Responses Of Eight Groundcover Species To Renovation By Mowing[1]

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Abstract

Eight species of groundcovers commonly used in the southwestern United States were subjected to renovation by mowing during a 2-year study: red apple, coyote bush, pink iceplant, trailing lantana, prostrate myoporum, trailing African daisy, dwarf rosemary and garden verbena. Plant response was evaluated monthly in terms of total height, thickness of thatch, density, and overall appearance. Six species responded favorably to mowing at a height of 10 cm (4 in) in that thatch and height were significantly reduced for up to several months with only a brief loss in aesthetic quality. Coyote bush, trailing lantana, prostrate myoporum and garden verbena responded well to March mowings, while pink iceplant and trailing African daisy responded well to June mowings. In the two species that did not respond favorably (red apple and dwarf rosemary), the 10 cm (4 in) mowing treatment significantly reduced thatch and height but their aesthetic quality and density were reduced to unacceptable levels for several months. These findings provide landscape managers, architects and designers with specific information needed to conduct effective, minimum input maintenance programs.

Index words: landscape maintenance, thatch, renovation, growth control.

Species used in this study: red apple [*Aptenia cordifolia* (L.f.) Schwant]; coyote bush (*Baccharis pilularis* DC. 'Twin Peaks'); pink iceplant [*Drosanthemum hispidum* (L.f.) Schwant]; trailing lantana [*Lantana montevidensis* (K.Spreng.) Briq.]; prostrate myoporum (*Myoporum parvifolium* R. Br. 'Prostratus'); trailing African daisy [*Osteospermum fruticosum* (L.) Norl.]; prostrate rosemary (*Rosmarinus officinalis* L. 'Prostratus'); garden verbena (*Verbena* x *hybrida* Voss).

Significance to the Nursery Industry

Specific information is now available on the timing and consequences of mowing landscape groundcovers commonly used in the southern and western United States. Landscape managers, architects and designers can use this knowledge to conduct effective, minimum input maintenance programs where a low growing, non-turf plant material is desired. Six species out of 8 responded positively to close mowing on an infrequent, but timely basis. Mowing significantly reduced their height and thatch development without a prolonged reduction in their overall aesthetic quality.

Introduction

Groundcovers are widely used in landscapes as transition plantings, borders and slope covers (4, 6). In the southwestern U.S. they have special appeal because their irrigation and maintenance requirements are often less demanding than those of turfgrasses (2). Once established, many species of groundcover either lose vigor and thin out, or grow vigorously and develop an irregular, overgrown appearance with a thick and uneven thatch of stemmy growth (3, 4). In both instances their appearance is unsightly, and they can collect trash, pose a fire hazard, serve as a haven for rodents and interfere with irrigation (3).

Regular pruning or renovation of groundcovers is sometimes recommended to remove unhealthy tissue, reduce thatch and keep plantings vigorous and neat (2, 4, 8). MacKenzie (4) simply suggests removing one-third or less of the length of branches immediately following the bloom period of spring flowering species and as growth begins in the spring for summer or fall flowering species. In a limited field trial it was shown that mowing established groundcovers at selected times of the year could potentially produce good quality, low-growing, uniform growth in *Vinca minor*, *Baccharis pilularis* 'Twin Peaks', *Hedera helix,* and *H. canariensis*, but not in *Rosmarinus officinalis* (3). However, there are no research-based guidelines on mechanical management of groundcovers that specify proper timing and height or expected recovery rates for individual species.

This study was designed to investigate the vegetative growth and aesthetic responses of several common groundcover species to periodic mowing. Specific objectives were to determine which species benefited from mowing in terms of reducing thatch and overall height with minimal loss in density (coverage) and overall quality.

Materials and Methods

Eight groundcover species (Table 1) that are widely used in the southwestern U.S. were established in plots 3 m × 3 m (10 ft × 10 ft) on September 9, 1989 at the University of California South Coast Research and Extension Center in Irvine, CA. The experimental design was completely randomized with four replications. A clear zone of 60 cm (24 in) was established between plots, and it was maintained during the study by regular hand edging and semi-annual applications of oxidiazon.

