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Propagation and forcing of *Armeria maritima* as a pot plant

Formering og drivning af Armeria maritima som potteplante

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Summary

Armeria maritima 'Düsseldorfer Stolz' and 'Arvi' can be produced as a pot plant, while 'Ardens' is not suited. Experiments in 1984 to 1986 showed that proagation should take place from late June to early August. From rooting to forcing, plants should be placed outdoor for growth and later for low temperature treatment.

The forcing time should be early January to March, under either natural light conditions or natural plus artificial light. The forcing period is shortened both by forcing at a later date and by the use of artificial light. 'Düsseldorfer Stolz' had a one week shorter period of forcing compared with 'Arvi'.

Key words: *Armeria maritima* 'Düsseldorfer Stolz', 'Arvi', 'Ardens', pot plant, herbaceous perennial, propagation, forcing, flowering.

Resumé

Armeria maritima 'Düsseldorfer Stolz' og 'Arvi' kan produceres som potteplante, mens 'Ardens' ikke er egnet. Forsøg i 1984–86 viste, at formeringen skulle foretages fra sidst i juni til begyndelsen af august. Efter formeringen placeres planterne på friland, hvor de vokser og senere på efteråret får lav temperatur.

Drivtidspunktet skal være fra begyndelsen af januar til marts enten under naturlige lysforhold eller med lystilskud. Drivtiden bliver afkortet både ved at drive senere og ved at bruge kunstigt lys. 'Düsseldorfer Stolz' har en uge kortere drivperiode end 'Arvi'.

Nøgleord: *Armeria maritima* 'Düsseldorfer Stolz', 'Arvi', 'Ardens', potteplante, stauede, formering, drivning, blomstring.

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Introduction

The production of potted plants partly outdoor and partly in glasshouse has been practised in former times and has again expanded during the last years. *Dicentra* (6), *Aquilegia* (7) and *Astilbe* (1) are perennials which have been suggested as potential pot plants.

In Denmark, too, a number of perennials has been screened to find plant species suitable for a pot plant production (2). Among these was *Armeria maritima*.

The objects of the present studies of *Armeria* were to determine the influence of propagation time, number of cuttings per pot and forcing time in natural and artificial light on the period of forcing and on the plant quality, expressed as number of inflorescences and plant size.

Materials and methods

Cuttings, consisting of single rosettes, of *Armeria maritima* (Mill.) Willd. were propagated in 10 cm pots in glasshouse under mist and a minimum temperature of 20°C. Rooting and growing medium were a mixture of 75% peat moss and 25% rock wool.

After rooting, plants were placed outdoors on capillary beds until the time of forcing or to the beginning of December. The plants were watered and fertilized with one per thousand Hornum fertilizer blend (4) until medio September. Later only water was supplied. From December until forcing the plants were placed in an unheated plastic tunnel. At the time of forcing, the plants were transferred to a glasshouse, watered and fertilizer on ebb and flood tables.

Experiment 1

In 1984, plants were propagated on 29 May, 29 June and on 9 August with either one or three cuttings per 10 cm pot.

The forcing took place from 1 November, 3 December, 2 January and 1 March at 14–16°C under natural light conditions. In each treatment 25 pots of *Armeria maritima* 'Düsseldorfer Stolz' were tested.

Experiment 2

In 1985, cuttings of *Armeria maritima* 'Arvi', were propagated on 1 July and 8 August with one cutting per 10 cm pot. *A. maritima* 'Ardens' was propagated on 1 July with one cutting per 10 cm pot,

and *A. maritima* 'Düsseldorfer Stolz' was propagated on 8 August with one and three cuttings per 10 cm pot. The cultivars are illustrated in *Kristensen et al.* (5).

The forcing took place from 3 December and 8 January in 16–18°C and supplementary light ($35 \mu\text{E m}^{-2}\text{s}^{-1}$) was given for 20 h by means of high pressure sodium lamps, when the natural photonflux density was less than $120 \mu\text{E m}^{-2}\text{s}^{-1}$.

