

## IMPROVING CHRISTMAS ROSE (*Helleborus niger* L.) YOUNG PLANTS PRODUCTION

Maria Piskornik

**Abstract.** At the stage of the first or second leaf christmas rose seedlings were pricked to pots or to multiple pots, the roots being rolled or nipped off during the operation. The quality of young plants was estimated by determining the fresh weight, number, and length of leaves and roots. The best quality of young plants was obtained from christmas rose seedlings pricked at the stage of the second leaf and with roots rolled when planted to pots.

**Key words:** christmas rose, seedlings, pot culture

### INTRODUCTION

Christmas rose is a perennial highly esteemed by plant lovers on account of its early and very abundant blooming in early spring. The flower characterized by a fairly long vase-life, is a good material for bouquets. Thanks to wintergreen leaves the perennial shows decorative usefulness throughout the year. Difference from neighbour countries [Heuger 2001], in spite of its values, the species is hardly available in nurseries owing to its fairly difficult propagation both by generative or vegetative methods and to inconsistent directions found in the literature. The aim of the present studies was to improve the production of christmas rose from seeds. It seems the more necessary that the producers of the discussed plants should obtain such recommendations which should not disturb plant vegetation at any production stage. This would permit the plant producers obtaining commercial material of the best quality in the possibly shortest time and compete with flowers imported from Western countries.

### MATERIAL AND METHODS

The seedlings of christmas rose were obtained from seeds selected by the author. In the presented experiments a mixture of peat substrate for transplant production, garden-mould, and perlite at 1:1:0.25 ratio and of pH 6.8–7.0 was used. Two weeks after the

pricking the plants were watered with a 0.1% solution of Florovit fertilizer at the dose of 15 ml/plant every seven days. 120 plants represented each experimental object, 30 plants in each of four replications. The quality of young plants was estimated by determining the fresh matter (g) of leaves and roots.

In 1997 an experiment with three variables was designed in an independent system. Christmas rose seedlings were pricked on June 7, at the stage of the first or second photosynthetic leaf, roots being rolled or nipped off during this operation. The seedlings were planted in pots 7.0 cm in side length or in Vefi multiple pots 5.5 cm in side length. On September 27 the number and length (cm) of leaves were additionally estimated in evaluating the quality of young plants. Since towards the end of the vegetation season the young plants of christmas rose grown in multiple pots were much poorer than that in pots, this combination was discarded. In the successive years experiments with two variables were conducted, seedlings being planted in 7.0 cm pots. In 1998 the seedlings were pricked on May 23 while the quality of young plants was estimated on October 29. A successive experiment was carried out from June 21 to September 26, 1999. In estimating the quality of young plants the number and length (cm) of leaves and roots were additionally determined. In 2002 the seedlings were pricked on July 24, the quality of young plants being estimated on October 4. The number and length of leaves and the length of roots were also taken into consideration.

The results of the experiments were statistically verified using analysis of variance for two or three variables, using the Student t test at the significance level of 0.05.

## RESULTS AND DISCUSSION

Of the three variables of the experiment the type of containers where the plants were grown, had the strongest effect on the quality of young plants estimated by the fresh weight of leaves and roots. The weight of leaves was also affected by the time of pricking seedlings. The treatment of roots during this operation also affected the fresh weight and length of leaves (tab. 1).

The greatest fresh weight and number of leaves, deciding on their quality, were found when the seedlings were pricked to pots in the phase of the second leaf with their roots rolled. The seedlings at the same stage planted in multiple pots showed a smaller fresh weight than in pots irrespective of the method of treating roots. The above dependence did not appear with pricking seedlings in the phase of the first leaf. In the case of nipping off roots of seedlings pricked at the stage of the first leaf the size of pots did not affect the length of leaves in the young plants. In other cases plants growing in pots developed longer leaves than in multiple pots. The fresh weight of roots was greater in transplants growing in pots than in multiple pots. The greatest weight was found in the treatment with roots of seedlings nipped off when pricked to pots at the stage of the first leaf (fig. 1).

The results of experiments conducted in the successive years confirmed the tendencies observed in the first year of the study (tab. 2, tab. 3).

