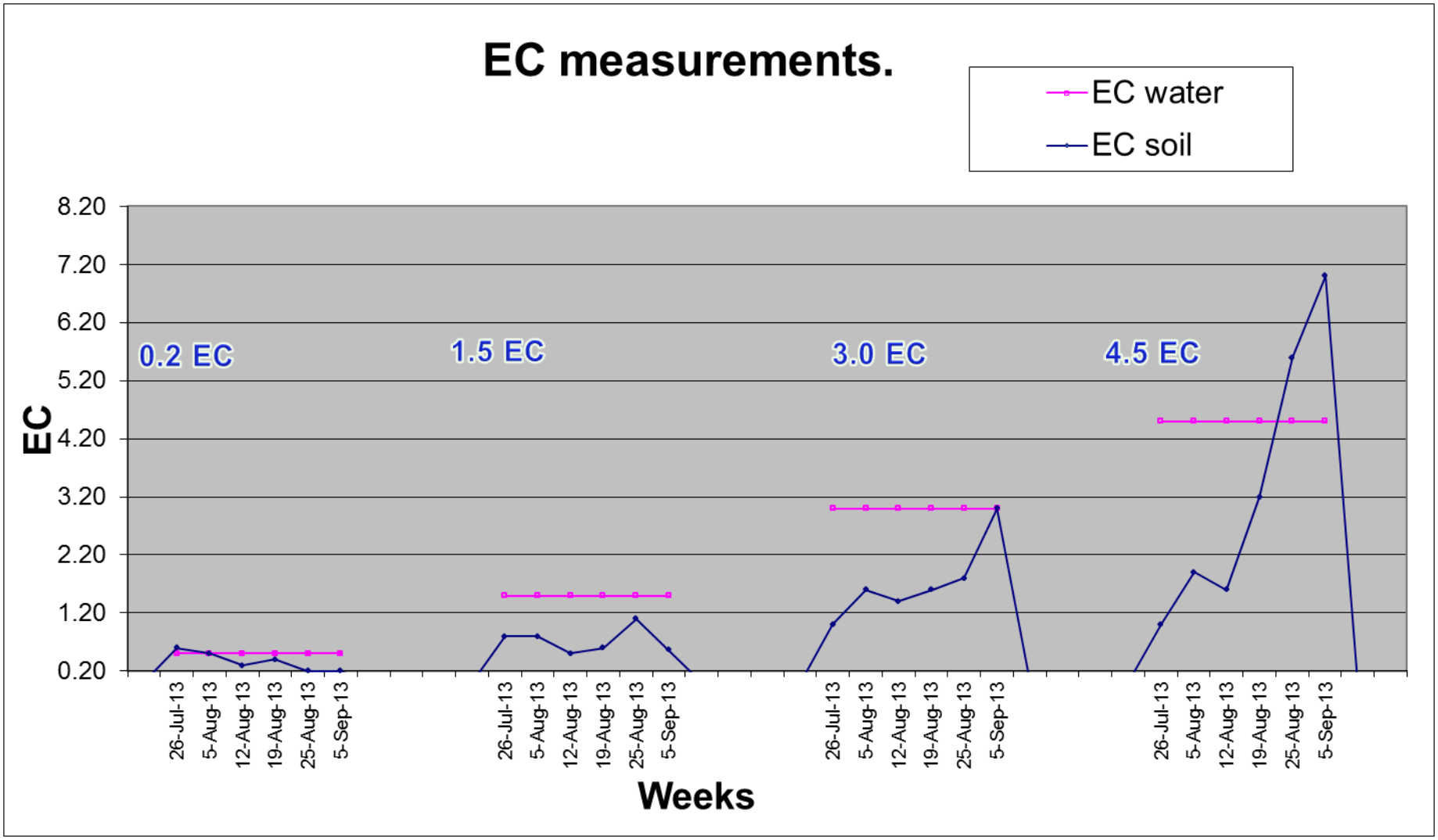
Conclusion of EC levels drip water winter trial

