

Appendix 1. Reproduction performance of clones in experiments. Performance in common garden experiments was reduced to one value for seedling and one for rhizome production. Experiments and moisture control levels where clones were not planted are marked by dash. Where rhizomes were not monitored they are marked by dash.

*Common garden experiments, Seedling:* Seedling production in common garden experiments: 1 = maximum score of seedling production at least 1 in any city, 2 = maximum score at least 0.5–0.9 in any city, 3 = maximum score at least 0.1–0.4 in any city, 4 = no seedlings. *Rhizome:* Rhizome production in common garden experiments: 1 = mean score of rhizome production at least 0.5 in any city, 2 = mean score at least 0.1–0.4 in any city, 3 = mean score at least 0.01–0.1 in any city, 4 = no rhizomes.

*Field experiment.* Moisture controlled field experiment with irrigation thresholds -100 hPa, -150 hPa, -200 hPa: 1 = seedling production at least 4 seedlings m<sup>-2</sup> and clone in top ten in moisture regime, 2 = 0.04–4 seedlings m<sup>-2</sup>, 3 = 0.004–0.04 seedlings m<sup>-2</sup>, 4 = no seedlings.

*Greenhouse.* Greenhouse emergence experiment. 1 = Clones reached at least 30% emergence rate in 35 days after sowing, Clones reached 2 = at least 30% emergence, 3 = 10–30 % emergence rate, 4 = 1–10 % emergence rate, 5 = not emerged in 221 days after sowing.

Species or clone	Common garden		Field experiment			Greenhouse
	No of seedlings	No. of rhizomes	-100 hPa	-150 hPa	-200 hPa	
<i>Achillea millefolium</i>	2	1	–	1	1	–
<i>Achillea millefolium</i> 'Cerise Queen'	4	2	–	–	–	–
<i>Aconitum napellus</i> ssp. <i>lusitanicum</i>	4	3	–	–	–	–
<i>Aconogonon alpinum</i>	–	–	–	–	–	5
<i>Aconogonon divaricatum</i>	4	2	–	–	–	1
<i>Aconogonon weyrichii</i>	1	2	–	–	–	1
<i>Aconogonon x fennicum</i>	1	2	–	–	–	4
<i>Agastache</i> 'Blue Fortune'	2	1	–	4	–	–
<i>Alchemilla alpina</i>	1	3	–	2	4	–
<i>Alchemilla erythropoda</i>	1	2	–	2	2	2
<i>Alchemilla mollis</i>	1	2	–	2	2	3
<i>Amebia pulchra</i>	4	4	–	–	–	–
<i>Anaphalis margaritacea</i> 'Neuschnee'	2	3	–	1	1	–
<i>Anemomidium canadense</i>	4	1	4	1	–	4
<i>Anaphalis triplinervis</i>	2	4	–	–	–	–
<i>Anemomidium canadense</i>	3	4	–	2	2	–
<i>Arabis caucasica</i>	2	4	–	–	–	–
<i>Armeria Maritima</i> group 'Splendens'	1	2	4	2	1	–
<i>Arnebia pulchra</i>	4	4	4	3	4	4
<i>Artemisia ludoviciana</i>	4	4	4	3	–	–
<i>Artemisia pontica</i>	3	4	4	3	1	–
<i>Artemisia schmidtiana</i> 'Nana'	4	2	–	–	–	–
<i>Aruncus aethusifolius</i>	3	4	4	2	2	2
<i>Aruncus dioicus</i>	1	2	1	4	4	–
<i>Asarum canadense</i>	–	–	–	–	–	5
<i>Asarum europaeum</i>	2	2	–	–	–	5
<i>Asarum europaeum</i> forma Viro	–	–	–	–	–	5
<i>Asclepias syriaca</i>	–	–	4	2	4	–
<i>Aster conspicuus</i>	–	–	–	–	–	1
<i>Aster Dumosus</i> group	–	–	–	–	–	5
<i>Aster sedifolius</i>	–	–	–	–	–	5
<i>Aster umbellatus</i>	–	–	–	–	–	2
<i>Astilbe Arendsii</i> group	4	2	–	–	–	3
<i>Astilbe chinensis</i>	–	–	4	3	4	3
<i>Astilbe Japonica</i> group	–	–	–	–	–	4
<i>Astilbe Japonica</i> group 'Red Sentinel'	4	3	–	–	–	–
<i>Astilbe speciosa</i>	–	–	–	–	–	4
<i>Astrantia major</i>	–	–	–	–	–	2
<i>Astrantia major</i> 'Rosensymphonie'	1	2	–	–	–	2
<i>Astrantia maxima</i>	–	–	–	–	–	2
<i>Bistorta officinalis</i>	3	1	4	2	4	4
<i>Calamagrostis x acutifolia</i> 'Karl Foerster'	4	1	–	–	–	–
<i>Campanula glomerata</i> 'Acaulis'	4	2	–	–	–	–
<i>Cerastium Tomentosum</i> group 'Silberteppich'	2	1	–	–	4	1

