

'the new growing'

Use of more sunlight and wide temperatures with pot plants

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Background trial

- Several pot plants are growing relatively dark in the Netherlands
 - hypothesis: more sunlight is possible with higher humidity
- Combined with growing between wide temperature levels should lower the use of energy
- What are the (im)possibilities?!

Trial

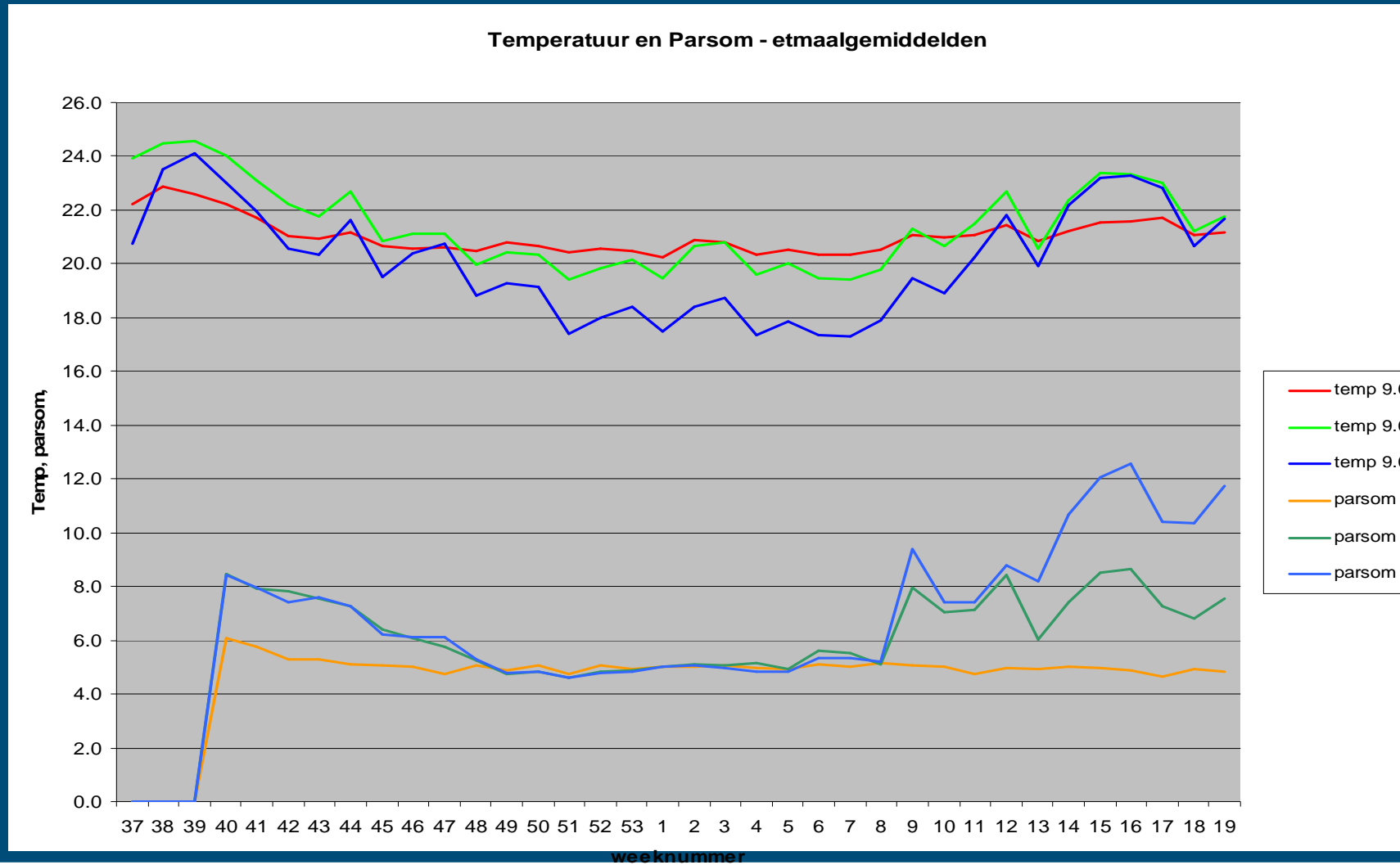
- 4 'jumped' growth 'rounds'
 - Half sections
 - half year growth per 'round'
 - 1: wk 37 - wk 04
 - 2: wk 45 - wk 16
 - 3: wk 07 - wk 28
 - 4: wk 17 - wk 38
- 7 different crops
 - Anthurium, Areca, Guzmania, Calathea, Dracaena, Ficus en Oncidium (and Dendrobium from 2e round)