Plants from nursery flats were transplanted at a 30 cm × 30 cm (12 in × 12 in) spacing into soil amended with fertilizer at a rate of 350 kg/ha (312.5 lb/a) as ammonium phosphate 16.0N-16.6P-0.0K (16-20-0). Supplemental N was applied annually between March and June at the rate of 0.45 kg/90 m^2 (1 lb/1000 ft^2) as ammonium sulfate 21.0N-0.0P-0.0K (21-0-0). Weed control during establishment was achieved with a single application of oxidiazon immediately

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Table 1. Groundcover species' names, growth habits and dates mowed.

Species	Common name	Family	Growth habit	Dates mowed
Aptenia cordifolia	red apple	Aizoaceae	succulent, prostrate	7/19/90, 3/17/92
Baccharis pilularis	coyote bush	Asteraceae	woody, prostrate, shrubby	3/7/91, 3/17/92
Drosanthemum hispidum	pink ice plant	Aizoaceae	succulent, prostrate, mat-forming	3/19/90, 6/12/91, 6/23/92
Lantana montevidensis	trailing lantana	Verbenaceae	woody, trailing	7/19/90, 3/7/91, 3/17/92
Myoporum parvifolium	prostate myoporum	Myoporaceae	woody, prostrate, mat-forming	3/7/91, 3/17/92
Osteospermum fruticosum	trailing African daisy	Asteraceae	herbaceous, prostrate, mat-forming	7/19/90, 6/12/91, 6/23/92
Rosmarinus officinalis 'Prostratus'	prostrate rosemary	Lamiaceae	woody, prostrate	6/12/91, 3/17/92
Verbena x hybrida	garden verbena	Verbenaceae	herbaceous, trailing, mat-forming	7/19/90, 3/7/91, 3/17/92

after planting and one hand weeding. A 2.5 cm (1 in) sprinkler irrigation was applied to settle transplants and once or twice weekly thereafter for the first 60 days. Sprinkler irrigation was applied weekly in a regime of 50% of real-time reference evapotranspiration ($0.5 \times ET_0$ calculated from the modified Penman equation measured by an on-site weather station) from November 1989 through March 1991, and 75% of ET_0 from April 1991 through October 1992 (1, 5, 7).

Mowing treatments were applied to a given species once it reached an unkempt state (Table 1). Timing varied according to species' maturity rates and general growth habit. Mowing was done just preceding or during the season in which a species began active growth, or, in the case of *Drosanthemum* and *Osteospermum*, immediately following their pronounced bloom period. Each species was mowed at least twice between June 1990 and June 1992. The 1990 mowings of *Aptenia*, *Drosanthemum*, *Lantana*, *Osteospermum* and *Verbena* were set at a cutting height of 5 cm (2 in), and all other 1992 mowings were set at 10 cm (4 in). Both mowings of *Baccharis* and *Rosemarinus* and the first 2 mowings of *Drosanthemum* and *Osteospermum* were accomplished using a flail mower. The final mowings of *Drosanthemum* and *Osteospermum* plus all mowings of the remaining 6 species were done using a commercial-grade, 53 cm (21 in) rotary mower. Clippings were not removed from the flail mowed plots, but most were removed from the rotary mowed plots with an attached bag.

Plantings were visually rated by a 2-member panel for overall appearance and density each month and direct measurements of thatch thickness and total plant height were also recorded. Thatch was defined as a dense layer of leafless, prostrate stems at or near the soil surface. Average values for thatch thickness and overall height were obtained from 2 random placements of a meter stick in each replicate. Analysis of variance procedures were used to determine differences between mowed and unmowed treatments for each species.

Results and Discussion

To facilitate evaluation and analysis, the eight species of groundcovers can be grouped according to their responses to mowing. Six species, including *Baccharis*,

Table 2. Monthly quality ratings of four groundcover species mowed in summer and unmowed[z,y].

