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Cold Storage of Rooted *Taxus* Cuttings on Subsequent Summer Regrowth[1]

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Abstract

After one growing season, root systems of *Taxus media* 'Nigra' and 'Densiformis' were similar, whether or not these fall-propagated rooted liners were given a cold treatment [−2.2°C (28°F) for 8 weeks] or left in the propagating beds until spring. However, storage did make propagation space available for two months for other uses. Outdoor spring propagated cuttings had more roots and a greater root shoot/ratio than indoor fall rooted cuttings, whether the latter were cold-treated or not.

Index Words: *Taxus*, Yew, propagation, cold storage

Significance to the Nursery Industry

There does not appear to be enough gain in growth to warrant the additional labor cost involved in harvesting and cold storing rooted cuttings for two months unless bench space is in great demand. While very few nurseries have labor to spare to make cuttings in April (5) it does remain an option which will produce vigorous liners (1). The outdoor bed is also an option for the smaller company which might need to expand but not want to construct propagating houses and incur the resultant cost of heat during the cooler months.

Introduction

Work at the Rhode Island Agricultural Experiment Station has demonstrated the feasibility of propagating *Taxus* cuttings in April, outdoors in insulated bottom heated mist beds. The winter temperature apparently affects *Taxus* shoots so that they grow faster once they are rooted. Vigor is carried over into the second year as well (3). Lathrop and Mecklenberg (2) observed *Taxus* shoots had a dormancy which could be broken by exposure to −2.2°C (28°F) for 3 weeks. Shugert (4) reported a stimulating effect on shoot growth after stored cuttings were held at 0.6–3.3°C (33–38°F) for 8 weeks.

Work was initiated at this station to determine if exposure of rooted *Taxus* cuttings to low temperatures [−2.2°C (28°F)] for 8 weeks would result in stimulated root and/or shoot growth and to determine how these compare with non-cold treated cuttings and with the previously observed growth stimulation we found in cuttings that were propagated in April. Removal of cuttings from indoor propagating beds 8 weeks earlier than normal would free the space but would also result in a smaller initial root system at planting time.

Materials and Methods

Rooted cuttings of *Taxus media* 'Densiformis' and 'Nigra' were obtained from a local nursery in February 1989. They were placed in a plastic bag and kept in the dark in a growth chamber (Hotpack model 352642 controlled environment chamber) where a temperature of −2.2°C ± 1° (28°F ± 1.8°) was maintained for 8 weeks. A similar group of unrooted cuttings was obtained from the same source in April and rooted in outdoor mist beds as previously described (3).

On May 12, 1989, cuttings were removed from the growth chamber and planted in a shaded liner bed along with a third group of rooted cuttings which were obtained from the nursery. The latter group was fall propagated and remained in the propagating bed until this date. On June 26, 1989, spring propagated cuttings were removed from the outdoor mist bed and planted in the liner bed. Ten cuttings from each of the three groups were randomly selected and used to count average root number and total root length (Table

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Table 1. Mean number of primary roots and mean root length of 2 cultivars of *Taxus media* at time of planting.

Cultivar	Season of propagation	Primary roots (no)	Root length (cm)
Nigra			
	Fall	26.1 a[z]	3.1 a
	Fall (cold storage)	23.4 a	1.7 b
	Spring	21.4 a	1.2 c
Densiformis			
	Fall	27.7 a	2.7 a
	Fall (cold storage)	25.0 ab	1.3 b
	Spring	17.9 b	0.7 c

[z]Means within a column followed by the same letter are not significantly different using Duncan's Multiple Range Test (5% probability). Comparisons made within cultivar only.

Table 2. Mean number of primary roots and mean root length of 2 cultivars of *Taxus media* after one growing season.

Cultivar	Season of propagation	Primary roots (no)	Root length (cm)
Nigra			
	Spring	45.1 a[z]	7.5 a
	Fall (cold storage)	29.6 b	7.3 a
	Fall	24.5 b	7.8 a
Densiformis			
	Spring	71.4 a	6.6 a
	Fall (cold storage)	41.9 b	6.8 a
	Fall	35.5 b	6.7 a

[z]Means within a column followed by the same letter are not significantly different using Duncan's Multiple Range Test (5% probability). Comparisons made within cultivar only.

Table 3. Oven dry weight of 2 cultivars of *Taxus media* after one growing season.

Cultivar	Season of propagation	Shoots dry weight (g)	Roots dry weight (g)	Root/shoot ratio
Nigra				
	Spring	3.4 a[z]	1.1 a	0.34 a
	Fall (cold storage)	3.4 a	0.8 b	0.24 b
	Fall	2.5 b	0.6 c	0.25 b
Densiformis				
	Spring	4.0 a	1.6 a	0.40 a
	Fall (cold storage)	4.3 a	1.0 b	0.24 c
	Fall	2.9 b	0.9 b	0.32 b

[z]Means within a column followed by the same letter are not significantly different using Duncan's Multiple Range Test (5% probability). Comparisons made within cultivar only.

1). On October 31, 1989 all cuttings were harvested and random samples consisting of 30 cuttings of each cultivar were used to count number of primary roots and total root length (Table 2). The tops and roots of all plants were oven dried to determine total plant growth and shoot/root ratio (Table 3).

Results and Discussion

Spring propagated cuttings of both cultivars produced more root growth after one growing season in the liner bed (Table 2 and 3). This was in agreement with our previous findings (3). When fall propagated cold stored cuttings were compared to cuttings which remained in the greenhouse for an additional two months there was no significant difference although there was some indication of improved vigor since they were in the bench 60 days less and they started out with a smaller root system when they were planted in the liner bed (Table 1). However, they did not exhibit the growth rate of spring propagated cuttings.

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