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DEVELOPMENT OF HYDRO – CULTURAL CUT FLOWERS GROWING

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ABSTRACT
Closed, circulation system hydroponics satisfies the strictest environmental protection regulations, environmentally friendly, nutriments do not contaminate soil water and there is no need for soil sterilization, no chemicals pollutes environment. It is well mechanised and controlled and optimal conditions for the plant are provided. Thus, yield increases. It is saving nutriment and water. By considering these facts we can say that there is a better timing, better programmed then chemo culture.
As for the cut flowers we found that stem yield in hydroponics is about the same than that is in traditional soil mix and chemo culture. Flower quality is however better due to the more balanced nutriment supply. This is especially true for the vase-endurance
Processing data by phytomonitor enables to develop an optimal nutriment supply, a cost saving and environmentally friendly technology.

Keywords: hydroculture, Zantedeschia, rose, Phytomonitor

INTRODUCTION

The advantages of hydroponics are:
- soil is not needed (TARJÁNYINÉ, 1980),
- independent from soil characteristics (no soil cultivation, no soil exchange and sterilisation) (IMRE, 1995),
- it is easier to sterilise substrates than the soils (TARJÁNYINÉ, 1980),
- less labour consuming as there is no soil cultivation needed (TARJÁNYINÉ, 1980),
- no pests in the root substrate (IMRE, 1995),
- substrate is inorganic and there is no need to protect plants against soil pests (TARJÁNYINÉ, 1980),
- the crop is standard especially in the root surrounding (BENOIT, CEUSTERMANS, 1995),
- we exclude soil infection and the accumulation of pesticide residues (BENOIT, CEUSTERMANS, 1995; FISCHER, 1991),
- energy input can be lowered in the root zone (BENOIT, CEUSTERMANS, 1995; MORGAN, MOUSTAFA, 1986; IMRE, 1995),
- water uptake is reduced (BENOIT, CEUSTERMANS, 1995; FISCHER, 1991; IMRE, 1995),
- more efficient nutriment uptake (BENOIT, CEUSTERMANS, 1995; FISCHER, 1991; IMRE, 1995),
- more efficient control of plant vegetative and generative development (BENOIT, CEUSTERMANS, 1995; FISCHER, 1991),
- earlier and higher yield (BENOIT, CEUSTERMANS, 1995; MORGAN, MOUSTAFA,1986; FERENCZ, 1998 a),
- longer growing season (plants are more healthy), changes of crops arefaster than on soil (IMRE, 1995),
- plant productivity is better utilized (IMRE, 1995),

- higher income is achieved (FERENCZ, 1998 b),
- better quality crop (BENOIT, CEUSTERMANS, 1995),
- more rational logistic (BENOIT, CEUSTERMANS, 1995; FERENCZ, 1996),
- better automation and mechanization of crop (BENOIT, CEUSTERMANS, 1995; MORGAN, MOUSTAFA, 1986; IMRE, 1995),
- 90% more utilization of space (MORGAN, MOUSTAFA, 1986),
- better stem, leaf and flower quality and more sprout is developed (MORGAN, MOUSTAFA 1986),
- environmentally friendly (BENOIT, CEUSTERMANS, 1995; IMRE, 1995).

MATERIAL AND METHOD

The plant species, used since 1998, are greenhouse carnation, *Zantedeschia* and rose.
The experiments were done in Filclair and Primőr-1 greenhouses. The plants were planted in 4 repetitions. The main aspects of hydroponic research are: optimal nutrient supply, timing of cultivation, effects of cultivation substrates, effects of cultivation methods, comparison of varieties, stem yield, flower quality attributes (length of stem, thickness of stem, flower size), vase life. During the statistical analysis we made analysis of variance and calculated the SD 5% values by F-test Student-type.
A PhyTech company plays a pioneer role in the Phytomonitoring ™ system, it detects the plants remotely. It uses advanced methods, collects and analyses the data derived from wireless communication sensors and innovative softwares. The main purpose is the detection of early plant stress, optimal growth and quality of product to increase income.