	Species							
	Aptenia		Drosanthemum		Osteospermum		Rosmarinus	
Date	Mowed	Unmowed	Mowed	Unmowed	Mowed	Unmowed	Mowed	Unmowed
July 90	1.2*	8.9	1.0*	9.0	1.1*	7.8	8.3	8.3
Sep	2.0*	9.0	2.1*	9.0	5.0*	8.9	8.8	8.8
Nov	2.5*	9.0	3.4*	9.0	8.1	8.5	9.0	9.0
Jan 91	2.6*	8.9	4.0*	9.0	8.6	8.9	9.0	9.0
Mar	6.5*	8.8	6.4*	9.0	9.0	9.0	9.0	9.0
May	7.9*	8.9	7.4*	8.9	8.8	8.9	9.0	9.0
Jul	8.1	8.5	4.6*	7.8	3.8*	8.1	2.3*	8.5
Sep	7.6	7.6	6.6	7.3	6.3*	8.5	3.1*	8.4
Dec	7.9	8.1	7.3	7.6	7.5	8.5	4.3*	8.8
Feb 92	7.6	8.0	7.6	8.0	8.8	8.9	4.4*	9.0
May	6.4	8.4	8.4	8.3	7.9	8.0	2.3*	9.0
Jul	7.8	8.1	4.6*	7.5	2.8*	7.8	4.1*	8.3
Oct	7.6	7.6	6.4	7.1	5.0*	7.4	5.8*	8.8

[z]Rating system: 1 = dead, 9 = optimum growth and appearance.

[y]Significance: * = significantly different at P = .05 level between treatments.

Table 3. Monthly quality ratings of four groundcover species mowed in spring and unmowed[z,y].

	Species							
	Baccharis		Lantana		Myoporum		Verbena	
Date	Mowed	Unmowed	Mowed	Unmowed	Mowed	Unmowed	Mowed	Unmowed
July 90	8.2	8.2	2.8*	7.8	7.6	7.6	1.0*	8.6
Sep	8.9	8.8	8.0	7.9	7.3	7.3	6.3	7.5
Nov	8.9	8.9	8.0	8.0	7.6	7.6	7.4	7.3
Jan 91	8.6	8.6	4.6	5.3	8.4	8.4	7.5	6.5
Mar	4.6*	8.6	5.3*	7.1	6.5*	8.6	5.9	7.5
May	7.9*	8.8	6.8	7.5	7.4	8.5	7.3	7.3
Jul	9.0	8.2	7.0	7.0	8.1	8.9	4.6	5.1
Sep	8.9	8.8	7.1	7.4	7.3	7.6	3.1	3.6
Dec	9.0	8.8	7.6	8.0	6.5	6.5	3.0	3.6
Feb 92	8.9	8.9	8.3	7.9	5.1	5.3	5.0	4.0
May	4.5*	9.0	7.3*	8.9	4.5	5.4	5.3	4.8
Jul	8.5	8.8	8.9	8.9	6.1	6.3	7.0	5.3
Oct	9.0	8.6	8.4	8.5	4.0	4.3	5.5	4.9

[z]Rating system: 1 = dead, 9 = optimum growth and appearance.

[y]Significance: * = significantly different at P = .05 level between treatments.

Drosanthemum, *Lantana*, *Myoporum*, *Osteospermum*, and *Verbena*, responded favorably to mowing at 10 cm (4 in). Mowing significantly reduced their height for several months with acceptable groundcover quality returning within 1 to 3 months (Tables 2, 3, 4, 5). Similarly, thatch was also reduced while densities recovered quickly (data not presented). However, within this group, only *Lantana* and *Verbena* recovered satisfactorily from a 5 cm (2 in) mowing.

Differences in height and thatch of *Verbena* after mowing were not significant during the second growing season. Overall quality and density declined in mowed and unmowed plots during the second growing season suggesting that *Verbena* is a short-lived plant that may need to be replanted every 2 years.

Immediate loss in groundcover quality was the most dramatic in *Baccharis*, *Drosanthemum* and *Osteospermum*, while long-term reductions in height and thatch occurred in *Drosanthemum* and *Osteospermum*. *Myoporum* was the least responsive to mowing since height was reduced for at least 5 months but thatch was not reduced. Neither thatch nor height was reduced for *Myoporum* after the second mowing, indicating that a lower mowing height was necessary if further growth control is desired.

Two species, *Aptenia* and *Rosmarinus*, responded unfavorably to mowing (Tables 2 and 4). Overall quality was reduced for 11 and 13 months respectively even though thatch and height were controlled. *Rosmarinus* was the more affected of the two. In addition to reducing its quality, mowing significantly reduced height, thatch and density (thatch and density data not presented). Density made a modest recovery after six months while overall quality never recovered. Mowing *Aptenia* at 5 cm (2 in) reduced all four per-

Table 4. Plant height (cm) of four groundcover species mowed in summer and unmowed[z].