In each treatment 30 pots of each of the cultivars were tested.

Registrations

At anthesis the dates, the number of inflorescences per pot and the foliage width were recorded. The number of inflorescences with more than 3 cm long stalks was measured.

The data were analysed by analysis of variance.

Results

Experiment 1

Propagation of one or three cuttings per pot on 29 June and three cuttings per pot on 9 August resulted in a significantly higher number of inflorescences (6.0–6.8) than propagation of one or three cuttings per pot on 29 May and one cutting per pot on 9 August (3.3–4.8) did. All pots propagated on 9 August flowered at forcing, while 76–87% of the pots propagated on 29 June and 52–56% of the pots propagated 29 May flowered. Foliage width decreased from 16 cm at the early propagation date to 12 cm at the late propagation date.

The period of forcing was not influenced by the time of propagation or number of cuttings per pot. The time of forcing had a strong and significant influence on the period of forcing (Fig. 1), as well as on the number of inflorescences per pot and percentage of pots that flowered (Table 1).

Experiment 2

The average number of inflorescences was 5.7 and did not differ when propagating one or three cuttings of 'Düsseldorfer Stolz' on 8 August and forced under supplementary light both from December and January.

The three cultivars had a shorter forcing period when the forcing began on 8 January compared with that of the 3 December (Fig. 1). Number of inflorescences per pot as well as percentage of pots that flowered depended on cultivars and were increased by forcing from January com-

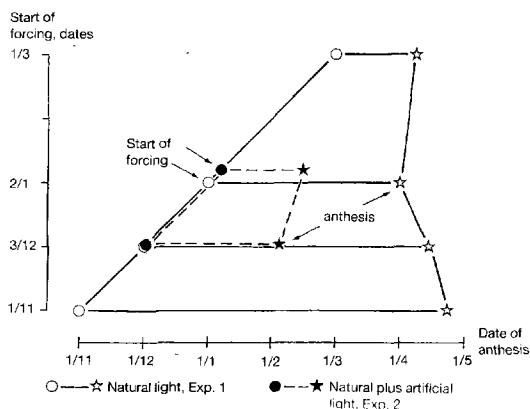


Fig. 1. Effect of lighting and the forcing date on the period of forcing until anthesis in *Armeria maritima* 'Düsseldorfer Stolz'. Exp. 1 and 2.

Table 1. Effects of forcing time on period of forcing, number of inflorescences and percentage of flowering pots. Average of one and three cuttings per pot and the three propagation times. Experiment 1, 1984/85.

Forcing time	Period of forcing, (weeks)	Number of inflorescences per pot	Flowering pots, (%)
1 November*	25	1.0	34
3 December	19	2.6	71
2 January	14	7.5	89
1 March	7	5.4	75
LSD _(0.05)	1	1	6

* Excl. plants propagated on 9 August with 3 cuttings per pot.

Table 2. Effects of forcing time on three varieties of *Armeria maritima*, forced under natural plus artificial light. Experiment 2, 1985/86.

Cultivars	Forcing time, date	Period of forcing, (weeks)	Number of inflorescences per pot	Flowering pots, (%)
'Düsseldorfer Stolz'	3 December	10	4.0	100
	8 January	7	7.5	100
'Arvi'	3 December	11	4.5	95
	8 January	8	11.6	100
'Ardens'	3 December	12	2.5	53
	8 January	9	2.6	76
LSD _(0.05)		1	1.3	4

pared with the forcing from December. 'Arvi' had a 1 week and 'Ardens' a 2 weeks delay in flowering compared with 'Düsseldorfer Stolz' (Tabel 2). 'Ardens' had a limited amount of flowers compared with 'Arvi' and 'Düsseldorfer Stolz' and furthermore, only 53 and 76% of the plants flowered (Tabel 2). The foliage width was 8 to 9 cm when the plants flowered, independent of varieties and treatments.

