ANNALS OF FACULTY ENGINEERING HUNEDOARA
– INTERNATIONAL JOURNAL OF ENGINEERING
Tome X (Year 2012) – FASCICULE 2 (ISSN 1584 – 2665)

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THE HYDROCULTURE OF DIANTHUS CARYOPHYLLUS L. VAR. SEMPER FLORENS HORT.

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ABSTRACT: *The importance of hydro-cultural growing is significantly increasing. As a consequence of urbanized way of life the territory of cropland has significantly decreased, due to the rapid industrialization peat stocks have diminished, the surface waters have got contaminated, the protection against ground fungi have caused more and more troubles in case of growing in soil mixture. Hydro-cultural growing offers a good solution for these problems. Its advantageous characteristics are that there is no soil work, growing can be mechanized easily, it is a growing method that saves nutritional materials and water but at the same time it needs a lot of care, expertise, and the construction of the system needs extra investment. Taking all these characteristics into consideration timing is easier, it can be programmed better than the traditional chemo-culture.*
KEYWORDS: *carnation, hydro-cultural growing, Grodan, PU sponge, flower yield*

INTRODUCTION

We have been dealing with the hydro-cultural growing of cut flowers at the Department of Ornamental Plant Growing and Maintenance of Gardens at the College Faculty of Horticulture at Kecskemét College since 1988. We started our experiments by growing carnation in growing establishment without soil then we introduced other species of cut flowers and potted ornamental plants into our research work.

Making use of the results and experience of the preliminary experiments in 2006, we made experiments of hydro-cultural growing of carnation in growing establishment for four years. The research work can be divided into comparative experiments of the media and the species.

Our aim was to examine the effect of Grodan and PU-sponge media on the growth, the yield of flowers, the diameter of the flowers and the length of the stem concerning the species of carnation 'Pink Castellaro'.

In case of comparing the species our aim was to examine the effect on the development of the plants, the yield and the characteristics of the flowers: the diameter of the flower and the length of the stem. We also aimed at comparing the effects of red and two 'Castellaro' species and making the characterization of the species in case of hydro-cultural growing.

MATERIAL AND METHOD

We made experiments of hydro-cultural growing of carnation with the following species: 'Danton', 'Gigi', 'Iury', 'White Castellaro', 'Pink Castellaro' and 'Candy', 'Rimini', 'Rodolfo', 'Ondina', 'Olivia'. The experiments of carnation were carried out by the French Filclair growing establishment, growing was arranged in a closed, circular system. The planting of shoots with roots was arranged by 40 pieces/m^2 at the end of May.

We applied PU-spongeas the medium of plantation for the comparative experiments, the length of the growing season was one year. The experiment was carried out by repeating the procedure four times. The supply of nutritional material was made by using complex chemical fertilizer, the pH of the nourishing solution was 5.0 - 6.5, the conductivity was 2.5 - 3.5 mS and these parameters were continuously controlled.

The height of the plants was measured from September to the end of the growing period each week. At the beginning of the survey period we chose 20-20 pieces of each by random choice, we marked them and we measured the height of the indicated plants each time. We measured the quantity of the picked flowers from the beginning of blooming each time. We chose 10-10 of the picked flowers by random choice and measured the characteristics of flower quality: the diameter of the flower and the length of the stem.

RESULTS AND DISCUSSION

The effect of themediaontheheight of thecarnation

In case of the hydro-cultural growing of carnation both the polyurethane-ether sponge and Grodan had a good effect on the growth of the plant, both are adequate as a plantation media but the stock grown in the sponge was higher.

The effect of themediaontheyield of thecarnation

We managed to reach the average flower yield of 7-9 flowers per stem characteristic of the traditional chemo-cultural growing in case of hydro-cultural growing in polyurethane-ether sponge and in Grodan that is both are adequate plantation media for hydro-cultural growing (Fig 1.).

The effect of themediaontheflowerdiameter of thecarnation

During the two growing seasons of the experiments the average diameter of the flowers planted in polyurethane-ether sponge and in Grodan reached the parameters of 1st class flowers that is 7-cm flower diameter. We did not experience significantly better results in case of the two media so both are adequate for the hydro-cultural growing of carnation.

