VASE LIFE BEHAVIOUR OF CUT GLADIOLUS FLOWERS IN DIFFERENT STORAGE SOLUTIONS

COMPORTAREA FLORILOR TĂIATE DE GLADIOLE IN DIFERITE SOLUȚII DE PĂSTRARE

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Abstract. *Gladiolus cultivars were evaluated during the summer season of 2012 at USAMV Cluj-Napoca, Horticultural Storage Laboratory, for their vase life behaviour of the cut spikes with different concentrations solutions under normal room temperature. Eight commercial varieties of gladiolus, namely 'Corula', 'Candida Ali', 'Cipriana', 'Nova Lux', 'Priscilla', 'Jester' , 'Peter Pears' and 'White Prosperity' were treated with the next four solutions: Bell Fleur, Chrysal, Native and sucrose 3% + citric acid 0,015% to determine the best solution for preservation and the vase life of cut flowers. Control flowers were stored in tap water. Furthermore was tested the unilateral influence of cultivars concerning the vase life. Results of laboratory experiment on the effect of different concentrations of solutions in the vase life behaviour of Gladiolus cut spikes under normal room temperature (25°C) demonstrated that Bell Fleur solution was the most effective substrate in prolonging the vase life (14.1 days). 'White Prosperity' and 'Priscilla' cultivars show positive significant compare with control cultivar ('Cordula'), in all the preservative solutions including tap water.*
Key words: *cut flower gladiolus, preservation, vase life*

Rezumat. *Soiuri de gladiole au fost evaluate în perioada de vară 2012 privind comportarea lor ca flori tăiate în diferite soluții conservante în condiții de cameră la USAMV Cluj-Napoca, laboratorul de Păstrare a Produselor Horticole. Opt soiuri comerciale de gladiole 'Corula', 'Candida Ali', 'Cipriana', 'Nova Lux', 'Priscilla', 'Jester', 'Peter Pears' and 'White Prosperity' au fost testate în următoarele patru soluții conservante: Bell Fleur, Chrysal, Native şi zahăr 3% + citric acid 0,015%, pentru a determina cea mai bună soluție de conservare şi durata de păstrare a florilor tăiate. Compararea s-a făcut cu flori păstrate în apă de robinet. De asemenea, s-a testat şi influența unilaterală a soiurilor, comparativ, privind durata de păstrare. Rezultatele experiențelor de laborator asupra efectului diferitelor concentrații de soluții conservante privind comportarea spicelor de gladiole la temperatura camerei (25°C) au demonstrat că soluția Bell Fleur a fost cea mai bună pentru a prelungi durata de păstrare (14.1 zile). Soiurile White Prosperity' şi 'Priscilla' au prezentat semnificații pozitive comparativ cu soiul martor ('Cordula'), în toate soluțiile conservante, inclusiv apa de robinet.*
Cuvinte cheie*: flori tăiate gladiole, păstrare, soluții conservante*

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INTRODUCTION

Cut flowers of Gladiolus occupy a major share in floriculture industry. For a viable cut flower business it is very important to maintain high quality of the produce. The qualitative and quantitative post harvest losses of gladiolus can be reduced by adopting improved technologies like harvesting at proper stage, use of floral preservatives and bud opening solution, pulsing, precooking, improved storage techniques such as low temperature storage, proper packaging methods etc. (Yoram et al., 1981).

The effects of 6 pretreatment on the freshness index of cut Gladiolus showered an increased of the Gladiolus vase life (Reid and Award 1980). Lazăr (2006) shows that the concentration of sucrose from solutions for the impulsion of Gladiolus flowers is 20%.

The longevity of gladiolus cut flowers is very short and for the florists and consumers one of the most important factors is to try to prolong the vase life of cut flowers. The typical vase life of individual florets is just 4 to 6 days and senescent florets remain at the bottom of the spikes after the opening of the upper florets (Yamada et al., 2003).

Rasul Jalili Marandi et al., 2011 showed that Salicylic acid (SA) and essential oils alone cannot provide very good preservative to increase of vase life of cut gladiolus flowers and for best efficacy this substances should be combined with chemical components such as STS (silver thiosulphate). Experiments of Ezhilmathi et al., 2007 suggest that 5-SSA (5-sulfosalicylic acid) increases vase life by rising the reactive oxygen species (ROS) scavenging activity of the *Gladiolus* cut flowers.