Discussion

Cultivars

The tested cultivars 'Düsseldorfer Stolz', 'Arvi' and 'Ardens' are all selected clones with uniform growth, abundant flowering and good colours for garden use (2). Forcing of these cultivars as pot plants showed variation in period of forcing and number of inflorescences. Therefore, 'Arvi' and 'Düsseldorfer Stolz' are suitable for forcing as pot plants, while 'Ardens' is not.

Propagation and Forcing

Propagation of 'Düsseldorfer Stolz' has to take place at the end of June until the beginning of August. One cutting was sufficient in June while three cuttings must be used in August.

Propagation in May resulted in a decreased amount of flowers by forcing, which could be in part due to flowering in the previous autumn.

How dormancy, flower initiation and growth are influenced by the environment is not yet know, but forcing from 1 November and 3 De-

cember 1984 showed a significantly lower number of inflorescences and a longer period of forcing compared with a later time of forcing (Table 1). However, the time of flowering only differed 3 weeks (Fig. 1). It may be explained by the period of cold treatment. In four varieties of *Astilbe* a cold treatment period of 12 weeks at 5°C gave the maximum flower number, height and fresh weight at forcing compared with fewer weeks of cold treatment (1). *Dicentra* should be cold treated at 5°C for at least 16 weeks to get 100% flowering plants (6). The poor results at early forcing (in November and December) could be influenced by a too short period of cold treatment.

Comparing experiment 1 (natural light) and 2 (natural plus supplementary light), the period of forcing for 'Düsseldorfer Stolz' from both 3 December and 8 January were shortened (Fig. 1), and the number of inflorescences and the percentage of pots flowering were increased with the use of supplementary light.

Forcing from March under natural light conditions gives a period of forcing which is the shortest of all in the tested treatments, but the amounts of flowers and percentage of pots flowering did not increase as expected (Table 1). A reason for the decrease in number and percentage of flowering pots may be that some of the pots have been attacked by *Botrytis* sp.

Conclusion

The best plant size and the most flowers were obtained by the cultivars 'Düsseldorfer Stolz' and 'Arvi'. The propagation should take place from late June to early August with one or three cuttings per 10 cm pot. After rooting, the plants should be placed outdoor for growth and low temperature treatment during autumn and winter.

The forcing should start from early January either under natural light conditions or by using supplementary lighting. The forcing can be continued throughout the winter with a shorter period of forcing and a reasonable amount of flowers as the result.

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References

1. Beattie, D. J. & Holcomb, E. J. 1983. Effects of chilling and photoperiod on forcing *Astilbe*. Hort Sci. 18, 449-450.
2. Brander, P. E. & Friis, K. 1985. Drivning af frilandsplanter i potte. Gartner Tidende 101, 217-219.
3. Brander, P. E. 1986. *Armeria* – engelskgræs. Afprøvning og udvælgelse af kloner og nye sorter. Statens Planteavlsforsøg, Meddelelse nr. 1872.
4. Knoblauch, F. 1973. Gødningsvand til containerkulturer, koncentration og kontrol. Statens Forsøgsvirksomhed i Plantekultur, Meddelelse nr. 1090.
5. Kristensen, L. N., Friis, K. & Christensen, O. V. 1988. *Armeria* – ny potteplante til forårssalget. Statens Planteavlsforsøg, Grøn Viden, Havebrug nr. 28.
6. Lopes, L. C. & Weiler, T. C. 1977. Light and temperature effects on the growth and flowering of *Dicentra spectabilis* (L.) Lem. J. Am. Soc. Hort. Sci. 102, 388-390.
7. Shedron, K. G. & Weiler, T. C. 1982. Regulation of growth and flowering in *Aquilegia x hybrida* Sims. J. Am. Soc. Hort. Sci. 107, 878-882.

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