THE PREPARATION OF GARDEN HYACINTH BULBS (*HYACINTHUS ORIENTALIS*) BY THERMAL TREATMENT FOR FORCED CULTIVATION WITHIN PROTECTED SPACE

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Abstract:
The common, garden or Dutch hyacinth (Hyacinthus orientalis) can be cultivated in parks as a decoration plant and also as vase flowers or in protected space for vase flowers during winter time and early spring. A prerequisite condition for culture success is the quality of the bulbs to be planted and their biological preparation. From qualitative point of view, bulbs must be dimensionally uniform, preferably with larger circumference, over 16 cm and in a good phytosanitary condition. Biological preparation of the bulbs that ensures the continuity of the differentiation process of the floral buds, takes place also during their dormancy in the warehouse. It is a well acknowledged fact that the biological preparation of the bulbs is the consequence of the interaction of the environmental factors of which temperature plays an important role. During the initial phase and during the duration of the biological preparation, the temperature is maintained at a higher level, and then it must be decreased until planting. The level of the temperature and the duration of the treatment differ according to the objective namely, early or late flowering, for the timing of flower production over a larger period.

Key words: *Hyacinthus orientalis*, bulbs, flowers, biological preparation.

INTRODUCTION

The garden hyacinth (*Hyacinthus orientalis*) is a perennial, bulbous, horticultural species, originating from Mediterranean basin, introduced in Europe beginning with 1554 and in Romanian Countries from 1559. The conspicuous bulbs are protected by protected by external sheaths; the leaves are strap shaped, with indented or straight margin. The flower spikes are large, white, blue or purple, beared at the top of straight flowering stems of 25-32 cm long, depending on the cultivar.

The flowering season starts at the beginning of the spring and continues to the beginning of the summer in open field. Plants cultivated in greenhouse forced regime bloom during the winter or summer. The species is heliophilous but can be cultivated successfully in semi-shade. The plants are growing well on heavy soils and need moderate watering. It is also recommended to change the cultivation place, the re-cultivation the same species in the same place being possible only after 4 years.

Flower spikes harvesting is performed in the morning when the un-opened flower spikes are fully developed and colored, depending on the cultivar.

MATERIAL AND METHOD

The cultivar employed under the current study was the blue cultivar *Myosotis,* with large flowers and vigorous flower stem.

The treatments applied to the bulbs included two variants, namely:

1. V1 – the bulbs were maintained during two weeks at 30ºC until reaching the stage G (tri-lobed distinct carpel) realized on July, 18.
2. V2 – bulbs maintained at 20ºC until reaching the stage G, on July, 30.

Working volume was of 600 bulbs each variant, respectively 300 bulbs each sub-variant.

One half of the bulbs was preserved at 5ºC during 12 weeks (just after reaching the stage G) and the second half (or sub-variant) was preserved at 5ºC during 11 weeks and one week at 27ºC. Greenhouse planting was performed on October, 12 for V1 and on October, 23 for V2.

After bulbs were planted in the greenhouse, the near soil air temperature was maintained at three different levels: 13-14ºC, 8-9ºC and 3-4ºC.

RESULTS AND DISCUSSIONS

Table 1 shows the percentage of flowering plants presenting close values when bulbs have been maintained during the initial phase at 30 and 20ºC.

The forcing period can be reduced if one applies a temperature raising to27ºC after running the plants thought the phase of bud differentiation at 30 and 20 ºC, with an afterwards storage at 5ºC.

The time lapse from bulb planting and 50% flowering covers from 42 days when greenhouse temperature is maintained at a higher level (13-14ºC) to 75 days when greenhouse temperature is maintained at 8-9ºC. Previously, the bulbs were treated by maintaining the temperature at 20ºC during 12 weeks. As a consequence one can infer that the greenhouse temperature must be maintained at lower values at least at the beginning of the development cycle.

A similar conclusion can be drawn regarding the favorable influence of lower temperatures for optimizing flower quality (longer flower stems) as shown in table 2.

Table 1

The influence of temperature threshold during the period of biological preparation, storage, and after the greenhouse planting of the bulbs on the development and flowering of *Hyacinthus orientalis* plants

Variants	treatment	Planting date	Greenhouse temperature after bulb plantation								
			3-ºC			8-9ºC			13-14ºC		
			A	B	C	A	B	C	A	B	C
V1	12 weeks 5ºC	12 X	100	73	30	100	61	29	100	58	28
	11 weeks at 5ºC +1 week at 27ºC	12 X	100	55	28	99	48	27	98	42	26
V2	12 weeks 5ºC		100	88	36	100	75	34	100	64	28
	11 weeks at 5ºC +1 week at 27ºC		100	73	29	88	29	28	94	51	25

Note: A – Flowering percentage %: B – Number of days from planting to flowering: C – Flower stem length

Table 2

Temperature influence on the flower stem length in *Hyacinthus orientalis*

Variant	Flower stem length		D±	Significance of the difference
	Absolute (cm)	Relative (%)		
V1 12 weeks 5ºC	28	112	3	**
V2 11 weeks at 5ºC +1 week at 27ºC	25	100	-	-

Thermal treatment of garden hyacinth bulbs exerts favorable influences also upon the rooting. Table 2 shows that treated bulbs during the initial phase at 30 ºC and maintained at 5ºC, root after 7 days. As initial bulb treatment temperature period is shorter and the treatment is restarted at 27ºC, rooting period can be prolonged up to 17 days.

Table 3

The influence of treatment temperature of the bulbs upon subsequent rooting

Variant	Bulb treatment and maintenance duration	Number of days until bulb rooting
V1	12 weeks 5ºC	7
	11 weeks at 5ºC +1 week at 27ºC	9
V2	12 weeks 5ºC	12
	11 weeks at 5ºC +1 week at 27ºC	17

Table 4

Economical efficiency of the garden hyacinth forced culture exposed to thermal treatment (average values, 2010/2012)

Variant	Treatment after reaching phase G	Expenses (lei/ha)	Production value	Profit (lei/ha)
V1	12 weeks 5ºC	473,700	677,800	204,100
	11 weeks at 5ºC +1 week at 27ºC	409,800	658,500	248,700
V2	12 weeks 5ºC	486,000	673,400	193,400
	11 weeks at 5ºC +1 week at 27ºC	428,200	657,800	299,600

Economic efficiency is favorable in both variants but in the case of the sub-variant V2 (with 11 weeks at 5ºC plus 1 week at 27ºC) yields a better profit of 248,700 lei/ha. The higher profit is explained by the reduction of the forcing phase and the lowering of the expenses with heating for up to 25 days.

CONCLUSIONS

- Biological preparation of the garden hyacinth bulbs for the differentiation of the flower buds can be performed by using thermal treatment of different durations and different temperature levels.
- The extension of the thermal treatment with one week at 27ºC after 11 weeks at 5ºC induces the reduction of the forcing period and hence, the reduction of the production costs.
- Thermal treatment exerts a favorable effect upon the rooting of the garden hyacinth bulbs if they are treated initially at 30ºC followed by a treatment at 5ºC. Under these circumstances, the rooting is produced after only 7 days leading to a reduction of the forcing period and of the expenses.

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