RESULTS

Vase life of *Zantedeschia*

In case of both the treatment without preserving agents and that with Zwetin solution, the flower of the hydro-cultural stock was significantly more stable at the five survey times compared to the control chemo-cultural stock. The flowers grown in hydro-culture were 3-6 days more durable due to the better supply of nourishing material (*Table 1).*

Table 1. Vase life of *Zantedeschia*, Kecskemét, year 2010

Dates of measure ments	02.03.	09.03.	16.03.	23.03.	30.03.
Metod of growing	**(day)**				
In container	10.75	11.00	11.00	10.75	10.50
In sponge	11.75	11.75	12.00	12.00	12.00
In soil heated container	10.25	10.25	10.50	10.50	10.50
Control	6.75	6.25	7.50	7.50	6.25
Experiment					
In container + Zwetin	13.25	12.75	13.25	13.25	13.50
In sponge + Zwetin	13.50	13.50	14.50	13.50	14.50
In soil heated container + Zwetin	11.00	11.00	11.75	11.50	13.25
Control + Zwetin	9.75	9.25	10.50	10.25	9.25
SD 5%	1.06	1.07	1.10	1.26	0.86

Source: TURI – FARKAS (2010)

Vase life of rose

Vase life of rose is shown in *Table 2.*

Table 2. Vase life of *rose* varieties

Varieties	Vase life (day)	Vase life according to catalogue (day)
'Aloha'	10	12
'Circus'	15	14
'Corvette'	13	14
'Dream'	16	16
'Fantasia'	15	14
'Frisco'	18	16
'Metaliana'	14	12
'Red Corvette'	14	14
'Sioux'	17	18

Source: TURI – FARKAS (2010)

The fluctuation of air temperature well indicates the change of the phases of the day (*Figure 1).*

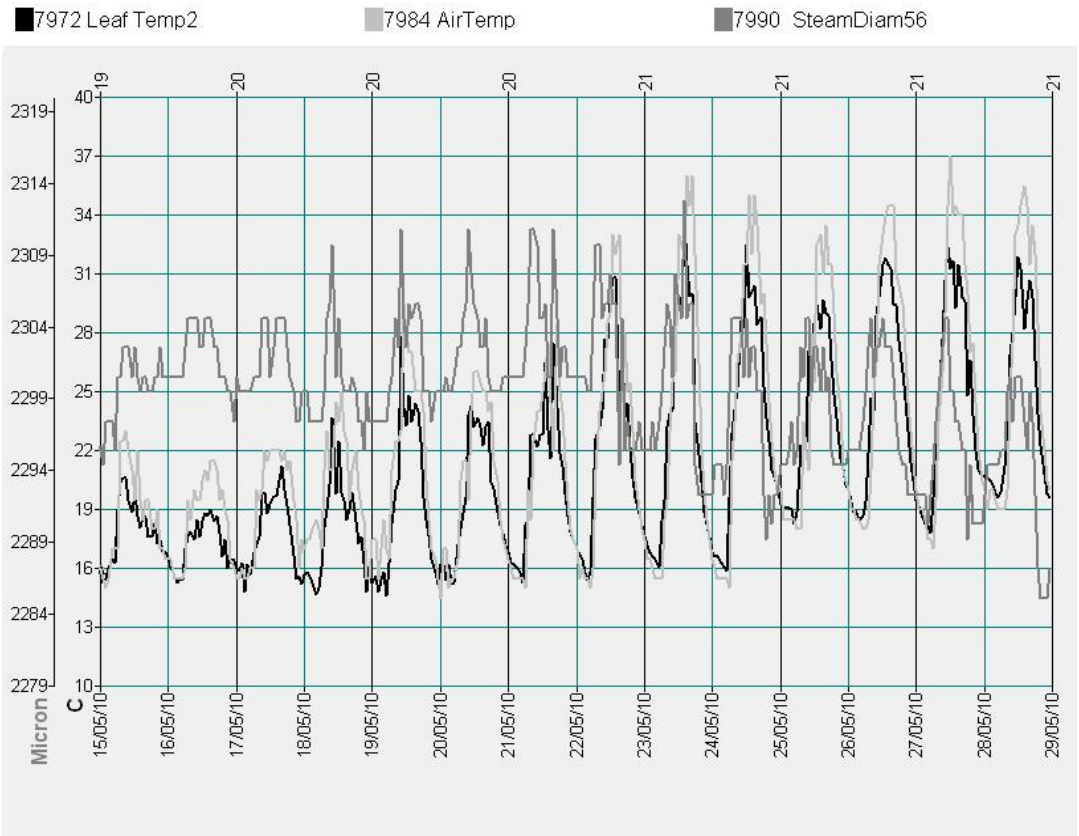

Figure 1. The effect of air temperature on rose leaf temperature and expansion of stem