<i>Cimicifuga racemosa</i>	–	–	–	4	–	–
<i>Cimicifuga simplex</i>	–	–	–	4	–	–
<i>Claytonia sibirica</i>	1	4	–	–	–	–
<i>Clematis recta</i>	4	2	–	–	–	–
<i>Coreopsis tripteris</i>	–	–	4	2	4	3
<i>Coreopsis verticillata</i>	4	2	4	3	4	4
<i>Dianthus deltoides</i> 'Leuchtfunk'	1	2	4	2	2	1
<i>Dianthus deltoides</i> 'Nelli'	1	2	–	–	–	–
<i>Dicentra Formosa</i> group 'Luxuriant'	4	4	–	–	–	–
<i>Dicentra Formosa</i> group	4	2	–	–	–	2
<i>Doronicum Columnae</i> group 'Finesse'	1	2	–	–	–	–
<i>Doronicum orientale</i>	1	2	–	–	–	1
<i>Dracocephalum grandiflorum</i>	2	3	–	4	4	–
<i>Dracocephalum sibiricum</i>	1	2	–	1	–	2
<i>Echinops bannaticus</i> 'Blue Glow'	4	4	4	3	4	–
<i>Echinops ritro</i>	4	1	4	2	4	5
<i>Epimedium x rubrum</i>	3	2	4	–	–	–
<i>Epimedium x youngianum</i>	4	1	4	–	–	–
<i>Eupatorium maculatum</i> 'Atropurpureum'	3	4	–	–	–	–
<i>Eupatorium maculatum</i>	–	–	1	1	2	4
<i>Eupatorium purpureum</i>	3	3	1	1	2	3
<i>Euphorbia epithymoides</i>	1	2	–	–	–	–
<i>Euphorbia palustris</i>	3	1	1	2	4	2
<i>Euphorbia polychroma</i>	4	4	–	3	1	2
<i>Fallopia japonica</i> var. <i>compacta</i>	4	1	–	–	–	–
<i>Fallopia japonica</i>	–	–	–	4	–	–
<i>Filipendula rubra</i> 'Venusta'	3	2	–	–	–	–
<i>Filipendula rubra</i>	–	–	4	2	4	–
<i>Galium odoratum</i>	3	2	4	3	4	3
<i>Geranium endressii</i>	4	2	–	–	–	–
<i>Geranium macrorrhizum</i>	3	1	–	–	–	–
<i>Geranium macrorrhizum</i> 'Wilma'	–	–	–	2	4	4
<i>Geranium platypetalum</i>	1	4	–	–	–	–
<i>Geranium renardii</i>	4	4	–	3	4	–
<i>Geranium sanguineum</i>	1	2	–	2	2	3
<i>Geranium sanguineum</i> 'Nanum'	2	2	–	–	–	–
<i>Geranium x cantabrigiense</i> 'Biokovo'	3	1	–	–	–	–
<i>Geranium x cantabrigiense</i> 'Cambridge'	3	1	–	–	–	–
<i>Geranium x cantabrigiense</i> 'Karmina'	3	4	4	2	4	5
<i>Geranium x magnificum</i>	3	4	4	3	4	5
<i>Geum coccineum</i>	4	4	–	–	2	3
<i>Geum coccineum</i> 'Borisii'	1	2	–	–	–	3
<i>Helenium autumnale</i> 'Pumilum magnificum'	2	2	–	3	4	–
<i>Helenium autumnale</i> 'Rotgold'	2	2	–	3	4	–
<i>Helenium autumnale</i> 'Rubinzweig'	2	2	–	3	4	5
<i>Helenium hoopesii</i>	4	2	–	2	4	1
<i>Helianthus</i> 'Lemon Queen'	4	4	–	4	–	–
<i>Heliopsis helianthoides</i> var. <i>scabra</i> 'Sommersonne'	2	2	–	–	–	–