In 1999 and 2002 (tab. 3) the greatest fresh weight of plant tops and the greatest number of leaves of the greatest length (only in 1999) were found in transplants of

Table 1. Effect of the stage of seedling development, shortening of roots in pricking, and the size of pots on the quality of christmas rose young plants

Tabela 1. Wpływ stadium rozwoju siewek, skracania korzeni i wielkości pojemnika na jakość rozsady ciemiernika białego

Seedlings pricked at the stage of Siewki pikowane w stadium	Roots during pricking Korzenie w trakcie pikowania	Pricking to Pikowanie do	Quality of young plants – Jakość rozsady			
			Fresh weight of leaves Świeża masa liści (g)	Number of leaves Liczba liści	Length of leaves Długość liści (cm)	Fresh weight of roots Świeża masa korzeni (g)
The first leaf Pierwszego liścia	rolled	A	2.7 bc*	4.8 bc	4.9 b	1.9 b
	zwijane	B	2.5 ab	4.8 bc	3.6 a	1.4 a
	nipped off	A	2.4 ab	4.5 ab	3.9 a	3.0 d
	uszczykiwane	B	1.9 a	4.0 a	3.6 a	1.5 a
The second leaf Drugiego liścia	rolled	A	3.6 d	5.3 c	4.7 b	2.5 c
	zwijane	B	2.4 ab	4.7 bc	3.8 a	1.3 a
	nipped off	A	3.5 cd	5.0 bc	4.7 b	1.9 b
	uszczykiwane	B	2.4 ab	4.8 bc	3.6 a	1.3 a

\*Means in columns marked with the same letters do not differ significantly

\*Wartości średnie w kolumnach oznaczone tymi samymi literami nie różnią się istotnie

A – pots – doniczki,

B – multiple pots – komora wielodoniczki

Table 2. Effect of the stage of growth and shortening of roots in pricking the seedlings on the quality of plant tops of christmas rose young plants

Tabela 2. Wpływ stadium rozwoju i skracania korzeni w trakcie pikowania na jakość części nadziemnej ciemiernika białego

Seedlings pricked at the stage of Siewki pikowane w stadium	Roots during pricking Korzenie w trakcie pikowania	Quality of plant tops – Jakość części nadziemnej						
		Fresh weight of leaves Świeża masa liści (g)			Number of leaves Liczba liści		Length of leaves Długość liści (cm)	
		1998	1999	2002	1999	2002	1999	2002
The first leaf Pierwszego liścia	rolled	1.6 a*	2.5 b	2.0 ab	4.9 ab	4.1 a	8.7 a	5.6 a
	zwijane							
	nipped off	2.0 b	1.9 a	1.6 a	4.7 a	3.9 a	8.4 a	6.0 a
	uszczykiwane							
The second leaf Drugiego liścia	rolled	1.8 ab	3.9 c	2.2 b	5.5 c	5.3 b	11.9 b	6.0 a
	zwijane							
	nipped off	1.6 a	2.2 ab	1.4 a	5.2 bc	4.6 ab	8.0 a	5.2 a
	uszczykiwane							

\*see table 1 – patrz tabela 1

christmas rose pricked with rolled roots at the stage of the second leaf (tab. 2). In 1998 only the greatest fresh weight of leaves was found in young plants obtained from seedlings pricked at the stage of the first leaf and with roots nipped off. In 2002 the factors of the experiment did not affect the length of leaves in young plants.

In 1998 and 2002 the greatest fresh weight of roots was determined in young plants obtained from seedlings whose roots were rolled in the operation of pricking at the stage of the first leaf (tab. 3). In 1999 this was observed with the same treatment of roots though at the stage of the second leaf. The greatest number of roots was found in the



Fig. 1. Quality of christmas rose young plants depending on pricking seedlings to pots or to multiple pots: I – seedlings pricked at the stage of the first leaf, II – seedlings pricked at the stage of the second leaf, A – nipping off roots, B – rolling roots

Rys. 1. Jakość rozsady ciemiernika białego w zależności od pikowania siewek do doniczek lub komórek wielodoniczek: I – siewki pikowane w stadium pierwszego liścia, II – siewki pikowane w stadium drugiego liścia, A – korzenie uszczykiwane, B – korzenie zwijane



Fig. 2. Quality of young plants depending on the time and method of root treatment in pricking Christmas rose seedlings: I – seedlings pricked at the stage of the second leaf, II – seedlings pricked at the stage of the first leaf, A – nipping off roots, B – rolling roots

Ryc. 2. Jakość rozsady w zależności od terminu i sposobu traktowania korzeni w trakcie pikowania siewek ciemiernika białego: I – siewki pikowane w stadium pierwszego liścia, II – siewki pikowane w stadium drugiego liścia, A – korzenie uszczykiwane, B – korzenie zwijane