	Species							
	Aptenia		Drosanthemum		Osteospermum		Rosmarinus	
Date	Mowed	Unmowed	Mowed	Unmowed	Mowed	Unmowed	Mowed	Unmowed
July 90	0.0*	32.4	0.0*	22.8	0.0*	42.0	36.3	43.3
Sep	3.5*	24.0	5.5*	25.8	22.0*	46.0	52.0	52.0
Nov	2.5*	22.0	5.0*	27.5	21.8*	45.0	51.8	51.8
Jan 91	2.8*	21.3	8.8*	25.8	24.0*	39.3	56.0	56.0
Mar	11.0*	24.3	12.8*	25.8	31.3*	47.8	57.0	57.0
May	23.0	32.3	17.0*	28.0	45.0	52.0	58.8	58.8
Jul	23.0*	31.3	9.5*	25.0	12.3*	46.0	12.3*	68.0
Sep	19.0	25.0	12.3*	27.8	20.8*	45.0	13.5*	83.8
Dec	20.3	21.0	13.0*	29.3	26.3*	46.0	18.8*	86.0
Feb 92	16.3	18.0	15.0*	31.0	34.0*	50.0	18.3*	86.3
May	18.3	25.0	16.0*	29.0	36.3*	53.0	12.0*	92.3
Jul	19.8	22.8	11.8*	27.0	10.8*	49.0	21.0*	89.3
Oct	19.0	22.3	11.0*	26.3	28.0*	44.0	25.8*	99.3

[z]Significance: * = significantly different at P = .05 level between treatments.

Table 5. Plant height (cm) of four groundcover species mowed in spring and unmowed[z].

	Species							
	Baccharis		Lantana		Myoporum		Verbena	
Date	Mowed	Unmowed	Mowed	Unmowed	Mowed	Unmowed	Mowed	Unmowed
July 90	29.6	29.6	4.4*	24.6	12.9	11.4	0.0*	43.9
Sep	30.0	30.0	19.0*	30.8	16.0	16.0	16.8*	38.3
Nov	32.3	32.3	20.3*	32.3	15.8	15.8	17.0*	30.8
Jan 91	29.8	29.8	19.8*	30.8	12.8	12.8	17.8*	30.8
Mar	12.3*	32.8	9.0*	31.0	7.0*	14.0	9.3*	30.0
May	24.8*	49.3	18.8*	43.0	10.8*	19.3	25.8*	41.3
Jul	43.5	55.0	27.0*	42.0	13.0*	21.0	21.8*	37.0
Sep	55.0	65.0	35.0*	54.0	17.3*	27.0	17.3	24.0
Dec	47.3	63.0	38.0	58.0	16.0	20.0	21.0	22.8
Feb 92	56.3	58.0	35.8	53.0	13.8	20.0	19.8	23.0
May	14.8*	75.0	19.8*	60.0	10.8	15.0	25.8	28.8
Jul	42.0*	82.3	39.0*	71.8	10.8	19.0	31.0	30.3
Oct	51.3*	80.0	45.3*	70.8	11.3	16.8	32.3	24.8

[z]Significance: * = significantly different at P = .05 level between treatments.

formance categories and its overall quality took nearly a year to recover. Mowing at 10 cm (4 in) resulted in no lasting differences, indicating that it was ineffective.

Plantings of *Baccharis*, *Drosanthemum*, *Lantana*, *Myoporum*, *Osteospermum* and *Verbena* benefit from infrequent, timely mowing at 10 cm (4 in). Mowing will control height at a manageable level and reduce buildup of unwanted thatch with only short-term reductions in density and overall appearance. Weed invasion after renovation of these species is unlikely since they recover rapidly. The frequency and timing of mowings appear to be important, not only in attaining maximum growth control but for rapid recovery. *Baccharis* and *Lantana* benefit from an early spring mowing, and a second mowing in late summer or early fall may be required to provide long-term suppression of height and thatch. These findings are supported by those of Hamilton (3), although he believed that the appearance of *Baccharis* was unacceptable immediately after it was mowed at 8 to 13 cm (3 to 5 in). A single mowing just after peak flowering is adequate for *Drosanthemum* and *Osteospermum*. *Verbena* should probably be treated as an annual or, if replanted every two years, mowed at 10 cm prior to the onset of growth the second year. It is also possible that *Verbena* has an irrigation requirement that is greater than 75% of ET_o. *Myoporum* is best mowed at 10 cm or less in the spring just after peak flowering.

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