Stop #2: Groundcovers for Water Conserving Landscapes

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Location
U.C. Riverside, Riverside, CA

Project Overview

This study of 17 groundcover plant materials and one turfgrass managed as a groundcover is designed to evaluate their adaptation to the inland valley climate of Southern California and their performance at a reduced level of irrigation (see table). The plants represent a mix of native, so-called California-Friendly, and non-native as well as woody and herbaceous plant materials. Replicated field plots were planted in late 2009 through early 2011 and have been challenged with irrigation of 60% of real-time reference evapotranspiration (ETo) since mid-May 2011. Beginning in May, 2012, irrigation was reduced to 40% of real-time reference evapotranspiration.

The study objectives are to: (1) substantially expand the knowledge of groundcover water requirements; (2) evaluate the adaptation and performance of 17 groundcover and one turfgrass species in the inland valley climate when receiving water in the amount of 60% ETo or less; and (3) evaluate the relative carbon fixation potential and water use efficiency among the plant species.

We are measuring plant response to irrigation by recording plant quality ratings of each species following to established and accepted protocol. Plant quality of each plot will be rated monthly on a scale of 1 to 9, with 9 = optimum/best plant quality and 1 = dead/worst plant quality.

Study Design

- 17 species
- 1 irrigation treatment; 3 replications of each species
- 54 sub-plots 10 ft. × 10 ft. each
- Sprinkler irrigation
- Plants transplanted from #1 containers or from flats as rooted cuttings 2009-2010
- No soil amendments

Background

Landscape groundcovers are a diverse group of trailing or spreading plants that naturally form a continuous soil covering. They can range in height from about six inches to nearly three feet tall, and may be woody, herbaceous, or succulent. Groundcovers are often looked upon as turfgrass substitutes in irrigated landscapes of the southwestern United States based on the presumption they require less water and other inputs to maintain high aesthetic quality. There is limited research-based information quantifying water requirements and climatic adaptability of the many plants that are potential landscape groundcovers. Unlike turfgrass, much of the information describing groundcover irrigation needs is anecdotal and non-quantitative. Thus, it can be impossible to accurately compare water needs of many groundcovers to those of turfgrass.

In a previous study, we looked at six groundcovers representing a range of growth habits and potential adaptations to drought to compare their minimum water needs. We found they varied widely and unpredictably in their minimum water needs and drought responses. We concluded that many groundcover species (in our study *Vinca major*, *Baccharis pilularis*,

Drosanthemum hispidum, and *Hedera helix*) are able to maintain acceptable landscape performance when presented with significant drought and have minimum water needs around 30-40% of ETo, which is similar to that of warm-season turfgrass. Other species (exemplified in our study by *Potentilla tabernaemontanii* and *Gazania* hybrid*)* are not able to withstand any drought and have minimum water needs similar to cool-season turfgrasses. Thus, the idea is not true that groundcovers in general require less water than turfgrass to remain aesthetically appealing in the landscape.

Thus far, Lantana, Honeysuckle, Red Apple, Ice plant, Saltbush, Coreathyrogene, Salvia, Rosemary, Australian Fushia, California Aster and Thyme are all thriving, though growth has slowed. The Cranesbill is almost dead. The other species are displaying various signs of drought stress such as leaf burning, smaller leaves, and stem dieback. However, these species recover following an irrigation event and will probably survive the summer. The only monocot, Buffalograss is green-brown, but temporarily shows green color following an irrigation event. Kurapia or Lippia, which is in the neighboring plot is off-color, but recovers temporarily after an irrigation event.