The higher the EC, the better the quality

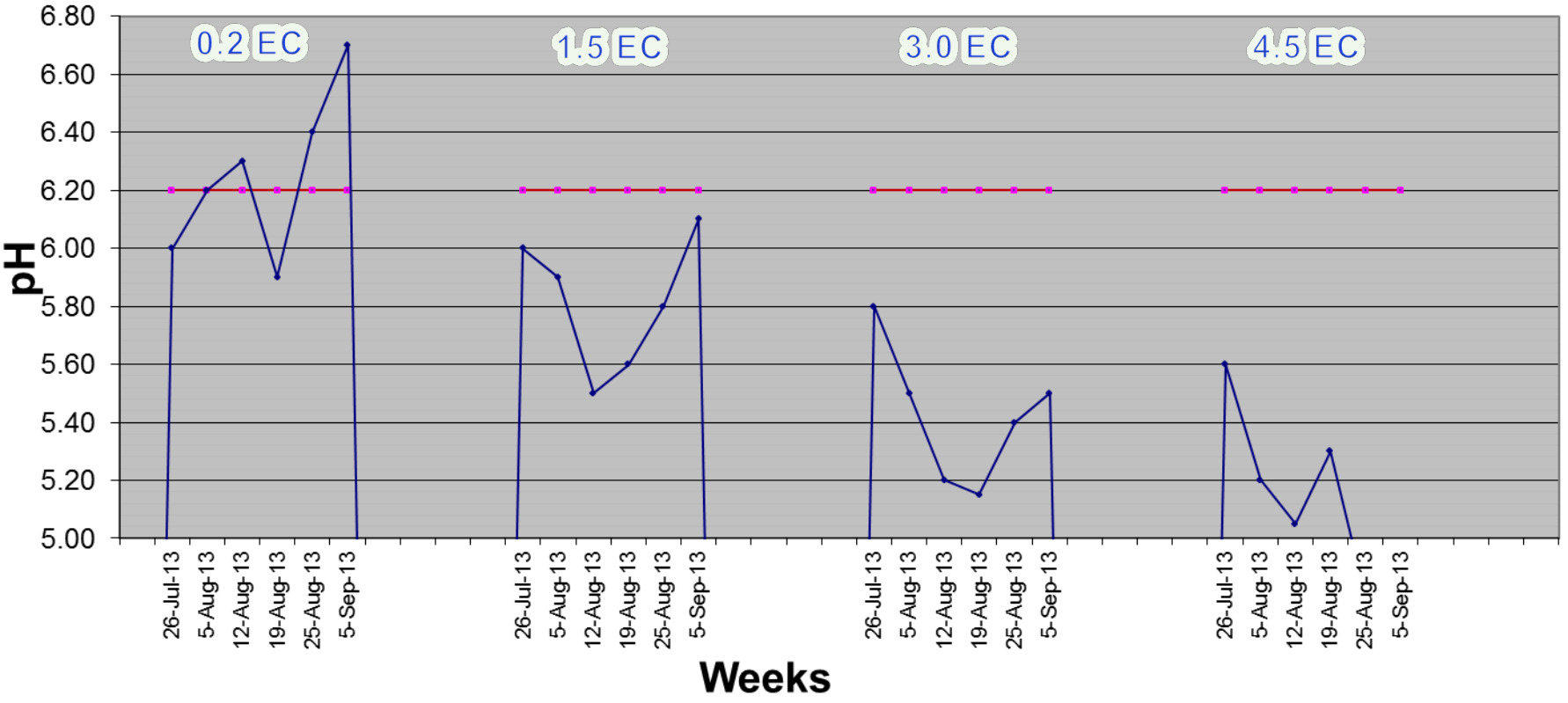
- 0,5 EC Plants are very poor, yellowing. Plants are weak.
- 1,0 EC Consumption is bigger than given amount.
- 1,5 EC Same as 1,0 but soil EC goes up slowly = minimum drip!!
- 2,0 EC Soil EC goes up almost from the start.
- 3,0 EC Increase level from the beginning.
- 4,0 EC Best quality, and increasing EC. = **PGR effect.**

Trial need continuation to see end effect.

EC change in the pot. *Summer* production



pH change in the pot. *Summer* production



	0.2 EC	4.5 EC
13 juli 2013		
2 aug 2013		

Compare plant size at the same date.

16 aug 2013

30 aug 2013


Compare plant size at 13 aug 2013
0. EC
1,5 EC
3 EC
4,5 EC

Compare plant size at the same date.

7 sept 2013

7 sept 2013


Compare plantsize at the same date of 10 sept 2013.
0,5 EC
1,5 EC
3,0
4,5 EC


Compare plantsize at the same date of 10 sept 2013.
0. EC
1,5 EC
3 EC
4,5 EC

Compare plant size at the same date of 10 sept 2013.


Compare plant size at the same date of 10 sept 2013.
0,5 EC
1,5 EC
3,0 EC
4,5 EC

Compare plant size at the same date of 10 sept 2013.

Whole trial

- **temp > 25 ° C**
- **NO PGR**

Conclusion of EC levels drip water Summer trial

The higher the EC, the better the quality

- 0,2 EC Plants are very poor, yellowing. Dying.
- 1,5 EC Consumption is bigger than given amount. End still to low.
- 3,0 EC Soil EC goes up slowly = minimum drip!!
- 4,5 EC Soil EC goes up almost from the start. End up too high.

Advice for summer production:

- *4,0-4.5 EC is the best start, half way go down a bit.* ***PGR effect in Summer is higher due to more water is given.***
- **Be careful with the pH level..** **The lower the EC, the higher the pH**

Salvia EC differences. Size and Color.

