GROWING ORNAMENTAL PLANTS IN HYDROCULTURE

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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.*

Key words*: hydroculture, Zantedeschia, rose, Phytomonitor*

INTRODUCTION

The closed system hydro-cultural growing is environment-friendly, the chemical fertilizer used for nourishing material supply does not contaminate the soil water and it is possible to eliminate the chemical materials accumulating during the disinfection of the soil getting into the environment. It can be mechanized and regulated well so the optimum growing conditions can be fixed for the plant and as a consequence higher yield can be reached both. Growing method with saving both the nourishing material and the water. Taking all the above into consideration timing is easier and better, it can be programmed better than the traditional chemo-cultural growing. The main purpose of the research was to evaluate plant development, yield and flower quality in different growing conditions, mediums and variety and vase life of Zantedeschia. We wanted to see the effect of different mediums on yield and quality.

The Phytomonitor instrument is placed in the French Filclaire greenhouse and measure rose culture parameters in hydroponics. We measure the following factors: air temperature, leaf temperature, radiation, relative humidity of air, stem diameter and soil moisture. Using Phytomonitor data processing make it possible to use nutriments in an optimal level thus apply a low-cost environmentally friendly technology. We can download the registered data from the instrument to computer.

MATERIALS AND METHODS

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 variety analysis 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.

RESEARCH 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

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

Vase life of rose

Vase life 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

Phytomonitor data processing

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

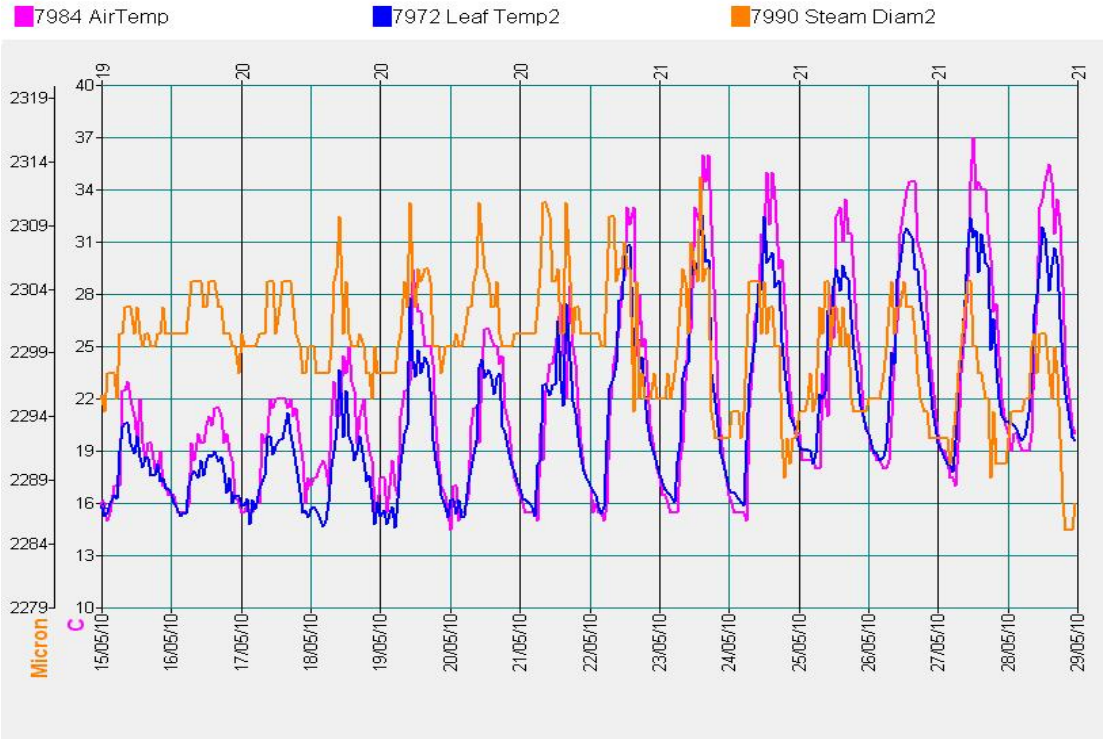

Figure 1 The effect of air temperature on rose leaf temperature and expansion of stem

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.

