

ornamental horticulture extension responsibilities, information is provided that tells the web visitor the expertise of each person, where they are located and how to reach them for assistance. A photograph is also provided of each person so growers and landscapers can recognize the people they have contacted.

Horticultural fact sheets are available at the web site in Adobe Acrobat PDF file format and other Extension publications will also be added. The PDF file format allows the web site user to view and print the fact sheets exactly as they are in the hardcopy versions by using free Acrobat Reader software and any internet-capable computer with a laser printer. Similarly, back issues of *Yankee Nursery Quarterly*, a regional Extension Nursery publication produced by the University of Connecticut, are available in PDF file format.

Effect of Division Size on Direct-potted Ornamental Grasses

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INTRODUCTION

In many nursery operations, ornamental grasses are potted in May using established plugs. These plugs are started in October/November (cool season grasses) or in February (warm season grasses) from very small divisions made from the previous year's container crop. Although this system makes efficient use of a small number of stock plants to yield a large quantity of small divisions, it adds an extra step to the production process. This extra step has the potential to add cost to the process in the form of additional labor-hours, additional skills needed by laborers, and fuel to at least minimally heat greenhouses. Typical production methods also require that a grower is set up to efficiently deal with a plug production system that uses a different set of pots, potting medium, materials handling equipment, and so on, than are used for 1- and 2-gal production.

Of course, when stock plants are limited in number, such as for new cultivars and species or for slow-to-increase selections, this method makes the most sense, allowing one to gain the greatest number of plants from a minimal amount of stock materials. However, for more common plant material and those that increase rapidly, we don't have to be as concerned about conserving plant material and dividing the plants down to the smallest propagule that is possible. In these cases, a method where a larger division is potted directly into the container size that the plant will be marketed in may be another approach worth considering. The advantage of this type of system is the elimination of the entire plug production step, which, as was discussed earlier, can be resource intensive.

MATERIALS AND METHODS

A study was conducted during the 1995 growing season to look at the performance of two division sizes of several common ornamental grasses when used in a direct potting system that eliminates the plug production step. The research was con-

ducted at the Department of Plant Science Research Farm, University of Connecticut, Storrs, Connecticut. The ornamental grasses used in the study are listed below. For each grass, divisions of two sizes, large and small, were made on 9 May 1995 as follows: *Miscanthus sinensis* 'Graziella' (small = 4 to 6 tillers, 2 inch \times 2 inch clump, large = 15 to 20 tillers, 4 inch \times 4 inch clump); *M. sinensis* var. *purpurascens* (small = 12 to 15 tillers, 3 in. \times 3 inch clump, large = 50 tillers, 5 inch \times 5 inch clump); *M. sinensis* 'Silberfeder' (small = 3 to 5 tillers, 2 inch \times 2 inch or 3 inch \times 5 inch clump, large = 8 to 12 tillers, 5 inch \times 5 inch clump); *M. sinensis* 'Strictus' (small = 3 to 5 tillers, 2 inch \times 2 inch clump, large = 9 to 11 tillers, 4 inch \times 5 inch clump); *M. sinensis* 'Variegatus' (small = 4 to 6 tillers, 2 inch \times 3 inch clump, large = 12 to 15 tillers, 4 inch \times 4 inch clump); *Calamagrostis xacutiflora* 'Karl Foerster' (small = 15 to 20 tillers, 1 inch \times 2 inch clump, large = 35 to 40 tillers, 2 inch \times 4 inch clump); *Panicum virgatum* (small = undetermined number tillers, 2 inch \times 2 inch clump, large = undetermined number tillers, 4 inch \times 4 inch clump); *Pennisetum alopecuroides* (Small = 12 to 15 tillers, 1.5 inch \times 1.5 inch clump, large = 25 to 30 tillers, 2 inch \times 3 inch clump). All divisions were potted directly into 2-gal containers (Nursery Supplies Classic 600 containers). The potting medium used was an aged pine bark, peat moss, and sand mix (3 : 2 : 1, by volume) to which 7 lb of dolomitic lime was added per cubic yard of mix. Each container was top dressed with 40 g of Sierra 17-6-10 controlled release fertilizer, 8- to 9-month formulation, plus minor nutrients. Plants were grown in an outdoor gravel container nursery and received irrigation through a trickle system (0.5 gal per pot, 3 times daily). For each ornamental grass type, 10 pots were used per division size. At the end of the growing season (27 Sept.), data were collected to determine and compare how well small and large divisions performed in a direct pot system. The following measures of plant performance were evaluated: foliage height, flower height, number of flowers per plant, number of tillers per plant, plant fresh weight, and plant dry weight.