<i>Heliopsis helianthoides</i> var. <i>scabra</i>	–	–	1	1	2	1
<i>Hemerocallis citrina</i> 'Mirja'	4	2	–	4	–	–
<i>Hemerocallis fulva</i> 'Sirkku'	3	2	–	4	–	–
<i>Hemerocallis</i> Hybrida group 'Aino'	3	2	–	4	–	–
<i>Hemerocallis</i> Hybrida group 'Kartano'	3	2	–	4	–	–
<i>Hemerocallis</i> Hybrida group 'Stella de Oro'	3	2	–	4	–	–
<i>Hosta</i> sp.	–	–	–	–	–	3
<i>Hosta</i> 'Elata'	4	2	–	–	–	–
<i>Hosta</i> Fortunei group 'Hyacinthina'	1	1	–	–	–	–
<i>Hosta</i> Fortunei group 'Francee'	1	1	–	–	–	–
<i>Hosta sieboldiana</i> 'Elegans'	4	1	–	–	–	–
<i>Hosta sieboldiana</i> 'Frances Williams'	4	1	–	–	–	–
<i>Hosta</i> Tarhafunkia group 'Ginko Craig'	1	1	–	–	–	–
<i>Hosta undulata</i> 'Irish Green'	4	4	–	–	–	–
<i>Hyssopus officinalis</i>	1	2	4	–	1	3
<i>Inula helenium</i>	1	4	1	1	2	–
<i>Iris</i> sp.	–	–	–	–	–	2
<i>Iris germanica</i>	4	4	–	–	–	–
<i>Iris germanica</i> 'Somero'	4	4	–	–	–	–
<i>Iris orientalis</i>	3	4	4	3	4	–
<i>Iris pseudacorus</i>	1	2	4	3	4	–
<i>Iris</i> Pumila group 'Cyanea'	4	4	–	–	–	–
<i>Iris</i> Pumila group 'Nummen tuoksu'	4	4	–	–	–	–
<i>Iris</i> Pumila group 'Sunshine'	4	4	–	–	–	–
<i>Iris setosa</i>	4	4	4	2	4	–
<i>Iris setosa</i> 'Kiiminki'	4	2	–	–	–	–
<i>Iris sibirica</i>	4	4	–	–	–	–
<i>Lamium galeobdolon</i> 'Florentinum'	2	1	–	–	–	–
<i>Lamium galeobdolon</i> 'Herman's Pride'	2	1	–	–	–	–
<i>Lamium galeobdolon</i> 'Golden Crown'	2	4	–	–	–	–
<i>Lamium maculatum</i> 'Chequers'	2	3	–	–	–	–
<i>Lamium maculatum</i> 'Pink Nancy'	2	3	–	–	–	–
<i>Lamium maculatum</i> 'White Nancy'	2	2	–	–	–	–
<i>Lamium maculatum</i>	–	–	–	2	4	2
<i>Lamprocapnos spectabilis</i>	4	4	–	–	–	–
<i>Lavatera thuringiaca</i>	1	4	–	4	–	4
<i>Ligularia dentata</i>	1	4	–	–	–	–
<i>Ligularia wilsoniana</i>	–	–	–	4	–	–
<i>Ligularia wilsoniana</i> 'Hiisi'	3	2	–	–	–	–
<i>Ligularia x sibirica</i> 'Hietala'	3	2	–	4	–	4
<i>Ligularia x hessei</i>	3	4	–	4	–	–
<i>Lysimachia punctata</i>	3	2	4	3	4	2
<i>Lythrum salicaria</i>	4	2	1	2	2	–
<i>Lythrum salicaria</i> 'Rosy Gem'	1	4	–	–	–	–
<i>Malva alcea</i>	1	2	–	4	4	–
<i>Malva moschata</i>	1	4	–	1	1	–
<i>Monarda didyma</i>	4	1	–	–	–	–
<i>Monarda didyma</i> 'Cambridge Scarlet'	2	4	–	–	–	–