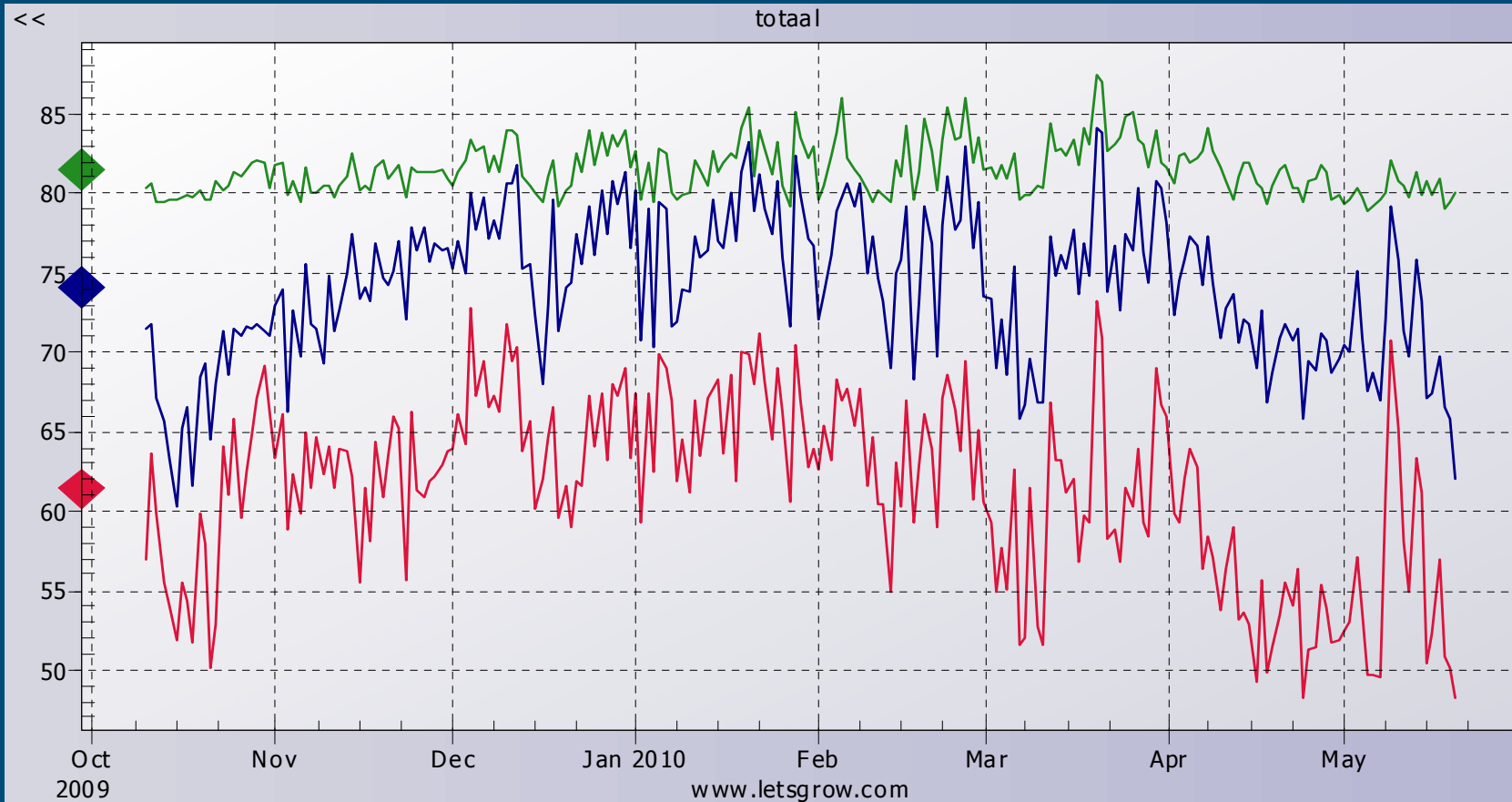
Important climate adjustments

	Reference (9.06)	Concept 1 (9.07)	Concept 2 (9.08)
Light	5 mol/m ² /day		
Screen closed	300 w/m ²	500 w/m ²	500 w/m ²
screen	LS 16, 50% chalk	LS 10, Diafragma, 25% chalk	LS 10, Diafragma
Temperature	19/21 tot 23	17.5 tot 28	15 tot 28
Humidity	minimal 40%	minimal 60%	80%