The effect of themediaonthelength of theflowerstem of carnation

The plantation media influenced neither the yearly nor the monthly length of the stem significantly in the years of research.

Taking the yearly average into consideration we reached the requirement of 1st class quality that is 55-60-cm stem length in case of both media.

Considering all the above both polyurethane-ether sponge and Grodan are adequate media for hydro-cultural growing.

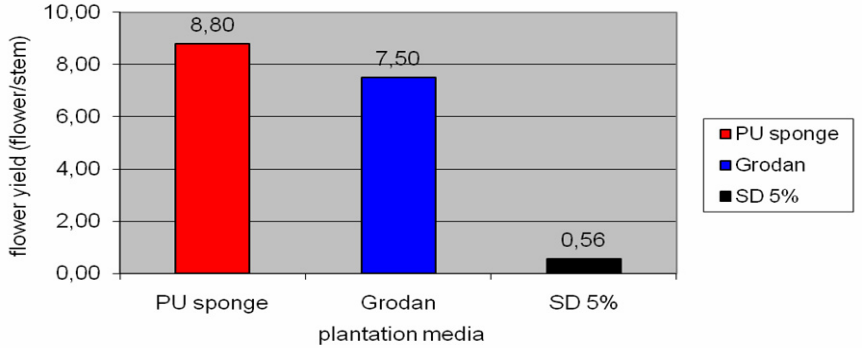

Figure 1: The effect of plantation media on the yearly yield of carnation 'Pink Castellaro'

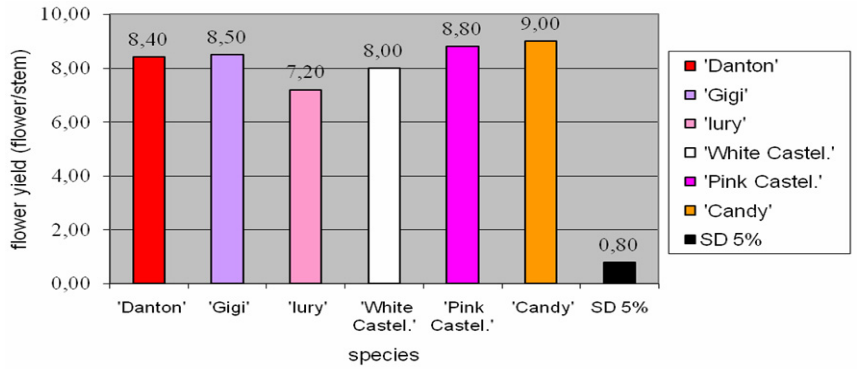

Figure 2: The effect of the species of carnation on the yearly yield

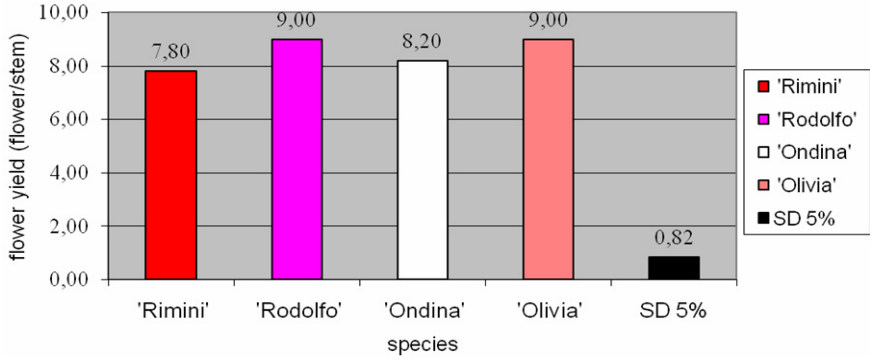

Figure 3: The effect of the species of carnation on the yearly yield

The effect of the species ontheheight of thecarnationplant

During growing in 2009 and 2010 'Candy' was the shortest. There was no significant difference between the two species of 'Castellaro'. From among the red species 'Iury' was significantly shorter than the others. In case of the plantation in 2010 and 2011 'Rimini', 'Rodolfo' and 'Olivia' were species of fast growth and 'Ondina' was the shortest.

