THE INFLUENCE OF THE CUTTINGS EPOCH REGARDING THE ROOTING AT *ASTER NOVAE-ANGLIAE* SPECIES

INFLUENȚA EPOCII DE BUTĂȘIRE ASUPRA ÎNRĂDĂCINĂRII BUTAȘILOR DE *ASTER NOVAE-ANGLIAE*

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Abstract. *Species originating in North America (southern Canada, eastern and central USA) Aster novae-angliae L. (Symphyotrichum novae-angliae (L.) G.L. Nesom), was introduced in Europe as an ornamental species, which became naturalized in many countries, including Romania. Perennial and hemicriptophyte plant, it can multiply both by seed or vegetative way. This paper aims to study the propagation by plants cuttings from three local populations of Aster novae-angliae identified in individual gardens from NE area of Romania, respectively in Suceava and Botosani counties. There were made four types of stem cuttings (simple peak cuttings, simple cuttings of stem sections with a node, simple cuttings of stem sections with 3-5 nodes, cuttings with heel) in two epochs, using cuttings characterized by different degree of tissues maturations (herbaceous and semi-lignified). The results showed that for aster plants from Marginea population are effective herbaceous cuttings, for Humoreni population are effective the herbaceous cuttings of stem sections with one or more nodes, or semi-lignified cuttings with heel, and for Darabani population are effective especially herbaceous cuttings with heel.*
Key words*: Aster novae-angliae, vegetative propagation, cuttings, the cuttings epoch*

Rezumat. *Specie originară din America de Nord (sudul Canadei, estul și centrul SUA), Aster novae-angliae L. (Symphyotrichum novae-angliae (L.) G.L.Nesom) a fost introdusă în Europa ca specie ornamentală devenind naturalizată în mai multe țări, printre care și România. Plantă perenă, hemicriptofită, se înmulțește atât prin semințe, cât și pe cale vegetativă. Lucrarea are ca scop studiul capacității de înmulțire prin butași a plantelor aparținând a trei populații locale de Aster novae-angliae identificate în grădini individuale din zona de NE a României, respectiv din județele Suceava și Botoșani. S-au confecționat patru tipuri de butași de tulpină (simpli de vârf, simpli din tronsoane de tulpină cu un nod, simpli din tronsoane de tulpină cu 3-5 noduri, cu călcâi), în două epoci, folosindu-se butași caracterizați prin gradul diferit de maturare a țesuturilor (erbacei și semilignificați). Rezultatele obținute au demonstrat faptul că pentru plantele de aster din populația de Marginea este eficientă folosirea butășilor erbacei, pentru cele din populația de Humoreni butașii erbacei din tronsoane de tulpină cu unul sau mai multe noduri, sau butași semilignificați cu călcâi, iar pentru cele din populația de Darabani, mai ales butașii erbacei cu călcâi.*
Cuvinte cheie: *Aster novae-angliae, înmulțire vegetativă, butași, epoca de butășire*

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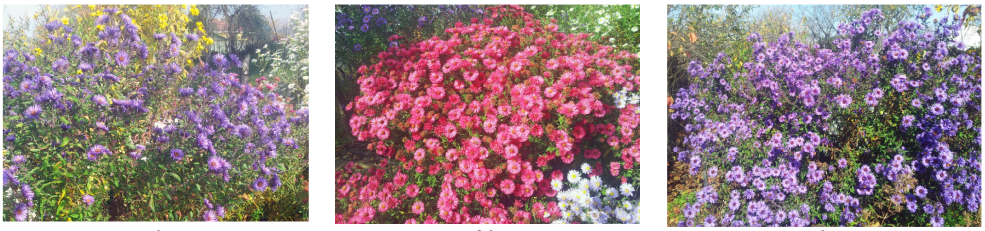
INTRODUCTION