Preservative solutions are widely used in all major countries producing flowers, to help maintain quality and prolong the life of cut flowers. The components of preservative solutions differ from one species to another, depending on the sensitivity to certain substances flowers. Also, the concentration of sugars and other substances that make up solutions for a particular species of flower is different, depending on the intended solution (Draghia and Chelariu, 2011).

Preservative solutions can be used to fortify or strengthen flowers after they have suffered from lack of water to boost or loading rods with sugars and antimicrobials before transporting or storing refrigerated for opening buds and for preserving in stores or to the consumer.

MATERIAL AND METHOD

The experiment has been carried out in 2012 at the Horticultural Storage Laboratory, USAMV Cluj-Napoca; the aim of the research was to screen out the suitable fresh-keeping agent of eight gladiolus cultivars. There were observed the following factors (table 1):

Biological material, which has been studied, was obtained from the teaching collection of Floriculture department, were harvested in the morning, when the turgid flowers was highest. The cutting moment of flower sticks interfere with the optimal harvesting moment (1-2 bud opened), stored in preservation solutions in habitual conditions of light and temperature specific for an apartment (Lazăr, 2006). During

vase life of cut flowers were done observations regarding the general aspect of inflorescent according with: floral stems, flowers blossom, turgid and the decorative value of cut flowers.

Table 1

Experimental Factors

Factor		
Cultivar	**Color**	**Fresh-keeping agent**
Cordula (Control)	Red-cream	Sink water (Control)
Priscilla	Pink-cream	Bell Fleur
Cipriana	Yellowed green	Chrysal
Nova Lux	Yellow with purple striations	Native
Jester	Yellow – red	sucrose 3% + citric acid
Peter s Pears	Orange	0.015%
Candida Ali	Pink-mauve	
White Prosperity	White	

Biological materials were represented by Gladiolus cultivars obtained from commerce and Romanian cultivars obtained at USAMV Cluj (Fig. 1).

All flowers were introduced in solutions and kept at about 25°C, in room conditions.

Data obtained concerning the days of vase life were synthesized by LSD test analysis to illustrate the differences between these varieties (Ardelean et al., 2007).

Fig. 1 – *Gladiolus* biological materials

RESULTS AND DISCUSSIONS

According with the results presented in the table 2, about unilateral influence of cultivar on vase life, it can be showed that all the eight *Gladiolus* cultivars studied have a different development preserved in vase comparing with the control cultivar with an average of vase life about 11.7 days, three cultivars recorded positively deviations, two cultivars had negatively deviations, while the other two with positive deviations recorded statistical not proved.

Table 2

The influence of the cultivar on vase life

Cultivar	Vase life (days)	± Difference in comparison with control	Significance of difference
Cordula (Control)	11.7	-	-
Priscilla	13.9	2.2	**
Cipriana	9.6	-4.3	ooo
Nova Lux	9.9	0.3	-
Jester	12.3	2.4	**
Peter s Pears	13.1	0.8	-
Candida Ali	10.6	-2.5	oo
White Prosperity	16.7	6.1	***

LSD 5% 1.38, LSD 1% 1.84, LSD 0.1% 2.65

Analyzing unilateral influence of the cultivar on vase life, results that 'White Prosperity' cultivar showed a positively difference of 6.1 days, difference which is very significant. Positively results statistical registered, showed 'Jester' cultivar (2.4 days) and 'Priscilla' cultivar (2.2 days), with distinct significant positive deviation. 'Nova Lux' and 'Peter's Pears' cultivars, although showed positive deviations, the differences in comparison with control are very low, statistical not proved. At the opposite, is situated 'Candida Ali' with negative deviations distinct significant negative and 'Cipriana' very significant negative. The results presented in table 3 show that all the five preservative solutions used influenced different vase life period for *Gladiolus* cultivars.