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GROUNDCOVER RESPONSE TO LIMITED IRRIGATION STUDY – U.C. RIVERSIDE				
Specific Epithet	**Common Name**	**Source Size[z]**	**Date Planted**	**Notes**
1. Drosanthemum speciosum, Delosperma, Mesembryanthemum??	vygie, iceplant	Altman Plants #1 container	4-2-10	Newer iceplant introduction, spring flowering, re-flowers in summer, So. Africa native, (vygie is Afrikaans term for Mesembryanthemums, fam. Aizoaceae)
2. Rosmarinus officianalis 'Irene'	prostrate rosemary	Native Sons 4-in. pot	11-4-09	Reported to be very low-growing
3. Convolvulus sabatius (Convolvulus sabatius ssp. mauritanicus)	ground morning glory	Native Sons 4-in. pot	11-4-09 repltd 4-2-10	Reported to be drought resistant, 1-2 ft. H × 2-3 ft. W, lavender flowers, Italy-Yugos-No. Af. native, hardy to 25°F
4. Lippia nodiflora	Kurapia, Lippia	Green Produce plugs	3-1-11	Selection for drought tolerance from Japan; Lippia is also a California native plant; low-growing, prolific white flowers
5. Thymus pracox arcticus (T. praecox subsp. Arcticus; T. serpyllum) 'Pink Chintz'	creeping thyme	Native Sons 4-in. pot	11-4-09	Reported to grow 1-in. ht., pink flowers, attracts bees
6. Atriplex cinerea Poir.	coast or grey saltbush	Native Sons #1 container	11-4-09	Silver foliage, low-spreading, dioecious, Australian native
7. Correa X unk. 'Dusky Bells' ('Carmine Bells')	Australian fuchsia	Native Sons #1 container	11-4-09	Reported to be low wide-spreading, deep red flowers, Australian native
8. Geranium X cantabrigiense 'Biokova'	cranesbill	Native Sons #1 container	11-4-09	Reported very low and spreading, flowers winter-spring
9. Juniperus horizontalis 'Wiltonii'	blue rug juniper	Monrovia #1 container	12-2-09	Very flat dense growing, trailing branches, silver blue foliage
10. Hypericum calycinum L.	creeping St. Johnswort, Aaron's beard	Expertise Growers cuttings in flats	10-29-09	Low-growing, widely adapted, flowers primarily in spring and periodically in summer
11. Salvia sonomensis 'Gracias' (S. sonomensis X S. clevelandii)	creeping sage	Las Palitas #1 container	9-11-09	California native, reported low growing, wide spreading, lavender-blue flowers, possibly a hybrid of S. sonomensis X S. clevelandii, flowers winter/spring
12. Aptenia cordifolia (L.f.) N.E. Br. 'Red Apple' (A. cordifolia X A. haeckeliana?)	red apple	Expertise Growers cuttings in flats	10-29-09 add plt 4-2-10	Ice plant relative
13. Lantana montevidensis	trailing purple lantana	Expertise Growers cuttings in flats	10-29-09 add plt 4-8-10	Common landscape lantana, purple flowers spr.-summer
14. Trachelospermum jasminoides	star jasmine	Expertise Growers cuttings in flats	10-29-09	Vigorous once established, widely adapted
15. Sedum spp.	mixed sedums	Altman Plants 8 ft. × 8 ft. mats	3-31-10	Sod-like product with cuttings of 4 sedum spp. Rooted in jute mat under laden with plastic netting
16. Buchloe dactyloides 'U.C. Verde'	buffalograss	Todd Valley Farms plugs	4-8-09	Warm-season grass, a standard of performance under limited irrigation
17. Corethrogyne filaginifolia 'Silver Carpet'	California aster, common corethrogyne	Las Palitas #1 container	9-11-09	California native plant
18. Lonicera japonica 'Halliana'	Hall's honeysuckle, Japanese honeysuckle	Expertise Growers cuttings in flats	10-29-09	Very vigorous, reported to be tolerates drought well

[z] Plants from flats and plugs spaced 1.0 ft. o.c., 64 plants/plot; plants from 4-in. and #1 pots spaced 2.0 ft. o.c., 16 plants/plot **rev. 9-08-12**