Research Reports

Shade Influences Propagation of Golden Barberry 'Baisel'

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SUMMARY. The influence of three shade levels on propagation of golden barberry (*Berberis koreana* Palib. x *B. thunbergii* DC.) selection 'Baisel' was evaluated in studies initiated 29 Apr. and 18 Sept. 1998. After 57 days, root ratings were higher in plants under 70% and 80% shade treatments than 60% shade for both studies. In study one, viability was lower among plants under the 60% shade level than those under 70% or 80% shade levels. Viability among treatments was similar in study two. Based on visual observations, leaf retention appeared greater under the 70% and 80% shade treatments than the 60% shade

treatment for both studies. Cuttings rooted under 70% and 80% shade levels generally had a uniform golden hue, whereas the foliage of those rooted under 60% shade often had a red hue and showed signs of desiccation for both studies. Root dry weights were greater for cuttings under the 60% shade levels than 70% or 80% shade.

Evergreen and deciduous barberries (*Berberis* L.) are common in landscapes throughout the United States and the world (Dirr, 1998; Steffey, 1985). Little research has evaluated ornamental production or propagation of barberries. Redleaf Japanese barberry (*B. thunbergii*) is generally rooted with IBA solutions of 1000 to 5000 mg·L⁻¹ (ppm) (Dirr, 1998). Growing stock plants in less than full sunlight increased rooting of cuttings of *B. thunbergii* and *B. thunbergii* 'Atropurpurea' (Knox and Hamilton, 1982). Studies have shown that low irradiance in the rooting environment can increase the rooting of cuttings of oak (*Quercus* L.) and maple (*Acer* L.) taxa (Zaczek et al., 1999). However, no reports exist concerning propagation of golden barberry cuttings under different light intensities. This study

evaluated the influence of light intensity during stem cutting propagation of golden barberry 'Baisel' (Golden Carousel™). 'Baisel' is an interspecific cross between *B. koreana* and *B. thunbergii* 'Aurea' discovered as a chance seedling in a field plot at Bailey Nurseries, Inc., in St. Paul, Minn. 'Baisel' has an upright and arching growth habit with golden yellow hues on young foliage throughout the growing season turning to orange and red in the fall.

Materials and methods

On 29 Apr. and 18 Sept. 1998, softwood medial stem cuttings, 7 to 10 cm (3 to 4 inch) long, were taken from 9.1-L (2.4-gal) stock plants growing under an open structure house covered with shade cloth providing a 50% reduction in ambient light levels at the Paterson Greenhouse Complex in Auburn, Ala. (32° 36'N x 85° 29'W, USDA hardiness zone 7b). Cuttings were treated with 1250 ppm IBA (Dip 'N Grow, Astoria-Pacific, Inc., Clackamas, Ore.) for 3 to 5 s and inserted into the propagation substrate in open trays lined with 24 cell inserts [267 cm³ (16.3 inches³)]. The substrate consisted of 6 pine bark : 1 sand (v/v) amended with 3.0 kg·m⁻³ (5.0 lb/yard³) of dolomitic limestone. The experiment was conducted in a standard double wall, polycovered greenhouse under intermittent mist with treatments consisting of three shade levels based on full sun ambient light. Treatments were 60% shade [≈800 μmol·m⁻²·s⁻¹ photosynthetically active radiation (PAR)] provided by a double layer of 4-mil [0.1-mm (0.004-inch)] polyethylene inflated by air; 70% shade (30% shade cloth providing ≈560 μmol·m⁻²·s⁻¹ PAR); and 80% shade (50% shade cloth providing ≈400 μmol·m⁻²·s⁻¹ PAR). Nine frames [76 cm (30 inches) tall] were constructed of 2.5-cm (1-inch) polyvinylchloride

Table 1. Effect of shade levels on cutting propagation of golden barberry 'Baisel'.

Shade (%) treatment	Root rating ^z		Root dry wt (g) Study 2
	Study 1 ^y	Study 2 ^y	
60	2.8 b	2.7 c	0.32 a
70	4.1 a	3.4 b	0.27 b
80	4.0 a	4.1 a	0.27 b

^zRoot rating scale (0–5) with 0 corresponding to plants having no roots and 5 corresponding to plants that were heavily rooted.

^yStudy 1 conducted from 29 Apr. to 25 June 1998; Study 2 conducted from 18 Sept. to 14 Nov. 1998. Mean separation within column by Duncan's multiple range test (n = 72), significant at P = 0.05.

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Table 2. Effect of shade levels on viability of golden barberry 'Bailsel' cuttings (28.35 g = 1.0 oz).

ANOVA	Significance ^z			
	Study 1 ^y		Study 2 ^y	
	Chi square	P	Chi square	P
Intercept	59.08	0.0000	64.80	0.0000
Treatment	6.69	0.0353	0.72	0.699
Replication	1.84	0.3993	3.19	0.2028
Residual	4.63	0.3280	0.84	0.9331
Treatment				
60% vs. 70% Shade	2.26	0.1325	0.18	0.6733
60% vs. 80% Shade	6.07	0.0138	0.70	0.4028
70% vs. 80% Shade	0.91	0.3396	0.25	0.6187

^zSignificance determined by analysis of contrasts at $P = 0.05$ with PROC CATMOD due to categorical nature of data.

^yStudy 1 conducted from 29 Apr. to 25 June 1998; Study 2 conducted from 18 Sept. to 14 Nov. 1998.

pipe (PVC) on raised benches [2.4×1.2 m (8×4 ft)]. Each shade level was randomly assigned to three of nine frames. One tray of 24 plants cuttings was placed under each frame. The experiment was arranged in a completely randomized design with three replications. Photosynthetically active radiation (PAR) levels during the study were monitored with a quantum sensor (LI-190; LI-COR, Lincoln, Neb.) attached to a portable photosynthesis system (LI-6250; LI-COR).

Rooted liners were harvested 57 d after treatment (DAT). Roots rinsed free of substrate were evaluated using a root rating scale (0 to 5) with 0 = plants having no roots and 5 = plants that were heavily rooted (Marcotrigiano and McGlew, 1990). Subjective foliar color and leaf retention ratings were made weekly. Root dry weights were collected only for the September study. Viability ratings were recorded as dead (0) or alive (1) for each study. Mean separation for treatment effects were performed by PROC GLM. Due to the categorical nature of the data, viability data were subjected to analysis of variance using PROC CATMOD. The CATMOD procedure analyzes data that can be repre-

sented by a contingency table which does not necessarily require transformation of the data for analysis (SAS Institute, 1988).

Results and discussion

Initial signs of root development occurred for all treatments about 20 DAT in both studies. After 57 d, root ratings were higher in plants under 70% and 80% shade treatments than 60% shade both studies (Table 1). Based on visual observations, leaf retention appeared greater among plants under the 70% and 80% shade treatments than those occupying 60% shade for both studies. Viability was lower under the 60% shade treatment than either 70% or 80% shade in study one, but treatments were similar in study two (Table 2). Cuttings rooted under 70% and 80% shade levels generally had a uniform golden hue, whereas the foliage of those rooted under 60% shade often had a red hue and showed signs of desiccation for both studies. Root dry weight, although slight, was greater for cuttings under the 60% shade (Table 1) than 70% or 80% shade.

As a new hybrid, no previous propagation information is available for golden barberry 'Bailsel'. Based on

the results of this study, 'Bailsel' can be successfully propagated from softwood cuttings in early summer with solutions containing 1250 ppm IBA. This work indicated rooting, leaf retention, and overall foliar color was improved as shade levels increased.

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