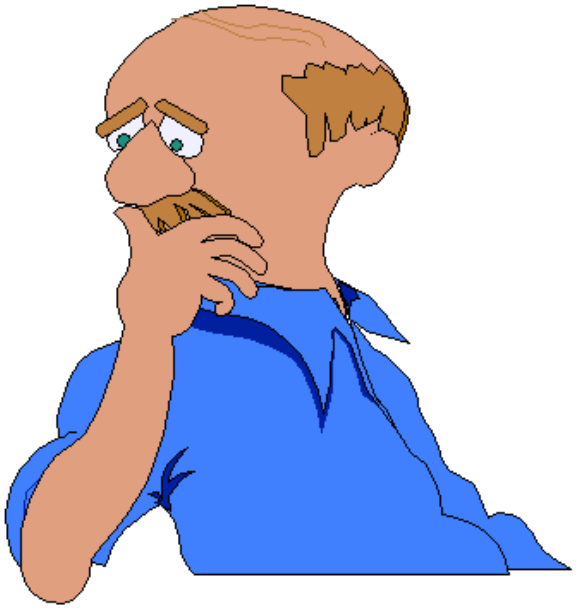
Zinnia EC differences

Results: The more EC given, the more compact plants!

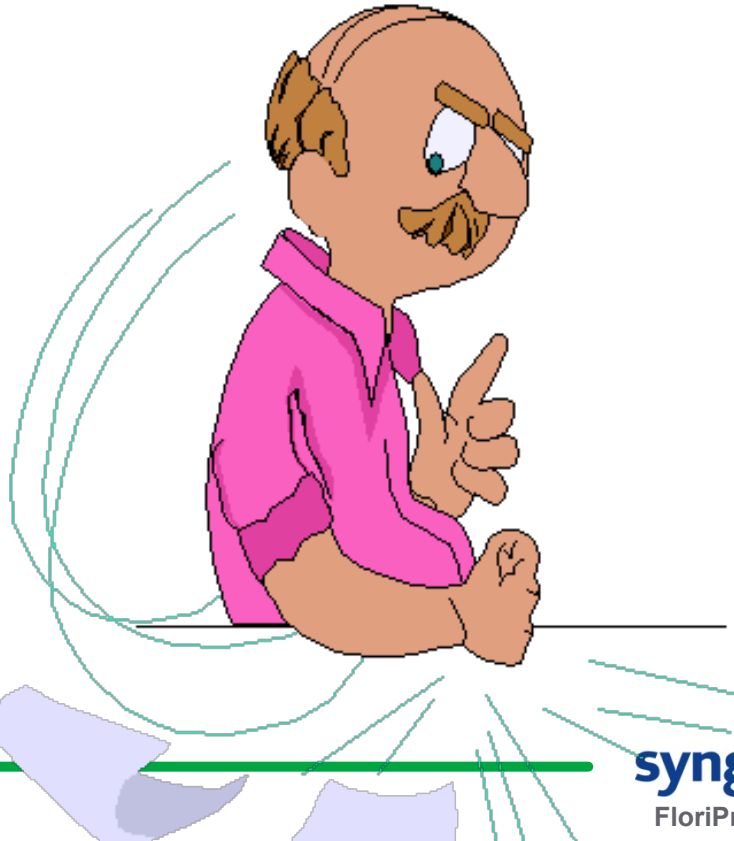
The biggest growing factor is….

YOU !!

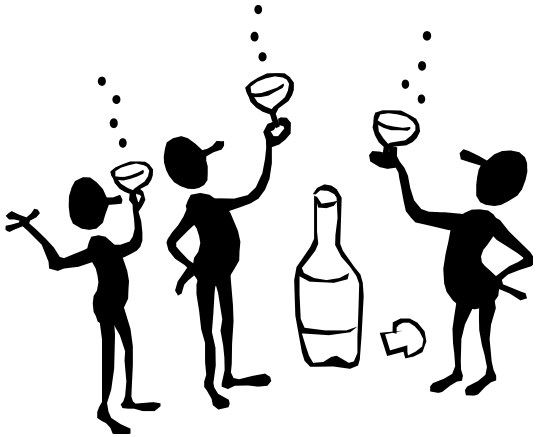
Stop questioning……

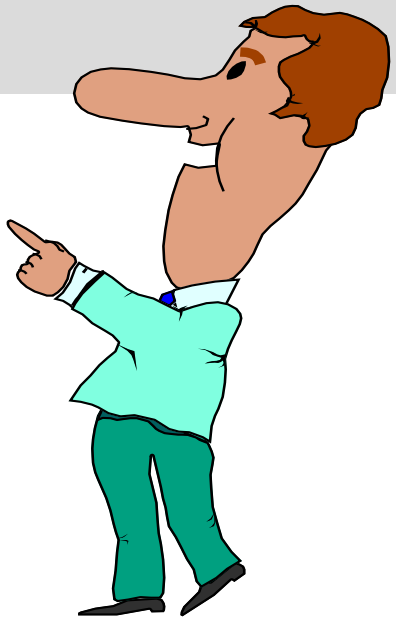


Decide !!!!!!!



Conclusion EC trials:





- Be sure — Organise a good EC/pH meter
- Good supplier — Make appointments and control them!!
- Perfect fertilization — Give the needs and in time
- Attention — Avoid surprises, make analysis
- Quick actions — Decide quickly and handle accordingly

Pansy culture high EC
(almost) without PGR's. (winter)

Finally….

Rig jou lewe met doelbewuste keuses,
nie met spoed en haas nie.

Die beste musikant is een wat met
gevoel en betekenis speel,
nie die een wat eerste klaar is nie.

Thank you for your attention

Dankie vir jou aandag.