Source: TURI – FARKAS (2010)

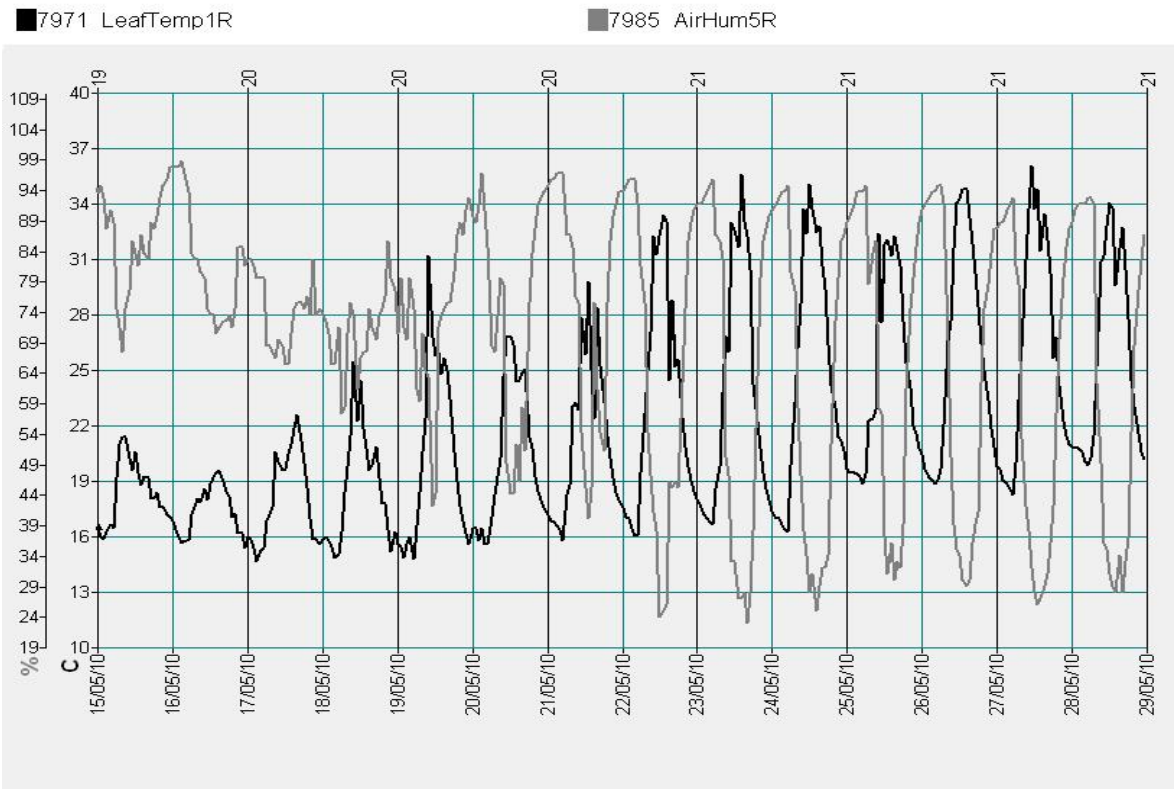

Figure 2. Rose leaf temperature in relation with the air humidity
Source: TURI – FARKAS (2010)