Light and temperature



Humidity



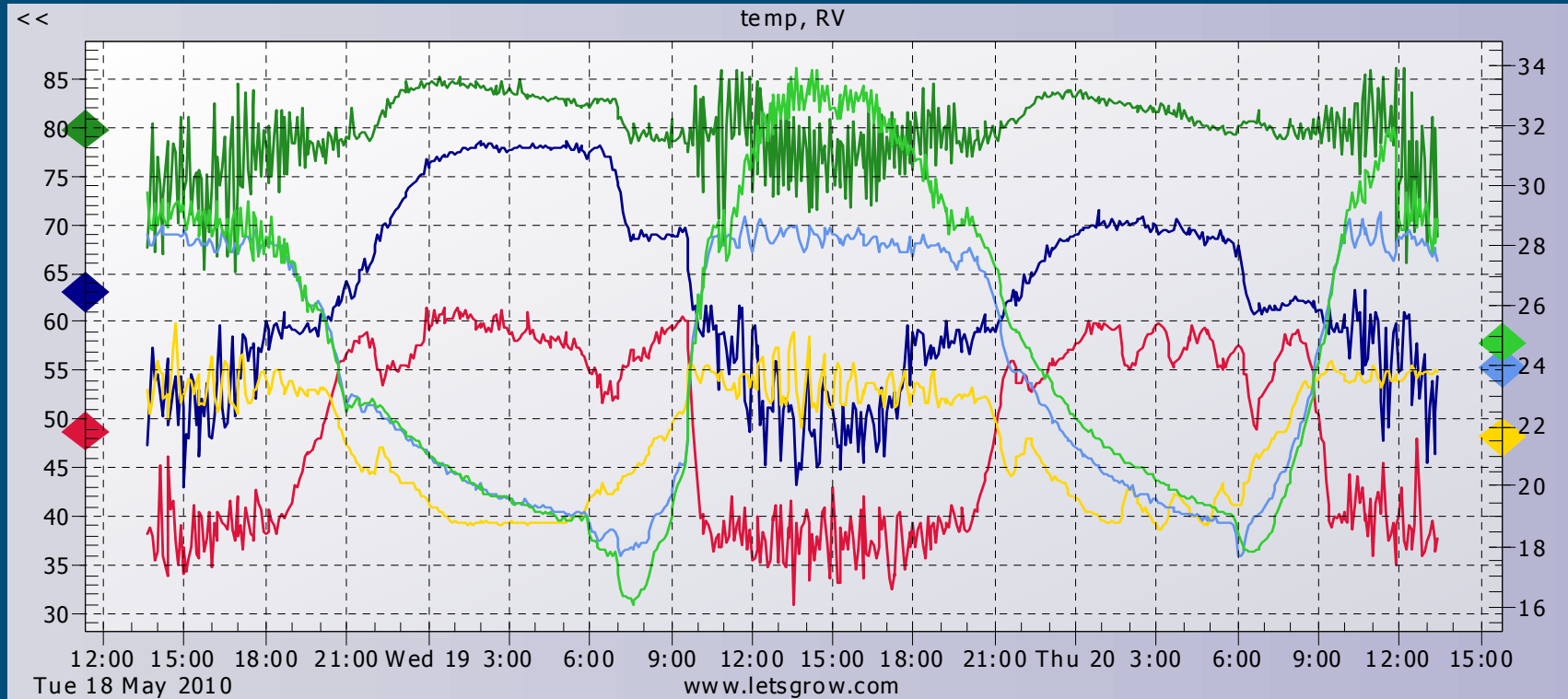
www.letsgrow.com

??	Colour	Description and unit	Device	Fact	Axis	Min	Max	Avg	Cursor
1	Red	RH Greenhouse - % - daynight: 9.06	ECONOMIC 4145 - PPO III	1	<	48.2	73.2	61.4	61.4
2	Blue	RH Greenhouse - % - daynight: 9.07	ECONOMIC 4145 - PPO III	1	<	60.3	84.2	74.1	71.3
3	Green	RH Greenhouse - % - daynight: 9.08	ECONOMIC 4145 - PPO III	1	<	78.9	87.5	81.5	79.7

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Recent figure – temp., humidity

