

EVALUATION OF DIFFERENT METHODS FOR DRYING OF *ERYNGIUM PLANUM* AND *ECHINOPS RITRO* FLOWERS

EVALUAREA DIFERITELOR METODE DE USCARE A FLORILOR DE *ERYNGIUM PLANUM* ȘI *ECHINOPS RITRO*

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Abstract. *The plants of the genres Eryngium and Echinops assume distinctive ornamental qualities, being appreciated both in landscaping design and in floral art. In this paper are presented results regarding the drying of cut flowers obtained from Eryngium planum and Echinops ritro, with the purpose of utilization as immortelles. The drying of the inflorescences was achieved by two methods, respectively, simple drying in the dark and using a desiccant (silica gel). The results obtained show that for both species, the drying time is shorter and the water is eliminated in a higher percentage when using silicate. Eryngium inflorescences dried with silica gel have more intense blue tone; at Echinops ritro have been obtained the immortelles with similar aesthetic features with both drying methods.*

Key words: *Eryngium, Echinops, dried flowers, desiccant*

Rezumat. *Plantele din genurile Eryngium și Echinops au calități ornamentale deosebite, fiind apreciate atât în amenajarea grădinilor, cât și în arta florală. În lucrarea de față sunt prezentate rezultate privind uscarea florilor tăiate recoltate de la Eryngium planum și Echinops ritro, în vederea valorificării lor ca imortele. Uscarea inflorescențelor s-a realizat prin două metode, respectiv uscarea simplă la întuneric și prin folosirea unui desiccant (silica gel). Rezultatele obținute arată că, la ambele specii, durata de uscare este mai scurtă și cantitatea de apă eliminată este mai mare, atunci când uscarea se face în silica gel. Inflorescențele de Eryngium uscate în silica gel au avut culoarea albastru mai intens; la Echinops ritro s-au obținut imortele cu însușiri estetice asemănătoare, prin ambele metode de uscare.*

Cuvinte cheie: *Eryngium, Echinops, flori uscate, desiccant*

INTRODUCTION

In recent years, *Eryngium* and *Echinops* species are increasingly found in gardens, where they decorate in summer, autumn and winter, through dry inflorescences. Also, these plants have become more and more appreciated as cut flowers, used in floral workshops in compositions of arrangements and bouquets, due to their color and appearance, but also for the time resistance of floral stems (Armitage, 1993).

In floral compositions, the use of *Eryngium* cultivars is increasingly being used due to the unique appearance of the inflorescences and the effect they offer

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in arrangements. Although used with a secondary role in floral creation, they often become the center of attraction in compositions (Everett, 1960).

The plants of *Eryngium* and *Echinops* are considered to be immortelles by adoption because they retain their shape and color after drying. For long-lasting floral stems, it is recommended to dry in the dark, in well-ventilated rooms or with a desiccant (Armitage, 1993).

MATERIAL AND METHOD

The experiments took place in 2017, in the laboratory of Floriculture, at the University of Agricultural Sciences and Veterinary Medicine from Iasi, Romania. The floral material used in the experiment is the inflorescences of the *Eryngium planum* and *Echinops ritro* species and the methods of drying the material are by the classical method (in the dark) and by means of a desiccant (silica gel).

Eryngium planum presents glaucous leaves, pale blue flowers grouped in umbels and it blooms from July to August.

Echinops ritro is a perennial species that reaches heights between 40-60 cm. Leaves are simple, green; the flowers are grouped in spherical inflorescences, blue color, and it blooms from July to September.

Uses of *Echinops* and *Eryngium* species can be in dry state, because the flowers maintains its characteristics after drying. For drying, the optimal harvest time (fig. 1) is in colorful bud stage (Ellis, 2000).

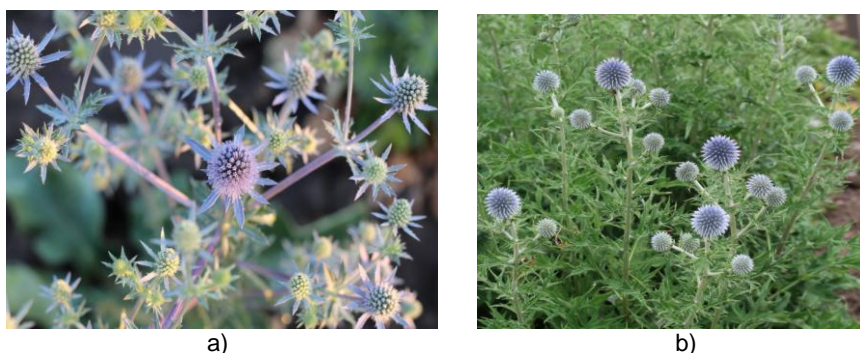


Fig. 1 Optimum harvest time for *Eryngium planum* (a) and *Echinops ritro* (b) (original)

The classic method of drying is considered an effective and easy to implement, drying of inflorescences with the top down, into dark and in well-ventilated rooms. It is important that immortelles are not exposed to light during the drying process, because some decorative parts are discolored, resulting in poor quality finishing materials. It is recommended that bouquets meant to be dried are made up of few threads to avoid the risk of pressing. Their positioning with the tip down is also important if a right flowering rod is ultimately followed (Draghia and Chelariu, 2011).

The silica gel is also used for drying flowers because it absorbs moisture quickly and keeps colors better than other drying methods. Drying must be done in closed containers so that the silicate does not absorb the humidity in the atmosphere, which can lead to delayed drying of the flowers (Smith *et al.*, 1998). Inflorescences were harvested from plants in colorful bud phase plants, in dry time, at noon.