Table 3

The influence of preservation solution on vase life period

Fresh-keeping agent	Vase life (days)	± Difference in comparison with control (days)	Significance of difference
Sink water (Control)	10.7	-	-
Bell Fleur	14.1	3.4	***
Chrysal	13.2	2.5	***
Native	11.8	1.1	**
sucrose 3% + citric acid 0.015%	11.4	0.7	(*)

LSD 5% 0.72, LSD 1% 0.96, LSD 0.1% 1.25

Vase life of cut flowers preserved in commercial solutions (Bell Fleur, Chrysal, Native) showed deviation statistical proved and in sucrose 3% + citric acid 0.015% solution the deviation is positive and near by limited difference of 5% (LSD 5%). The combined effect of preserve solutions with the influence of cultivar on vase life (table 4) highlight 'White Prosperity' cultivar, which shows positive deviations very significant compare with control ('Cordula'), in all the preservative solutions in which was stored, including sink water. Positive deviations statistical registered, showed 'Priscilla' cultivar for which the difference is distinct significant for Bell Fleur solution (3.4 days), also significant for Chrysal solution (2.4 days) and Sucrose 3% +

citric acid 0.015% (2.3 zile). The lowest results regarding preservation of gladiolus were statistical registered with negative deviation for 'Cipriana' and 'Nova Lux' cultivars for all three commercial solutions recommended for cut flowers.

Table 4

The influence of preservation solution and cultivar on vase life

Variant		Vase life (day)	± Difference in comparison with control	Significance of difference
Fresh-keeping agent	**Cultivar**			
Tap water (Control)	Cordula (Mt.)	9.7	-	-
	Priscilla	11.7	2.0	-
	Cipriana	9.0	-0.7	-
	Nova Lux	8.7	-1.0	-
	Jester	10.7	1.0	-
	Peter s Pears	11.7	2.0	-
	Candida Ali	8.7	-1.0	-
Bell Fleur	White Prosperity	15.7	6.0	***
	Cordula (Mt.)	13.3	-	-
	Priscilla	16.7	3.4	**
	Cipriana	11.0	-2.3	o
	Nova Lux	11.7	-1.6	-
	Jester	13.7	0.4	-
	Peter s Pears	15.0	1.7	-
Chrysal	Candida Ali	12.3	1.0	-
	White Prosperity	18.7	5.4	***
	Cordula (Mt.)	13.3	-	-
	Priscilla	15.7	2.4	*
	Cipriana	9.3	-4.0	oo
	Nova Lux	10.7	-2.6	o
	Jester	13.3	-	-
	Peter s Pears	14.3	1.0	-
	Candida Ali	11.3	-2.0	-
	White Prosperity	17.7	4.4	***
Native	Cordula (Mt.)	11.7	-	-
	Priscilla	12.3	0.6	-
	Cipriana	9.3	-2.4	o
	Nova Lux	9.3	-2.4	o
	Jester	12.7	1.0	-
	Peter s Pears	12.7	1.0	-
	Candida Ali	10.7	-1.0	-
	White Prosperity	16.0	4.3	***
	Cordula (Mt.)	10.7	-	-
Sucrose 3% + citric acid 0.015%	Priscilla	13.0	2.3	*
	Cipriana	9.3	-1.4	-
	Nova Lux	9.0	-1.7	-
	Jester	11.3	0.9	-
	Peter s Pears	12.0	1.3	-
	Candida Ali	10.0	-0.7	-
	White Prosperity	15.7	5	***

LSD 5% 2.28, LSD 1% 3.03, LSD 0.1% 4.08

CONCLUSIONS

The scientific results obtained regarding the behavior of some *Gladiolus* cultivars at preservation in preservative solutions conduct to the next conclusions:

The observed cultivars behaved different at preservation in preservative solutions. The best results were obtained at ‚White Prosperity' cultivar for which the difference of 6.1 days compared with control is very significant;

Regarding with the unilateral influence of preservative solution on vase life it can be observed compared with control (sink water) that solutions recommended by traders, also self recipe shoed significant positive differences between 0.7 – 3.4 days.

The interaction of the two factors analyzed pointed out the 'White Prosperity' presented a very significant positive deviations in all preservative solution and 'Priscilla' cultivar which statistical registered show positive deviations for three preservative solutions of five, used.

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