Species originating in North America (southern Canada, eastern and central USA), *Aster novae-angliae L.* (*Symphyotrichum novae-angliae* (L.) G.L.Nesom), was introduced and naturalized in most parts of Europe and is considered one of the most widespread species of Aster in Europe (Jedlička and Prach, 2006). Also, as most species of Aster, it falls into the category of potentially invasive plants (Perry, 1998). In Romania it is grown as an ornamental plant, but sometimes occurs as wild species in Transylvania, Banat and Muntenia or as a sub-spontaneous in Moldova (Sîrbu and Oprea, 2011; Sîrbu et al., 2011). Currently, *A. novae-angliae* is part of ornamental assortment of Romanian rural gardens, providing color and specific decoration of their abundance of flowering in autumn. Due to high vigor and flowering it can be placed grouped as far background, but is also suitable for solitary location as isolated specimens (Draghia and Chelariu, 2011). Perennial hemicriptophyte plant of cca.150 cm high, *Aster novae-angliae* multiply both by seeds and vegetative by rhizomes, cuttings or division (Cantor and Pop, 2008; Sîrbu and Oprea, 2011; Şelaru, 2007). In the specialized literature it is recommended potting-up carried out in early summer, from young shoots, non-lignified (Perry, 1998; Şelaru, 2007).

This paper aims to study the propagation by cuttings of plants from three local populations of *Aster novae-angliae* identified in individual gardens of north-eastern Romania (Moldova).

MATERIAL AND METHOD

The biological material used was the *Aster novae-angliae* cuttings harvested from mother plants from local populations identified in three localities in Suceava (Marginea - Fig. 1a, respectively Humoreni - Fig. 1b) and Botosani (Darabani - fig. 1c). Plants were taken from the gardens of these localities and were transplanted in the experimental field of Floriculture discipline at the University of Agricultural Sciences and Veterinary Medicine, in autumn 2012.



a) **b)** **c)**

Fig. 1 - *Aster novae-angliae* (original) – mother plants from local populations from Marginea (**a**), Humoreni (**b**) and Darabani (**c**).

Aster novae-angliae form high bushes, vigorous, with lignified stems at the base and highly branched at the top. Inflorescences, 4-5 cm in diameter, are grouped in loose corymb, regular (Şelaru, 2007). In the case of the plants of the three local populations studied there was an average stems height of 120-165 cm and a number of 35-46 branches of strains (tab. 1). The flowers had similar sizes (4.2-4.4 cm in diameter), but were differentiated by color (shades of purple-lilac at Marginea and

Darabani populations or red-pink at Humoreni population) (fig. 1). Also, it appears that the richest flowers blossoming and the largest number of ligules have had it the plants in Humoreni. Flowering takes place in September-October. Floriferous stems leans under the weight of flowers, creating an effect of "flowers cascade" (obvious in Humoreni population due to the grater larger number of flowers per stem).

Table 1

Morphological characters of *Aster novae-angliae* mother-plants

Population	Plant height (cm)	No. of ramif./ stem	Length of ramif. (cm)	No. of infloresc./ stem	Diameter of infloresc. (cm)	No. of ligules/ infloresc.
Marginea	148.2	46.0	30.4	287	4.4	86
Humoreni	120.9	35.8	28.3	368	4.2	132
Darabani	165.6	43.0	30.0	167	4.3	111

For each of the three local populations of aster, bifactorial experiments were performed, differentiated by type of stem cuttings and epochs of cuttings (degree of tissue maturation). There were made four types of cuttings (simple peak cuttings, simple cuttings of stem sections with a knot, simple cuttings of stem sections with 3-5 nodes, cuttings with heel) in two periods: the early summer, June (herbaceous cuttings) and the end of July (semi- lignified cuttings). Thus, 8 variants were resulting from each local population of aster: simple peak cuttings, herbaceous (V_1) and semi-lignified (V_2); simple cuttings of stem sections with a node, herbaceous (V_3) and semi-lignified (V_4); simple cuttings of stem sections with 3-5 nods, herbaceous (V_5) and semi-lignified (V_6); cuttings with heel, herbaceous (V_7) and semi-lignified (V_8). For each variant were made on 25 cuttings. Rooting was done in a mixture of peat and garden soil in equal proportions. To stimulate rootedness process, to all variants there were applied soil treatments with Razormin solution (2.5 mL/L), weekly for one month. Rooting lasted approx. 5 weeks. The experiments were organized by randomized block method with three replications. Data on the number of rooted cuttings were interpreted statistically by analysis of variance; the results were compared with the average variants (Săulescu, 1967).