Experimental factor is the drying method: V_1 - dark drying; V_2 - silica gel drying. The plants were considered dry when, after weighing, they kept their constant weight.

The parameters observed were: influence of both methods on drying time, expressed in days from harvest to drying of inflorescences; influence of drying methods on the percentage of water eliminated daily after drying.

RESULTS AND DISCUSSIONS

The difference between the drying time by classical method and the silicate versus the average of the experience is about 2 days. Dried plants in the dark were conserved with 27.87% later than the average of the experience, while those dried with silicate dried with 26.63% faster (tab. 1). The silicate method has the advantage of a faster drying time of cut flowers, with 3 days compared to the drying method in the dark.

Table 1

Influence of methods for preserving on cut flowers of *Eryngium planum*

Variant (preservation solution)	Drying (no. of days)		Differences (± days)	Significance of differences
	Absolute value	Relative value (%)		
V_1	7.8	127.83	1.65	**
V_2	4.5	73.17	-1.65	oo
Average (control)	6.15	100.00	-	-
				LSD 5% = 0.8 LSD 1% = 1.5 LSD 0.1% = 3.2

Following the experiments on the drying of *Echinops ritro* plants (tab. 2) by the two methods: in the dark, in a well-ventilated room and with the help of silicate, it can be noticed that the drying time is lower in the case of the immortelles obtained with crystals of silica gel (13.5 days) than in the dark (16.5 days). Compared to the average of experience, both methods record a difference of 1.5 days.

Table 2

Influence of preserving methods on cut flowers of *Echinops ritro*

Variant (preservation solution)	Drying (no. of days)		Differences (±days)	Significance of differences
	Absolute value	Relative value (%)		
V_1	16.5	110.00	1.5	*
V_2	13.5	90.00	-1.5	o
Average (control)	15.0	100.00	-	-
				LSD 5% = 1.3 LSD 1% = 2.4 LSD 0.1% = 5.3

The advantage of drying *Eryngium planum* plants with silicate is to keep the color blue, in a toner more intense compared with dried flowers obtained by the classic drying method (fig. 1). Another advantage is the intact form of the bracts, compared to the classic drying where they are not as aesthetic.



a) b)
Fig. 2 Plants of *Eryngium planum* after drying: a-dark drying, b-silicate drying

Differences between the dried flowers of *Echinops ritro* obtained by the two methods are minimal in their aesthetic aspect. The only aspect is in the foliage that it is more aesthetically dried in desiccant than in the dark, as its shape has been preserved (fig. 3). The color of the inflorescences was retained by both drying variants, as well as the globular form.



a) b)
Fig. 3. Plants of *Echinops ritro* after drying: a) dark drying; b) silicate drying

In the drying process the plants remove the water from the tissues and the esthetically appropriate immortelles can be obtained in a shorter time with the help of a suitable drying method.

The percentage of water lost through the silicate method is higher than the conventional method by 2.7% and the average of the experience by 1.4% (tab. 3).

Table 3

Influence of preserving methods on the daily water loss percentage of *Eryngium planum*

Variant (preservation solution)	% of every day water loss	Differences ($\pm\%$)	Significance of differences
V ₁	4.8	-1.35	oo
V ₂	7.5	1.35	**
Average (control)	6.15	-	-
			LSD 5% = 0.6
			LSD 1% = 1.2
			LSD 0.1% = 2.6

The classical method records differences compared to the average of the experience, distinct significant in the negative sense having a more reduced percentage with 1.3% (tab. 3).

Drying in the dark for the *Echinops* floral stems brought with it the loss of water in the lowest percentage (tab. 4), recording values that are distinct significant in the negative sense, otherwise for plants whose drying was achieved with desiccant silica gel, showing positive differences of 0.2% compared to the average of the experience.

Table 4

Influence of preserving methods on the daily water loss percentage of *Echinops* *ritro*

Variant (preservation solution)	% of every day water loss	Differences ($\pm\%$)	Significance of differences
V ₁	2.6	-0.25	oo
V ₂	3.1	0.25	**
Average (control)	2.85	-	
			LSD 5% = 0.1
			LSD 1% = 0.2
			LSD 0,1% = 0.5

The plants of *Eryngium* and *Echinops* (fig. 4) can be used in floral workshops with a secondary role in the design of arrangements, vegetal pictures, bouquets with fresh cut flowers, roses and other preserved flowers, fruits or other auxiliary materials (branches, forests, lichens etc.).



Fig. 4 Valuation of *Eryngium planum* floral stems in dry condition (original): a) combination with preserved roses; b) association with preserved roses and lichens; c) association with fresh, dried flowers and fruits

Due to the color and shape of *Echinops* inflorescences, it can be successfully used as a secondary role in the composition of rustic floral

arrangements. Bouquets and floral arrangements containing these types of flowers are associated with flowers in similar colors or shades in contrast (fig. 5).



Fig. 5 Valuation of flowering *Echinops ritro* stems in dry condition (original): a) association with preserved roses; b) association with preserved roses and fruits; c) association with fresh flowers and fruits

CONCLUSIONS

1. The drying time of *Eryngium* and *Echinops* plants is shorter when using silicate than drying in the dark.

2. *Eryngium* floral stems dried with desiccant silica gel resulted in a more intense blue tone than dried by classical method.

3. The form of bracts for *Eryngium planum* was better preserved in silicate containers.

4. In *Echinops ritro* have been obtained the immortelles with aesthetic features similar to both drying methods.

5. Water is eliminated in a higher percentage, in a shorter time for both *Eryngium planum* and *Echinops ritro*, with the use of the silica gel.

6. The immortelles obtained both from *Echinops ritro* and *Eryngium planum* are special ornamental materials for the realization of dried floral compositions.

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