<i>Monarda didyma</i> 'Scorpion'	–	2	–	–	–	–
<i>Nepeta subsessilis</i>	–	–	–	–	–	1
<i>Nepeta x faassenii</i>	4	2	–	–	–	3
<i>Nepeta x faassenii</i> 'Six Hills Giant'	1	2	–	–	–	–
<i>Omphalodes verna</i>	4	2	4	2	4	–
<i>Pachysandra terminalis</i>	4	2	4	2	4	–
<i>Paeonia anomala</i>	4	2	–	–	–	–
<i>Paeonia obovata</i>	–	–	–	4	–	–
<i>Phlox paniculata</i> 'Europa'	0	3	0	0	0	–
<i>Phlox paniculata</i> 'Frau Anton Bruchner'	0	3	0	0	0	–
<i>Phlox paniculata</i> 'Kirchenfürst'	0	3	0	0	0	–
<i>Phlox paniculata</i> 'Osmo Heikinheimo'	0	3	0	0	0	–
<i>Phlox paniculata</i> 'Rheinländer'	0	3	0	0	0	–
<i>Phlox paniculata</i> 'Starfire'	0	3	0	0	0	–
<i>Phlox paniculata</i> 'Jules Sandeau'	–	–	0	0	0	–
<i>Phlox stolonifera</i>	–	–	4	2	4	–
<i>Phlox stolonifera</i> 'Blue Ridge'	1	4	–	–	–	–
<i>Phlox subulata</i> 'Maj'	4	1	4	4	2	–
<i>Phlox subulata</i> 'Morgenstern'	–	–	4	4	2	–
<i>Potentilla megalantha</i>	2	2	–	4	–	1
<i>Polygonum nakaii</i>	4	2	–	4	–	–
<i>Pulmonaria angustifolia</i>	4	2	–	4	–	–
<i>Pulmonaria saccharata</i> 'Mrs. Moon'	4	4	1	3	4	–
<i>Rheum palmatum</i> subsp. <i>tanguticum</i>	4	3	–	–	–	–
<i>Ranunculus ficaria</i>	–	–	–	–	4	4
<i>Salvia nemorosa</i>	–	–	–	–	–	1
<i>Salvia nemorosa</i> 'Ostfriesland'	1	4	–	–	–	–
<i>Salvia x sylvestris</i>	–	–	–	–	–	1
<i>Salvia x sylvestris</i> 'Blauhügel'	1	2	–	–	–	–
<i>Salvia x sylvestris</i> 'Blaukönigin'	1	2	–	–	–	–
<i>Sambucus ebulus</i>	–	–	–	–	–	–
<i>Sanguisorba hakusanensis</i>	–	–	4	3	4	–
<i>Sanguisorba hakusanensis japonensis</i>	–	–	–	–	–	2
<i>Sanguisorba obtusa</i>	–	–	–	–	–	–
<i>Sanguisorba officinalis</i>	1	2	–	2	2	–
<i>Saponaria ocymoides</i>	4	2	–	–	–	–
<i>Sedum acre</i>	1	2	–	–	–	–
<i>Sedum</i> 'Herbstfreude'	4	2	–	–	–	–
<i>Sedum kamtschaticum</i> var. <i>ellacombianum</i>	2	4	–	–	–	–
<i>Sedum spurium</i> 'Coccineum'	4	2	–	–	–	–
<i>Sedum spurium</i> 'Rosea'	4	1	–	–	–	–
<i>Sedum spurium</i> 'Summer Glory'	4	2	–	–	–	–
<i>Senecio doria</i>	4	2	–	–	–	4
<i>Senecio</i> sp.	3	3	–	–	2	4
<i>Sida hermaphrodita</i> 'Ruslay'	–	–	–	–	–	3
<i>Silphium integrifolium</i>	–	–	4	3	4	–
<i>Sinacalia tangutica</i>	–	–	–	–	–	–
<i>Solidago canadensis</i>	4	2	–	–	–	–

<i>Solidago Canadensis</i> group 'Golden Mosa'	2	2	–	–	–	–
<i>Solidago canadensis</i> 'Goldkind'	–	–	1	1	1	1
<i>Solidago Canadensis</i> group 'Leraft'	2	2	4	4	4	5
<i>Stachys macrantha</i>	4	2	–	–	–	3
<i>Stachys macrantha</i> 'Superba'	3	4	–	–	–	–
<i>Symphotrichum novi-belgii</i>	–	–	–	–	–	3
<i>Telekia speciosa</i>	1	2	1	1	2	4
<i>Tellima grandiflora</i>	1	2	4	3	4	2
<i>Thymus praecox</i>	–	–	–	–	–	1
<i>Thymus serpyllum</i> 'Albus'	3	3	–	–	–	1
<i>Tiarella cordifolia</i>	1	2	4	2	4	5
<i>Tradescantia Andersoniana</i> group	4	2	–	4	–	–
<i>Trollius asiaticus</i>	4	2	1	2	2	3
<i>Trollius chinensis</i>	2	2	–	–	–	–
<i>Trollius chinensis</i> 'Golden Queen'	–	–	1	2	2	2
<i>Trollius</i> Cultorum group	3	4	–	–	–	–
<i>Trollius europaeus</i>	1	2	1	2	–	3
<i>Waldsteinia ternata</i>	3	2	–	2	2	5
<i>Verbena hastata</i>	4	2	4	3	4	–
<i>Verbena hastata</i> 'Rosea'	1	4	4	3	4	–
<i>Verbena stricta</i>	–	–	–	–	4	4
<i>Veronica austriaca</i> ssp. <i>teucrium</i>	4	4	–	–	–	–
<i>Veronica austriaca</i> ssp. <i>teucrium</i> 'Königsblau'	1	2	4	2	4	2
<i>Veronica longifolia</i>	1	2	4	3	4	–
<i>Veronica prostrata</i>	2	3	4	3	1	–
<i>Veronica virginica</i>	3	2	4	–	1	–
<i>Veronica virginica</i> 'Alba'	4	4	–	–	–	2
<i>Veronica virginica</i> 'Rosea'	–	–	–	–	4	4
<i>Veronicastrum sibiricum</i>	–	–	–	–	–	2
<i>Veronicastrum virginicum</i>	–	–	–	–	–	2
<i>Veronicastrum virginicum</i> var. <i>sibiricum</i>	–	–	–	–	–	2
<i>Vinca minor</i>	4	1	–	–	–	5