Pruning Liriope Leaves During Division Reduces Subsequent Growth

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Two experiments were conducted to determine if pruning the shoots of liriope [*Liriope muscari* (Decne.) L.H. Bailey 'Big Blue'] at division affected subsequent growth of roots and shoots. Plants were divided into single bibbs and shoots were left uncut or cut 5 cm above the crown of the plant. Plants with shoots pruned at division took 42% more time to develop 25 new root tips, and had smaller root masses, and had fewer bibbs per container. Root system size at the time of division was also evaluated. Plants with larger roots systems (10 or more roots at division) developed 25 new roots faster, had larger systems at the end of the experiment, and produced more bibbs than plants with smaller root systems (3 to 5 roots at division).

INTRODUCTION

Liriope is a popular and versatile perennial for most of the United States. It can be used as a groundcover, in edging and massing, an understory plant for woody plants, and in combination with a wide range of perennials, shrubs, and trees. This plant is commonly sold under several names in the trade such as "lilyturf", "monkey grass", and "Aztec grass". With its increasing popularity, liriope is becoming an important landscape crop in today's market.

Liriope is commonly propagated by division. A common industry practice is to divide a stock plants into 3.8-liter (1 gal) containers with single shoot divisions called bibbs. Shoots and roots are pruned to within 2 inches of the crown of the plant, potted into liner pots, and placed on production beds. Generally, plants are sold within 6 months, depending on cultivar and time of year.

Several experiments have been conducted evaluating the effect of pruning on subsequent root growth. Gilliam et al. (1986) tested the effects of pruning on root and shoot growth of *Ilex crenata* 'Compacta' and found that shoot pruning at potting reduced root growth of transplanted rooted cuttings. Another study by Young and Werner (1982) with *Malus ×domestica* 'Golden Delicious' reported shoot pruning resulted in very little root dry weight increase up to 8 weeks after planting, indicating competitive inhibition between root growth and rapid new shoot growth. Kandiah et al. (1984) also demonstrated that pruning treatments reduced feeder root development in tea (*Camellia sinensis*). All three of these studies were conducted using woody plant species; no similar research could be found in the literature with nonwoody perennials. The objective of our study was to determine whether pruning shoots of *Liriope muscari* slows subsequent regeneration of roots and shoots.

MATERIALS AND METHODS

Experiment 1. Trade gallon (3.8 liter) containers of *L. muscari* 'Big Blue' were divided into single bibbs on 6 June 1997. Shoots were either pruned back to 5 cm (2 inches) of the crown of the plant or left unpruned. Bibbs were selected for uniform root systems: either 10 or more roots, or 3 to 5 roots at division; any roots over 10 cm (4 inches) length were cut. Most roots ranged in length from 5 to 10 cm (2 to 4 inches). Bibbs not cut back had an average leaf length of 31 cm (12.5 inches). Medium used was a pinebark and sand (6 : 1, v/v) medium amended with 5.7 kg m^{-3} (10 lb yd^{-3}) 18N-2.6P-10K (18-6-12) Osmocote (Scotts Co., Marysville, Ohio), 2.3 kg m^{-3} (5 lb yd^{-3}) dolomitic lime, and 0.9 kg m^{-3} (1.5 lb yd^{-3}) Micromax (Scotts Co., Marysville, Ohio).

After division each bibb was potted into a 45 cm (18 inches) deep, 10 cm (4 inches) diameter PVC root chamber with a 17.5-cm (7-inch) window covered with acetate. Root chambers were placed on a tilted bench in full sun under overhead impact irrigation, where the tilt of the bench directed root growth toward the window.

Root tips numbers were counted every other day beginning when the first root appeared in the window and continued until 25 new root tips were present. The bareroot plants were rated at the end of the study (18 Aug. 1997) on a scale 1 to 5 where 1 = small root mass, 3 = moderate root mass, and 5 = large root mass. Bibbs numbers and shoot and root fresh weights were also collected at this time. The experiment was a 2 × 2 factorial with a completely randomized design with 12 single plant replications.

Experiment 2. The second experiment was conducted similarly to the first experiment with a few exceptions. The cultivar *L. muscari* 'Evergreen Giant' was added. In addition to the two root systems evaluated in the 1st experiment [10 or more roots, or 3 to 5 roots], a third root system was added with 0 roots at division, making the experiment a 2 × 3 factorial. Bibbs were potted into 369 cm^3 (22.8 $inches^3$) plastic pots (Lerio SR 325, Lerio Co., Mobile, Alabama). Root ratings were collected 45, 60, and 75 days after potting (DAP) using a scale of 1 to 5, where 1 = 0%, 2 = 25%, 3 = 50%, 4 = 75%, and 5 = 100% of the root coverage of the substrate-container interface. Plants were completely randomized by cultivar with six single plant replications.

RESULTS AND DISCUSSION

Experiment 1. The analysis showed no pruning × root interactions, only pruning or root main effects. 'Big Blue' liriope with shoots not pruned developed root systems faster than plants with shoots pruned to 5 cm. For example, plants with shoots pruned took 14 days or 42% longer to develop 25 new root tips than plants with shoots not pruned (Table 1). Plants with 10 or more roots at division also took fewer days (6) to develop 25 new root tips than plants with 3 to 5 roots at division. By developing earlier root systems, plants with the shoots not pruned also had larger root systems at the end of the experiment as shown by the root rating. Plants with shoots pruned had 66% less fresh root weight at the end of the experiment than plants with shoots pruned. Plants with 10 or more roots or 3 to 5 roots at division had similar fresh root weights. With bibb numbers, plants with shoots not pruned or plants with 10 or more roots also produced more bibbs

Table 1. Experiment 1: The influence of shoot pruning and number of roots at division on subsequent growth of 'Big Blue' liriope.