a) **b)** **c)** **d)**

Fig. 2 - Cuttings types: **a)** peak cuttings; **b)** cuttings of stem sections with a node; **c)** cuttings of stem sections with several nods; **d)** cuttings with heel (original).

RESULTS AND DISCUSSIONS

Table 2 presents the results of the aster rooting cuttings made from plants from Marginea. The biggest differences appear depending on the epoch of cuttings, respectively the degree of tissue maturation. It can be seen that regardless the type of used cuttings, potting-up made in early summer, with

herbaceous cuttings (V_1, V_3, V_5, V_7), provides rooting rate of 85-100%, while semi-lignified cuttings, made in late July, not rooted at all (V_2, V_4, V_6), or less than half rooted (where cuttings with heel were used - V_8). From the statistical analysis, by comparing the number of rooted cuttings of each variant with the average of the variants, it appears that the differences are significantly positive in all variants derived from herbaceous cuttings. At the variants obtained from semi-lignified cuttings, the differences are very significant negative except V_8 variant, which have distinct significantly negative differences (tab. 2).

Table 2

The rooting cuttings of *A. novae-angliae* –Marginea population

Variant	Rooted cuttings		% compared with the average	D±	Signification
	No.	% from total			
V_1	23.0	92.0	178.29	10.1	xxx
V_2	-	-	0	-12.9	000
V_3	25.0	100.0	193.80	12.1	xxx
V_4	-	-	0	-12.9	000
V_5	21.3	85.2	165.12	-8.4	xxx
V_6	-	-	0	-12.9	000
V_7	23.7	94.8	183.72	10.8	xxx
V_8	10.0	40.0	77.52	-2.9	00
Average(control)	**12.9**	**51.6**	**100.0**	**-**	**-**

LSD 5%=1.4 LSD 1%=2.0 LSD 0,1%=2.8

The cuttings from Humoreni population plants, although rooting capacity is much lower than the population of Marginea (approx. 50%) no longer distinguish options so obvious after the age of cuttings (tab. 3). Thus, with the exception of variant V_6, in all variants there were obtained rooted cuttings, in varying proportions. The best results with significant positive differences from the average stood herbaceous cuttings with a node (V_3) and semi-lignified cuttings with heel (V_8). In other variants, the differences were negative (very significant in V_1, V_4, V_6, V_7, or distinct significant at V_2).

Table 3

The rooting cuttings of *A. novae-angliae* – Humoreni population

Variant	Rooted cuttings		% compared with the average	D±	Signification
	No.	% from total			
V_1	3.3	13.2	49.25	-3.4	000
V_2	5.0	20.0	74.63	-1.7	00
V_3	17.3	69.2	258.21	10.6	xxx
V_4	2.7	10.8	40.30	-4.0	000
V_5	8.7	34.8	129.85	2.0	xxx
V_6	0	0	0	-6.7	000
V_7	1.0	4.0	14.93	-5.7	000
V_8	15.8	63.2	234.33	9.0	xxx
Average(control)	**6.7**	**26.8**	**100.0**	**-**	**-**

LSD 5%=1.0 LSD 1%=1.4 LSD 0,1%=2.0

At the aster population from Darabani (tab. 4), the average number of rooted cuttings is intermediate to those of the population from Humoreni and Marginea. The results show a behavior closer to the Marginea population in the sense that the June potting-up is more effective. The best rooting percentage (100%), however they had the herbaceous cuttings with heel (V_7).