The effect of the species on the yield of carnation

Taking the plantations of 2009-2010 and 2010-2011 into consideration we can state that the species involved in the research reached the characteristic 7-9 pieces of flower yield per stem characteristic of the traditional growing. There was little difference among the species that is they are adequate for hydro-cultural growing. The yield of 'Iury' was the smallest that is why its application in hydro-cultural growing has to be considered (Fig 2.). We have got similarly good results in case of species involved in the experiments in 2009-2010 and 2010-2011, the yield per stem was between 7,7 and 9,0 (Fig 3.).

The effect of the species on the flower diameter of carnation

Most of the species in the experiment reached or exceeded the parameters of 1st class products determined by the standards, minimum was 7.0 except for the values of 6,91 and 6,96 of 'Candy' and 6,87 and 6,89 of 'Ondina' average yearly flower diameter.

The largest flower diameters of the red species were experienced in the case of 'Iury' and 'Rodolfo', from the point of flower diameter these species are worth being involved in hydro-cultural growing. In case of the 'Castellaro' species 'Pink Castellaro' produced significantly larger flowers.

The effect of the species on the length of the flower stem of carnation

From among the species planted in 2008 and 2009 'Candy' did not reach the 1st class flower quality of 55-cm stem length determined by the standards. There was little difference among the red species and it was characteristic of the 'Castellaro' species too. In 2009 and 2010 the species produced good quality.

CONCLUSIONS

Experiments with the media

- *During the hydro-cultural growing which is more and more popular in our country the generally used Grodan and the polyurethane-ether foam sponge that proved to be adequate based on the Belgian results carnation is adequate for hydro-cultural growing*
- *PU sponge offers steady, unique, good development for carnation grown in greenhouse while Grodan offers smooth but a bit smaller growth.*
- *Both media had a favourable effect on the yield per stem of carnation but the stock planted in sponge gave more flowers than that grown in Grodan.*
- *Taking blooming into consideration both media of hydro-cultural growing the time of peak blooming in case of carnation grown in greenhouse was March-April that resulted higher return.*
- *The two media used in our experiments resulted in good flower quality characteristics.*
- *Taking the results of preliminary and post-experiments also into consideration the PU sponge is of loose structure so rooting of the plant is faster.*

Experiments with the species

Based on the four-year research work we sum up our statements referring to the species according to the followings:

- *'Danton' is of high growth, of good yield, with large flowers and long stem*
- *'Gigi' is of high growth, of good yield, with large flowers and long stem*
- *'Iury' is of high growth, of average yield, with large diameter of flower and long stem*
- *'White Castellaro' is of high growth, of good yield, with large diameter of flower and long stem*
- *'Pink Castellaro' is of high growth, of excellent yield, with large flower and long stem*
- *'Candy' is of average growth, of excellent yield, with average size of flowers, with average long stem*
- *'Rimini' is of high growth, of good yield, with large flowers, really long stem*
- *'Rodolfo' is of high growth, of excellent yield, really large flowers, really long stem*
- *'Ondina' is of average growth, of good yield, with average size of flowers, long stem*
- *'Olivia' is of high growth, of excellent yield, with large flowers and long stem*
- *Each of the species in the survey is adequate for hydro-cultural growing.*
- *Concerning environmental protection PU sponge is more and more adequate media for growing carnation since it can be used until complete decomposition.*

- *Both PU sponge and Grodan have got a favorable effect on the growth of the plant, the yield of the flowers and the flower quality characteristics that is why Grodan is also an adequate media for the hydro-cultural growing of carnation.*

Based on the results of the four-year experiments we recommend hydro-cultural growing in case of the species of carnation in our experiments. The species 'Rodolfo', 'Olivia' and 'Pink Castellaro' are considered especially promising. The species 'Iury' and 'Candy' got worse qualification according to our experiment, we recommend them for increasing the choice.

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