Table 3. Effect of the stage of growth and root shortening during pricking seedlings on the quality of the underground part in christmas rose young plants

Tabela 3. Wpływ stadium rozwoju i skracania korzeni w trakcie pikowania na jakość części podziemnej rozsady ciemiernika białego

Seedlings pricked at the stage of Siewki pikowane w stadium	Roots during pricking Korzenie w trakcie pikowania	Quality of underground part of young plant Jakość części podziemnej					
		Fresh weight of roots Świeża masa korzeni (g)			Number of roots Liczba korzeni	Length of roots Długość korzeni (cm)	
		1998	1999	2002		1999	2002
The first leaf Pierwszego liścia	rolled zwijane	2.2 b*	2.3 a	1.8 b	6.3 a	8.9 a	6.8 a
	nipped off uszczykiwane	1.8 a	1.7 a	1.0 a	6.4 a	8.5 a	6.4 a
The second leaf Drugiego liścia	rolled zwijane	1.6 a	3.0 b	1.6 ab	6.5 a	10.5 b	6.3 a
	nipped off uszczykiwane	1.6 a	2.2 a	1.2 ab	7.2 b	8.4 a	6.1 a

\*see table 1 – patrz tabela 1

case of nipping them off in seedlings pricked at the stage of the second leaf. The variables of the experiment did not affect the length of roots in young plants apart from those obtained in 1999 from seedlings pricked at the stage of the second leaf and with roots rolled (fig. 2).

If the christmas rose is vegetatively propagated for a couple of years the plants become liable to degeneration. In such a case the simplest method is to use selected plants for the generative propagation. This easy method is also indispensable when greater numbers of plants have to be obtained.

In the first experiment christmas rose seedlings were pricked at the stage of the first or second leaf to containers of a multiple pot 5.5 cm in side length or to pots 7.0 cm in side length, with roots rolled or nipped off. Wicki-Freidl [1988] recommended planting christmas rose seedlings to pots 8–9 cm in diameter and transplanting to pots 12–14 cm in diameter in August. The obtained results show that the multiple pots were too small and the seedlings grown in them without transplanting to the end of the vegetation, developed young plants of a poor quality. This observation confirmed the above author recommendation. However, if the seedlings were pricked to pots with 7.0 cm side length and 0.25 dm<sup>3</sup> in volume the plants could have remained there to the end of the season. This size of pots seems sufficient for obtaining young plants marketable in autumn for the field planting. The pricking of seedlings to large pots and additional transplanting to greater ones, as recommended by Wicki-Freidl [1988], considerably increase the costs of transplant production and do not seem indispensable.

Wicki-Freidl [1988] recommended the pricking of christmas rose seedlings with a clump of substrate at the stage of the second or first leaf. The results show that the young plants obtained from christmas rose seedlings pricked at the stage of the second leaf were of a better quality than if planted at the stage of the first leaf. The careful handling of roots of the seedlings and no nipping off during pricking also effected a better growth of plants.

## CONCLUSIONS

1. Christmas rose seedlings pricked to pots 7.0 cm in side length can grow there to the end of the vegetation season.
2. In the operation of pricking white christmas rose seedlings the roots should be rolled and protected from damage.
3. Christmas rose seedlings pricked at the stage of the second leaf produce young plants of a better quality than if pricked at the stage of the first leaf.

## REFERENCES

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## USPRAWNIANIE PRODUKCJI ROZSADY CIEMIERNIKA BIAŁEGO (*Helleborus niger* L.) Z NASION

**Streszczenie.** Siewki ciemiernika białego pikowano do doniczek lub wielodoniczek, w stadium pierwszego lub drugiego liścia właściwego, zwijając lub uszczykując korzenie w trakcie tej czynności. Jakość rozsady oceniono, określając świeżą masę, liczbę i długość liści oraz korzeni. Dobrą jakość rozsady uzyskano z siewek ciemiernika białego, których korzenie zwijano w trakcie pikowania do doniczek w stadium drugiego liścia właściwego.

**Słowa kluczowe:** ciemiernik biały, siewki, uprawa w pojemnikach

*Maria Piskornik, Department of Ornamental Plants, Faculty of Horticulture, University of Agriculture in Kraków, Al. 29 Listopada 54, 31-425 Kraków, Poland,  
e-mail: piskornikm@bratek.ogr.ar.krakow.pl*