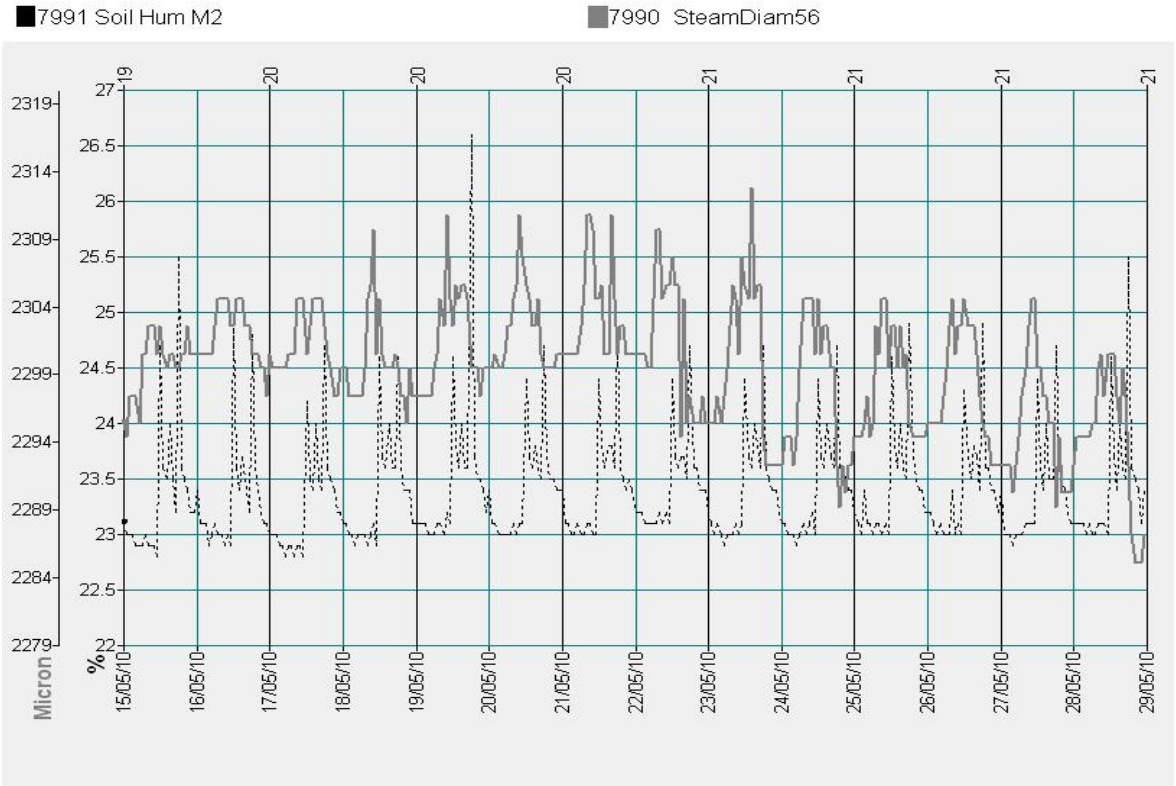

Figure 3. The expansion of rose stem in accordance with soil wetness
Source: TURI – FARKAS (2010)

The expansion of stem follows this cycle. It was pointed out that the higher was the daily

maximum temperature the expansion of stems were more intensive. Respectively the fewer daily fluctuation made the stem expansion more stable. By the increase of daily temperature the expansion of stems are significant. The temperature of leaves increases paralell with the air temperature.
By the increase of temperature the relative humidity decreases. The temperature change of leaves follows the change of air temperature (*Figure 2*). According to it, the relative humidity is higher in the night and lower in the day.
The wetness of soil indicates the time of irrigation (*Figure 3*). The expansion of stems well follows the wetness of the soil.

CONCLUSIONS

We have found that stem yield in greenhouse cut flowers is the same as in hydroponics, traditional soil-mix and in chemo-culture.
However, flower quality is better due to a more harmonised nutrient supply. It is especially the case in vase-life.
The aim of our research is to study the environmental factors on the growth and development of rose with special regard to stem expansion.
The research is being made continuously so that the hydroponics of rose could be analysed in a complex way - together with a detailed environmental and physiologic data processing.
The rose phytomonitor has been developed by the Israeli Phytech Ltd. in order to follow the growth and development of plants. Growers can observe the daily stem expansion, and if it differs from optimal due to a stress situation he can intervene.
Processing the data of the phytomonitor enables the development of an optimal nutrient supply and a less costly, environmentally friendly technology so that it could be more commonly used in the domestic ornamental plant growing.

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