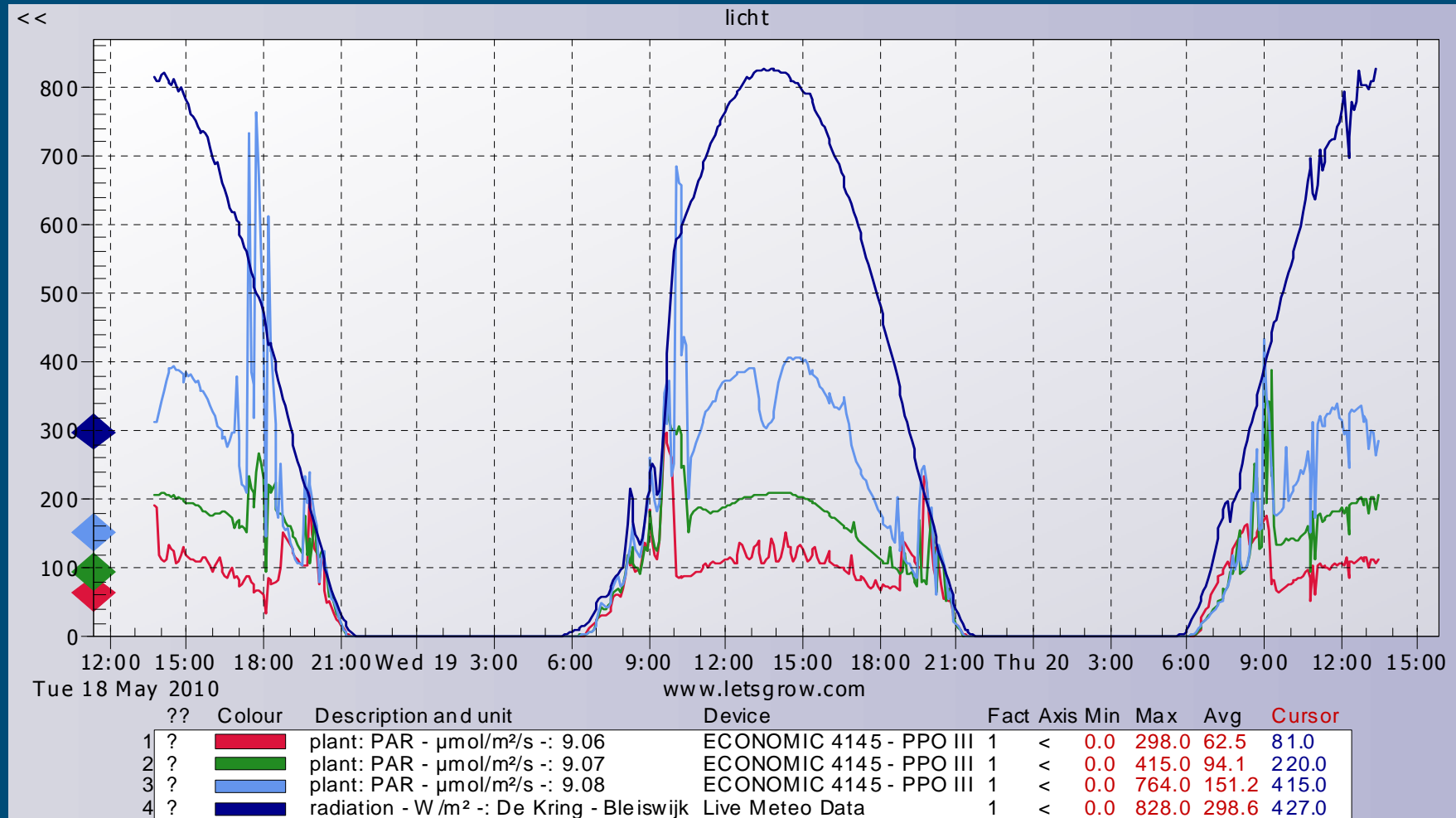


??	Colour	Description and unit	Device	Fact	Axis	Min	Max	Avg	Cursor
1	Red	RH Greenhouse - % -: 9.06	ECONOMIC 4145 - PPO III	1	<	31.0	61.5	48.8	-
2	Blue	RH Greenhouse - % -: 9.07	ECONOMIC 4145 - PPO III	1	<	42.9	78.6	63.1	-
3	Green	RH Greenhouse - % -: 9.08	ECONOMIC 4145 - PPO III	1	<	65.1	86.1	79.8	-
4	Yellow	temp greenhouse - °C -: 9.06	ECONOMIC 4145 - PPO III	1	>	18.6	25.4	21.7	-
5	Light Blue	temp greenhouse - °C -: 9.07	ECONOMIC 4145 - PPO III	1	>	17.7	29.1	23.9	-
6	Bright Green	temp greenhouse - °C -: 9.08	ECONOMIC 4145 - PPO III	1	>	16.1	33.9	24.8	-

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Recent figure - light



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Energy saving 1st round (wk 37-wk4)