	Days to produce 25 roots[z]	Root rating[y]	Bibb number[x]	Shoot fresh wt. (g)	Root fresh wt. (g)
Shoots not pruned	40*** [w]	3.5***	6.4***	15.7***	9.3***
Shoots pruned	48	2.1	3.6	5.9	3.2
>10 roots	38**	3.1**	5.6**	10.8 NS	6.5 NS
3-5 roots	46	2.6	4.3	10.8	6.0

[z]Number of days from potting until 25 new root tips appeared in the root chamber windows.
[y]Roots were rated at the end of the experiment, 18 Aug. 1997, on a 1 to 5 scale where 1 = small root mass, 3 = moderate root mass, and 5 = large root mass.
[x]Bibbs per container and shoot and root fresh weights were collected 75 days after potting.
[w]NS, *, **, and *** nonsignificant or significant at the 0.05, 0.01, and 0.001 level, respectively.

Table 2. Experiment 2: The influence of shoot pruning and number of roots at division on subsequent growth of 'Evergreen Giant' and 'Big Blue' liriope.

	Root Rating[z]			Bibb number[y]	Shoot fresh wt (g)	Root fresh wt (g)
	45 DAP	60 DAP	75 DAP			
'Evergreen Giant'						
Shoots not pruned	1.4* [x]	1.8***	2.0**	1.3 NS	12.9**	7.7***
Shoots pruned	1.1	1.3	1.4	1.1	3.6	2.9
<10 roots	1.2 NS	1.4b [w]	1.7ab	1.5 NS	7.6ab	7.1a
3-5 roots	1.4	1.7a	2.0a	1.2	12.5a	6.9a
0 roots	-	1.2b	1.5b	1.0	5.0b	2.2b
'Big Blue'						
Shoots not pruned	1.5***	-[v]	-	-	6.6***	9.6***
Shoots pruned	1.2	-	-	-	1.9	2
>10 roots	1.6a	-	-	-	5.9a	9.1a
3-5 roots	1.3b	-	-	-	3.8b	4.3b
0 roots	-	-	-	-	2.4b	2.8b

[z]Root ratings were collected 45, 60, and 75 days after potting (DAP) and were rated on a 1-5 scale were 1 = 0%, 2 = 25%, 3 = 50%, 4 = 75%, and 5 = 100% coverage of the container media interface.

[y]Number of bibbs per container, shoot and root fresh weights were collected 75 days after potting.

[x]NS, *, **, *** nonsignificant or significant at the 0.05, 0.01, and 0.001 level, respectively.

[w]Means were separated using Duncans Multiple Range Test ($P \leq 0.05$).

[v]Prune × root interaction significant; data shown in Table 3.

Table 3. Experiment 2: Effect of pruning shoots and root number at the time of division on subsequent root ratings and bibb number of 'Big Blue' liriope at 60 and 75 days after potting (DAP).

	Root rating [z]		Bibb number
	60 DAP	75 DAP	75 DAP
Not pruned, 10 roots	3.3a[y]	4.2a	4.5a
Not pruned, 3 to 5 roots	2.5b	3.6b	1.3b
Not pruned, 0 roots	1.7c	2.4b	2.0b
Pruned, 10 roots	1.6c	2.0bc	1.7b
Pruned, 3 to 5 roots	1.2c	1.5c	1.0b
Pruned, 0 roots	1.2c	1.3c	1.0b

[z]Roots were rated on a 1-5 scale where 1 = 0%, 2 = 25%, 3 = 50%, 4 = 75%, and 5 = 100% coverage of the container media interface.
[y]Means were separated using Duncans Multiple Range Test ($P \leq 0.05$).

than plants with shoots pruned or plants with 3 to 5 roots at division, respectively. Even though inherent differences existed between not pruned (larger) and pruned (smaller) plants, shoot fresh weights followed a similar trend to bibb numbers.

Experiment 2. Overall, results from Experiment 2 were in general agreement with those of Experiment 1. 'Evergreen Giant' liriope roots had greater coverage of the container-media interface at 45, 60, and 75 DAP and greater root and fresh and dry weights when shoots were not pruned back than when shoots were pruned (Table 2). At the end of the study, plants with 3 to 5 roots at division had similar root ratings and fresh root weights as plants with 10 or more roots at division. Plants with 3 to 5 roots had higher root ratings and more fresh shoot weight than plants with 0 roots at division while plants with 10 or more roots were similar to both treatments. There were no treatment effects on bibb numbers.

As seen in Experiment 1 and with 'Evergreen Giant', 'Big Blue' liriope with unpruned shoots had greater root and shoot fresh weights than plants with shoots pruned. While this was an expected result with shoot fresh weight, root fresh weight was increased 365% by not pruning the shoots. Also, plants with the largest root systems at division had the greatest shoot fresh weight at the end of the experiment. For example, plants with 10 or more roots had 55% more shoot fresh weight than plants with 3 to 5 roots at division.

'Big Blue' liriope had significant pruning × root interactions with root ratings at 60 and 75 DAP and with bibb numbers at 75 DAP (Table 3). Plants with shoots not pruned had greater root ratings with 10 or more roots or 3 to 5 roots compared to all other treatments. When shoots were pruned, root ratings were similar regardless of initial root number. With bibb numbers, plants with unpruned shoots and 10 or more roots had more bibbs per container than any other treatment.

This study shows that liriope with unpruned shoots grew new roots and shoots more rapidly compared to liriope with shoots pruned to 5 cm (2 inches). To a lesser extent, plants with a larger root systems at the time of division generated new growth faster than plants with smaller root systems. These results suggest that shoots play an important role in the generation of new shoots and roots. Hence, liriope producers should minimize pruning shoots at division.

LITERATURE CITED

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