Table 4

The rooting cuttings of *A. novae-angliae* – Darabani population

Variant	Rooted cuttings		% compared with the average	D±	Signification
	No.	% from total			
V_1	16.7	66.8	179.57	7.4	xxx
V_2	0	0	0	-9.3	000
V_3	10.9	43.6	115.05	1.4	xxx
V_4	0	0	0	-9.3	000
V_5	4.7	18.8	50.54	-4.6	000
V_6	7.1	28.4	78.49	-2.0	000
V_7	25.0	100.0	268.82	15.7	xxx
V_8	10.0	40.0	107.53	0.7	-
Average (control)	**9.3**	**37.2**	**100.0**	**-**	**-**

LSD 5%=0.7 LSD 1%=1.0 LSD 0,1%=1.4

From the graphical representation of the results summarizing the percentage of rooted cuttings according to origin and type of cuttings, it can be seen that in the case herbaceous cuttings, made in June, those coming from the Marginea responded favorably to all types of cuttings, rooting more than 85%. At the plants from Darabani, there are highlighted only the heel cuttings (rooting 100%) and partly the peak cuttings (rooting approx. 66%). For aster plants from Humoreni, there may be used cuttings of sections with a single node, which had rooting rate of 69.2% (fig. 3).

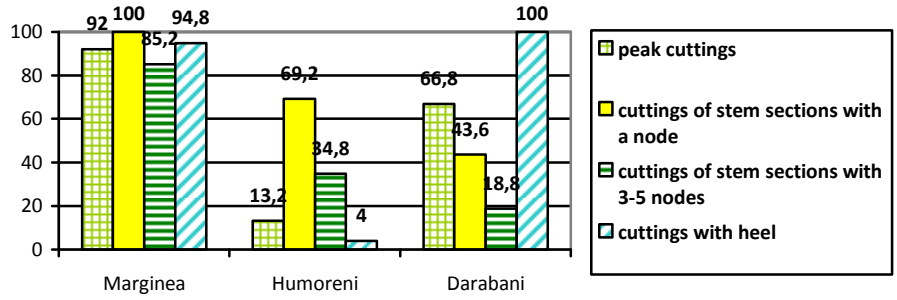


Fig. 3 - The rooting of herbaceous cuttings (after origin and manufacturing method) %

For July potting-up with semi-lignified cuttings (fig. 4), there are recommended only cuttings with heel, especially at plants from Humoreni

population (63.2%) and partly at plants from Darabani and Marginea populations (40%).

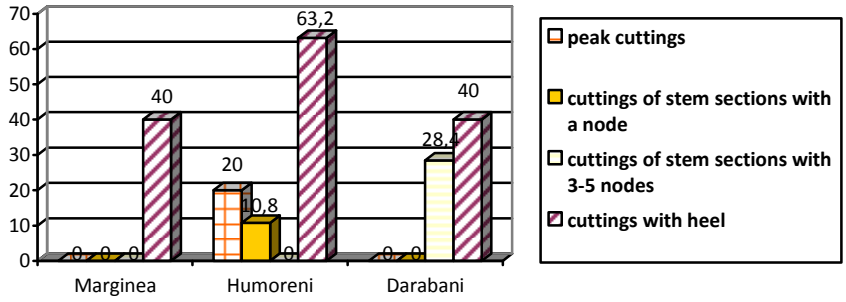


Fig. 4 - The rooting of semi-lignified cuttings (after origin and manufacturing method) %

CONCLUSIONS

1. The three *Aster novae- angliae* local populations coming from individual gardens in Suceava and Botosani counties behaved differently in propagation by cuttings, according to the epoch of cuttings (degree of tissue maturation) and the manufacturing method.

2. For aster plants from Marginea population is effective the use of herbaceous cuttings.

3. For aster plants from Humoreni population herbaceous cuttings can be made from stem sections with one or more nodes, or semi-lignified cuttings with heel.

4. For aster population of Darabani the best results are given by herbaceous cuttings with heel, however there can be made herbaceous peak cuttings or with a node sections cuttings and semi-lignified cuttings with heel.

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