	heating		Artificial light	
	Gas kub/m2		Elektricity in KwH	
Reference	4.61		79	
Concept1	1.02	- 78%	105	+ 33%
Concept 2	0.18	- 96%	106	+ 35%

Results 1st round



■ Concepts had:

- More leafsurface en fresh weight with Anthurium, Areca, Calathea, Dracaena, Ficus, Guzmania
- Most plants were longer, Anthurium equal and Calathea shorter
- Oncidium had more and heavier flowering stems

Results 1st round

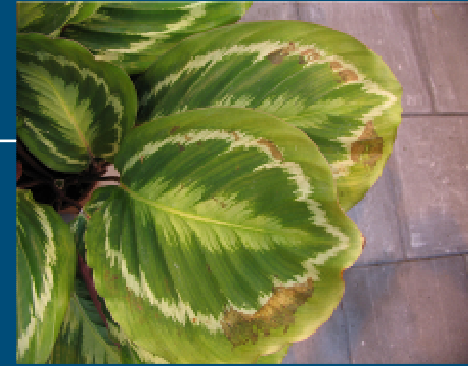
	Ref	C1	C2	Ref	C1	C2	Ref	C1	C2
	Length (cm)			Leaf surface (cm ²)			Fresh weight (g)		
Anthurium	41	-1%	-2%	764	15 %	23 %	75	8%	21 %
Areca	60	6	3	2308	15	4	96	16	4
Calathea	88	-8	-4	10495	4	3	690	-6	-3
Dracaena	49	11	24	1698	16	44	102	22	62
Ficus	63	3	2	3458	17	10	367	18	9
Guzmania	59	0	0	2167	15	3	149	11	3
Oncidium	42	-9	-4	427	-14	-4	116	-12	-2