RESULTS AND DISCUSSION

All of the grasses tested in this study did well in a direct pot system, producing salable 2-gal plants by the end of the growing season or earlier. Although I was concerned that uniformity of the plants produced by direct potting of divisions might not match that of those produced by potting plugs, the mature plants were no more variable than plants grown from plugs that I have observed at commercial nurseries. For the *M. sinensis* cultivars used in the study, larger divisions produced plants with significantly more tillers and greater fresh and dry weight (Table 1). The only exception was 'Silberfeder', which showed no differences in fresh and dry weight between plants from large and small divisions. In general, division size did not affect the foliage height or flower height of *M. sinensis* cultivars. However, 'Silberfeder' large divisions were again the exception, producing taller flowers than small divisions. Number of flowers per plant was greatest for large divisions of 'Graziella' and 'Purpurascens', but 'Silberfeder', 'Strictus', and 'Variegatus' showed no differences in flower number between large and small divisions. I should point out that evaluating flower number, and especially ultimate flower height, was challenging on 'Strictus' and 'Variegatus' because both cultivars bloom late in the fall and often fail to fully complete the blooming process before the first hard frost.

Larger divisions were important for the production of flowers on *C. xacutiflora* 'Karl Foerster' (Table 1). Large divisions produced over double the number of flowers

Table 1. The response of small and large divisions of eight ornamental grasses to direct potting. Where significant differences exist between division sizes (Tukey-HSD at $P \leq 0.05$), the first value given is for small divisions and the second value is for large divisions. NS indicates no significant differences between small and large divisions

Grass cultivar	Foliage height (cm)	Flower height (cm)	Flower number	Tiller number	Fresh weight (g)	Dry weight (g)
<i>Calamagrostis xacutiflora</i> 'Karl Foerster'	NS	131, 141	8.4, 19.0	NS	NS	82, 102
<i>Miscanthus sinensis</i> 'Graziella'	NS	NS	20.6, 26.6	39.0, 61.6	533, 606	202, 229
<i>M. sinensis</i> var. <i>purpurascens</i>	NS	NS	15.5, 29.0	60.1, 92.7	397, 480	163, 209
<i>M. sinensis</i> 'Silberfeder'	NS	149, 184	NS	35.6, 42.7	NS	NS
<i>M. sinensis</i> 'Strictus'	NS	NS	NS	33.0, 42.7	378, 507	118, 171
<i>M. sinensis</i> 'Variegatus'	NS	NS	NS	31.7, 45.4	423, 541	134, 180
<i>Panicum virgatum</i>	NS	NS	NS	140.1, 188.7	NS	NS
<i>Pennisetum alopecuroides</i>	93, 86	NS	35.7, 44.3	88.6, 112.8	NS	NS

of small divisions and the flowers were also taller. A difference was also detected between small and large divisions of *C. xacutiflora* 'Karl Foerster' for dry weight, but not for fresh weight. This is probably due to the fact that *Calamagrostis* flowers dry to tan early in the season and were already dry prior to the harvest date. Therefore, plants from large divisions had under-represented fresh weights in comparison to plants from small divisions, because a greater percentage of what was weighed for fresh weight was flowers that were already dry.

Switchgrass (*P. virgatum*) was simply too vigorous for a 2-gal container when large divisions were potted. Plants from the large divisions rapidly filled the pots and exhibited signs of growing under nutrient and possibly moisture deficiencies. The data bear out this empirical observation. Although large-division plants produced 40 to 50 more tillers per plant than small-division plants, there were no differences in fresh and dry weight, number of flowers, foliage height, or flower height (Table 1). This indicates that large-division plants had a greater number of thin, wiry tillers that failed to flower and were not particularly lush.

Fountain grass (*P. alopecuroides*) responded somewhat similarly to switchgrass. Large divisions seemed to be too much plant to start with, causing plants to become nutrient and/or water starved during the season. Large divisions had shorter foliage than small divisions, a greater number of flowers and a greater number of tillers (Table 1). However, the extra tillers and flowers may not compensate for the slightly anemic appearance of the plants.

Propagation of *Weigela florida* 'Alexandra', WINE & ROSES™ Weigela

Gail Billingsley

Spring Meadow Nursery, 12601 - 120 Ave. Grand Haven, Michigan 49417

Spring Meadow Nursery is a wholesale grower of woody shrub liners or starter plants. Many of our plants, like *W. florida* 'Alexandra', WINE & ROSES™ weigela, are direct rooted in pots that have a thin coating of SpinOut™. SpinOut™ is a root growth regulator containing 7.1% copper hydroxide that is sprayed on the interior portions of the pots to prevent circling roots. One cutting is stuck per 2¼-inch pot. The medium is composed of perlite, pine bark, and peat moss (55 : 35 : 10, by volume). The medium is amended with the following materials per cubic yard:

- 2 lb potassium nitrate 13.75-0-44.50
- 2 lb triple phosphate 0-46-0
- 4.5 lb Nutricote type 140 18-6-8
- 10 lb limestone

Weigela florida 'Alexandra', WINE & ROSES™ weigela is an easily rooted plant taken as softwood cuttings spring through mid-summer. The cuttings are ready to be taken when the stem is firm enough to snap rather than bend. A two-node cutting is taken just above the second node.

To improve efficiency, the cuttings are bundled in groups of 50 which are held together with a small rubber band. Unless there is access to a cooler or refrigerator, the cuttings should be stuck within 6 h. Application of Woods hormone in 1 : 20