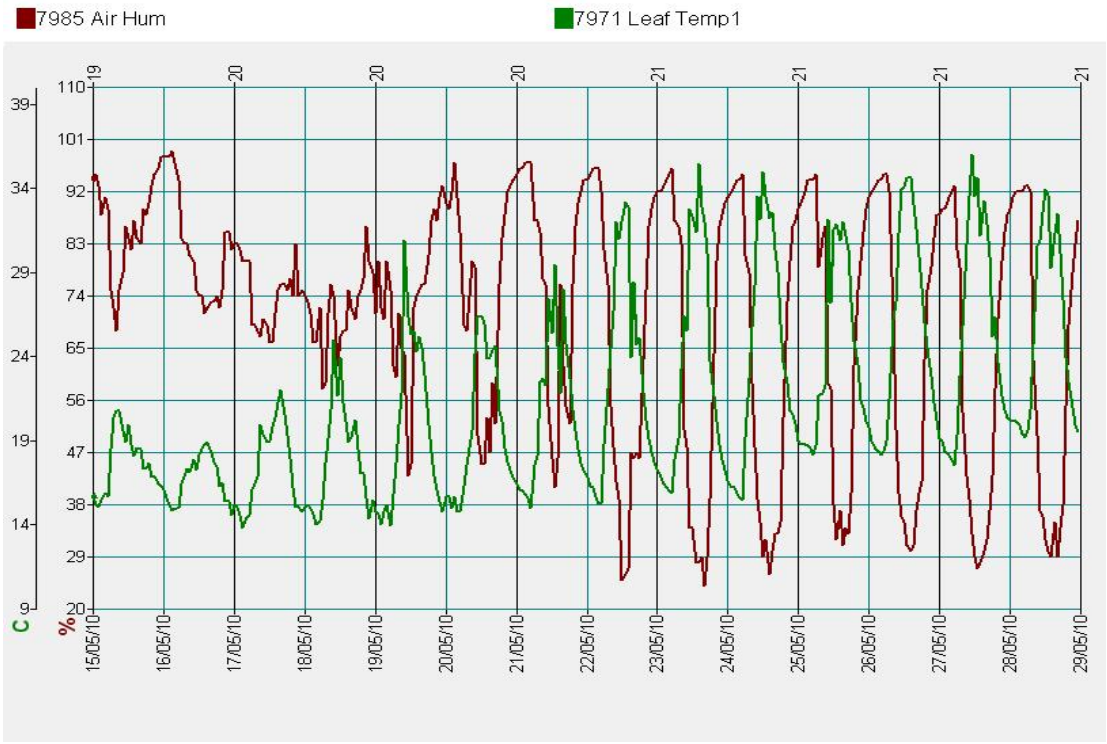

Figure 2 Rose leaf temperature in relation with the air humidity

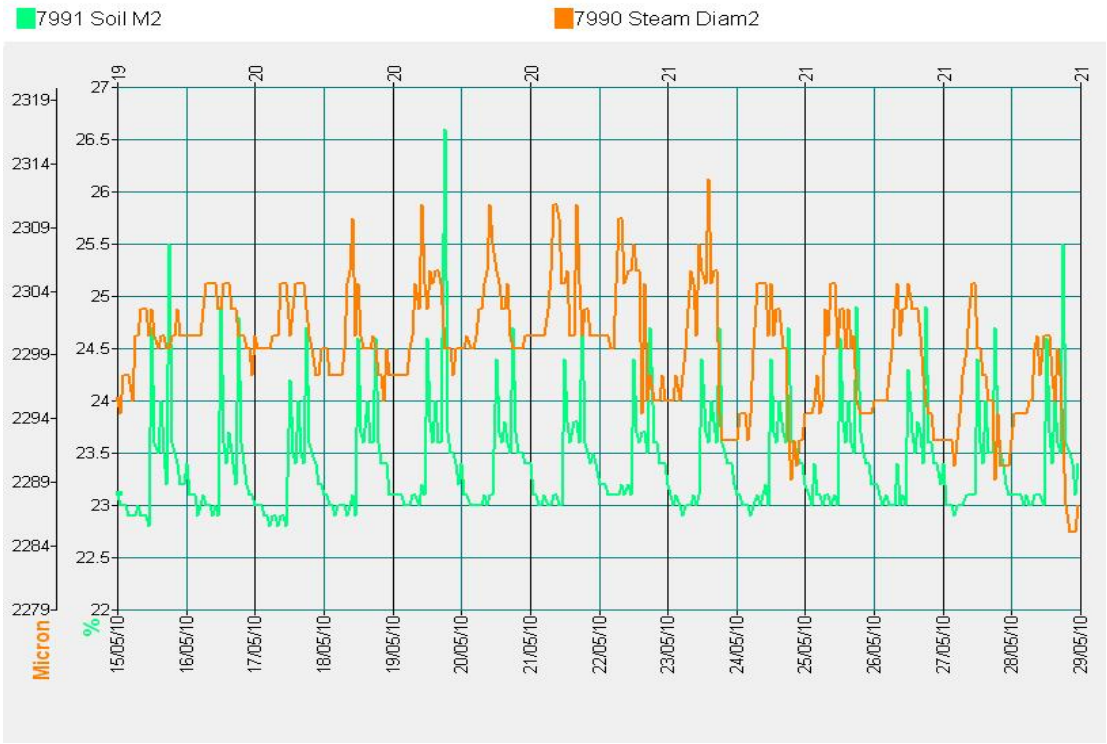

Figure 3 The expansion of rose stem in accordance with soil wetness

CONCLUSIONS

We have found that stem yield in greenhouse cut flower 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 phytomonitor enables to develop 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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