Quality 1st round

	Ref.	Con. 1	Con. 2	
Anthurium	5.5*	+	+	more leaf, flowers
Areca	5.5	-	-	All treatments leaf damage
Calathea	6.8	+	+	Leaf damage end December
Dracaena	6.3	++	+	Leaf margin to yellow
Ficus	6.0	++	++	Concepts more red in leaf and more air roots
Guzmania	6.3	++	+	Con.2 had dots on the leaf
Oncidium	6.8	++	+	Longer flowering stems

*judgement 4 persons (figures 1-10)

Results 1st round



- Much energy saving
- Concepts nearly every time more growth
- More light gave lighter green leaves with Anthurium, when the sunlight decreased the leaf became greener again
- Low night temperatures and high humidity gave leaf damage with Areca and Calathea (see picture)
- After 8 weeks no differences in shelf life

Energy 2th round (wk 45-wk 14)

	heating		Artificial light	
	Gas (kub/m2)		Electricity (KwH)	
Reference	6.47		12.1	
Concept1	1.66	- 74%	13.5	+ 11.6%
Concept 2	0.68	- 89%	13.6	+ 12.3%

Results 2th round

	Ref	C1	C2	Ref	C1	C2	Ref	C1	C2	Bloei
	Length (cm)			Leaf surface (cm ²)		Fresh weight(g)		Length (cm)		
Anthurium	41	8	-3	903	26	-2	87	46	25	64,100
Areca	73	-4	-6	3073	9	-8	141	8	-10	
Calathea	104	-2	-10	10835	22	-1	761	19	-5	
Dracaena	73	-8	-8	3041	-15	-18	233	-21	-24	
Ficus	50	17	15	2344	26	11	211	31	18	
Guzmania	56	-4	0	375	-8	-5	84	3	2	C2 slower
Oncidium	44	-8	13	317	-4	4	84	-10	27	C2 slower
Dendrobium	53	-6	-2	399	-16	-9	98	-16	-	C2

quality 2th round

	Ref.	C1	C2	
Anthurium	5.9*	++	+	More leafs and flowers
Areca	5.7	-	0	Leaf damage treathments
Calathea	6.7	+	+	
Dracaena	6.9	++	-	Leaf margins to very yellow
Ficus	6.6	++	++	
Guzmania	6.7	++	-	
Oncidium	6.7	++	-	

*judgements by 7 persons (figures 1-10)

Results 2th round

- Saving energy
- concept 1
 - more growth in Anthurium, Areca, Ficus
 - less growth in Calathea, Dracaena, Guzmania, Oncidium and Dendrobium
- concept 2
 - Less growth in Anthurium, Areca, Calathea, Dracaena, Oncidium and Dendrobium (2 weeks delay of flowering)
 - more growth in Ficus en Guzmania (but also 2 weeks delay of flowering)

Temporarily conclusions

- There are possibilities to save energy, but not always without losing growth.
- Starting with more sunlight, allowing big temperature fluctuations and a higher humidity gave enough extra growth to prevent delay of the growth (wk37-wk4)
- Starting with low (natural) light, allowing wide temperature fluctuations gave delay of flowering with most crops and that delay could be caught up (wk 45-wk14)
- Caution with fluctuation is necessary, especially with extreme light-, temperature- and humidity combinations

Afsluiting

Bedankt voor uw aandacht

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