of small divisions and the flowers were also taller. A difference was also detected between small and large divisions of *C.* ×*acutiflora* '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

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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 $2^1/_4$-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

dilution (500 ppm IBA), as a quick dip, is applied to the basal portion of the bundled cuttings. Although rooting would occur without the use of hormone, its use provides more consistent rooting.

Following sticking the cutting, the flat moves through a watering tunnel that thoroughly waters the medium and prevents desiccation before being placed under mist or in a fog environment. The flats containing *W. florida* WINE & ROSES™ weigela are placed on the concrete floor of Stuppy gutter connected greenhouses. Two systems for rooting are used. One method is under a traveling irrigator from Growing Systems with misting frequencies dependant on the time of day and light intensity controlled by a PRIVA environmental computer system. The other method is in a high humidity environment (90% to 95%) provided by a high pressure Mee Fog system. Traveling irrigators are used once or twice per hour on hot, sunny days to prevent overheating of the unrooted cutting.

Root initials appear within 7 to 10 days in both environments and after 4 weeks are rooted sufficiently to undergo hardening off by reducing mist frequency to 0 to 10 times per day or being moved out of the fog environment. Rooting percentages have been 90% to 95% in either environment with few disease problems noted.

Chionanthus virginicus: Embryo Culture vs. Traditional Germination

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INTRODUCTION

Chionanthus virginicus is traditionally propagated by seed sown outdoors, with germination taking 2 years to break double dormancy. Cuttings have not been as successful (Dirr,1987; Nicholson,1990), and grafting to *Fraxinus excelsior* rootstock (Dirr,1994) or *F. ornus* (Fagan,1980; Young,1992) has met with limited success. Work with embryos cultured on a gibberellic-acid-enhanced medium (Redcay and Frett, 1990) and with removal of the epidermis, pericarp, and endocarp to accelerate germination (Carpenter et.al.,1991) suggested a possible method to overcome the dormancy and to compress the time to obtain marketable plants. The objective of this investigation was to compare traditionally propagated and embryo-cultured *C. virginicus* for percent germination, plant size, and vigor over a duration of 2 years.

MATERIALS AND METHODS

Embryo Culture. Fruit (still green) of *C. virginicus* were collected 9 Aug., 16 Aug., and 23 Aug. 1995. The fruits were surface sterilized with 95% ethanol for 30 sec, then in 20% household bleach and 0.1% Tween with agitation for 20 min, rinsed 3 times for 4 min each in sterile distilled water, then left in the final rinse until excision. Ninety embryos were excised for each collection date and placed three per baby food jar for a total of 90 jars with 270 embryos.

Andersons rhododendron medium (Anderson,1978) was prepared a day in advance and included: 3.0% sucrose, 0.7% Difco-bacto agar, M.S. vitamins, and brought to pH