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Low-Input New Groundcover and Native Grass Species for Turfgrass Replacement in the Low Desert

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Objectives:

1. Evaluate and compare the adaptation and performance of nativegrasses and alternative groundcovers in the low desert southwest United States as a low input turfgrass replacement in non-play areas of golf courses.
2. Generate local research-based information on the feasibility of growing new groundcovers and the nativegrasses by properly assessing their interactions with insect pests and weeds, water, and fertility requirements.
3. Increase the awareness of stakeholders about the characteristics of nativegrasses and alternative groundcovers for low water use requirements and potential water saving capacity.

Start Date: 2016
Project Duration: 3 years
Total Funding: $45,000
Report Type: Annual, second year report (2017)

Summary Text

The need for low turf maintenance inputs such as fertilizer, pesticides, water, and less frequent mowing has generated interest to evaluate low-input nativegrasses and groundcovers for the landscapes of the southwest United States. This project investigates native grass species and new groundcovers as low input and minimum maintenance plant materials when turfgrass is removed from non-play areas of golf courses or other landscapes. The study is a multi-year and multi-location set of field trials consisting of nine grass species, a native forb, and an introduced horticultural groundcover (Table 1). The first was initiated in May 2016 at Camelback Golf Club in Scottsdale, AZ and the second in June 2017 at Briarwood Country Club in Sun City West, Arizona. Small plots for each species treatment measured 6 ft x 6 ft and were arranged in a randomized complete block design with three or four replicates. At Scottsdale, plants were established under sprinkler irrigation receiving an equivalent of 0.35 inch/day for about six weeks. After mid-July, plants were grown receiving an equivalent of 0.24 inch/day. In September, irrigation was reduced to an equivalent of 0.15 inch/day. Beginning in November, irrigation was suspended for the winter and then resumed in mid-April 2017 with an equivalent of 0.15 inch/day. In the second year during 2017, the overall plant quality evaluation data for greenness, percent ground cover and vigor were collected at various intervals during the growing seasons: summer, fall, winter, and spring. At Briarwood CC, field plots were installed with overhead sprinkler irrigation and during 2017, first year data were collected for plant emergence, plant height, and percent ground cover. Data were analyzed using JMP statistical software and means compared using Student's t-test.

Laboratory Germination

In 2017, concurrent with field planting at Briarwood CC, grass species showed varying percent seed germination rates in the laboratory at a room temperature. At one week, *Eragrostis tef* (teff) and *Eragrostis intermedia* (plains lovegrass) had germination rates of over 92% (Figure 1). *Hilaria rigida* (big galleta), and *Bouteloua gracilis* (blue grama) had germination rates of 52.5% and 47.5%, respectively. *Muhlenbergia asperifolia* (alkali muhly), *Sporobolus cryptandrus* (sand dropseed), *Sporobolus airoides* (alkali sacaton) exhibited 15-25% germination. *Bouteloua dactyloides* (buffalograss), *Sporobolus contractus* (spike

dropseed), and the forb, *Zinnia acerosa* (desert zinnia), failed to germinate, similar to the 2016 trial.

Field Experiments

A. Briarwood CC

Surface coverage of the plot area and height of plants data are presented in Figure 1. In the field small plots, all plant species except desert zinnia and buffalograss established a stand at Briarwood CC within 12 weeks after seeding (WAS). *Lippia nodiflora* (Kurapia), big galleta, and teff emerged relatively faster and there was better than 80% stand establishment. Blue grama and sand dropseed exhibited 70% plot coverage. Alkali muhly, Alkali sacaton and Spike drop seed covered less than 50% of the surface area. Spike dropseed, sand dropseed, plains lovegrass, and teff grew to a height of more than 24 inches at 12 WAS. Shortest in stature, Kurapia and alkali muhly grew no more than 2 and 10 inches in height, respectively. To increase the awareness of stakeholders about the establishment, characteristics and overall performance of nativegrasses and alternative groundcovers for low water use requirements, a field demonstration was conducted at Briarwood CC on September 15, 2017 (Figure 2)

B. Camelback Golf Club

The second-year performance of nativegrasses and groundcovers for overall quality throughout spring, summer, fall, and winter are presented in Figure 3. Before a mowing in July 2016, all plant species exhibited good visual quality and vigor. After mowing, all of the native grasses performed at varying rates of growth to establish and provide surface area coverage throughout spring (March-May), summer (June-August), fall (September-November) and winter (December-February). In fall, all but buffalograss, sand dropseed and spike dropseed exhibited acceptable visual quality levels (> 6) for greenness. There was a definite difference in color of plants (greenness) among plant species in winter (Figure 4). Kurapia, plains lovegrass, alkali sacaton, alkali muhly, and blue grama, maintained foliar greenness during the winter into spring.

Summary Points

- All plant species, except desert zinnia and buffalograss emerged, survived and established under field conditions at Briarwood CC.
- All of the native grasses exhibited varied growth rates to establish, provide surface area coverage, and overall plant quality throughout spring, summer, fall and winter at Camelback GC.
- Kurapia, plains lovegrass, alkali sacaton, alkali muhly, and blue grama, in that order, performed well to maintain greenness during the fall, into winter, and into spring at Camelback GC
- Overall observations showed that kurapia was very aggressive and vigorous as a groundcover.
- Desert zinnia seed did not germinate in the laboratory or in the field at both locations in both years.
- The evaluations at both sites demonstrated the requirement for an adequate water supply for the establishment and to achieve desirable characteristics of all plant species.

Table 1. List of native grasses and groundcovers evaluated in the low desert Arizona

	Common Name	Scientific Name
1	Alkali sacaton	*Sporobolus airoides*
2	Alkali muhly	*Muhlenbergia asperifolia*
3	Blue grama	*Bouteloua gracilis*
4	Buffalograss	*Bouteloua dactyloides*
5	Teff	*Eragrostis tef*
6	Plains lovegrass	*Eragrostis intermedia*
7	Big galleta	*Hilaria rigida*
8	Sand dropseed	*Sporobolus cryptandrus*
9	Spike dropseed	*Sporobolus contractus*
10	Desert zinnia	*Zinnia acerosa*
11	Kurapia	*Lippia nodiflora*

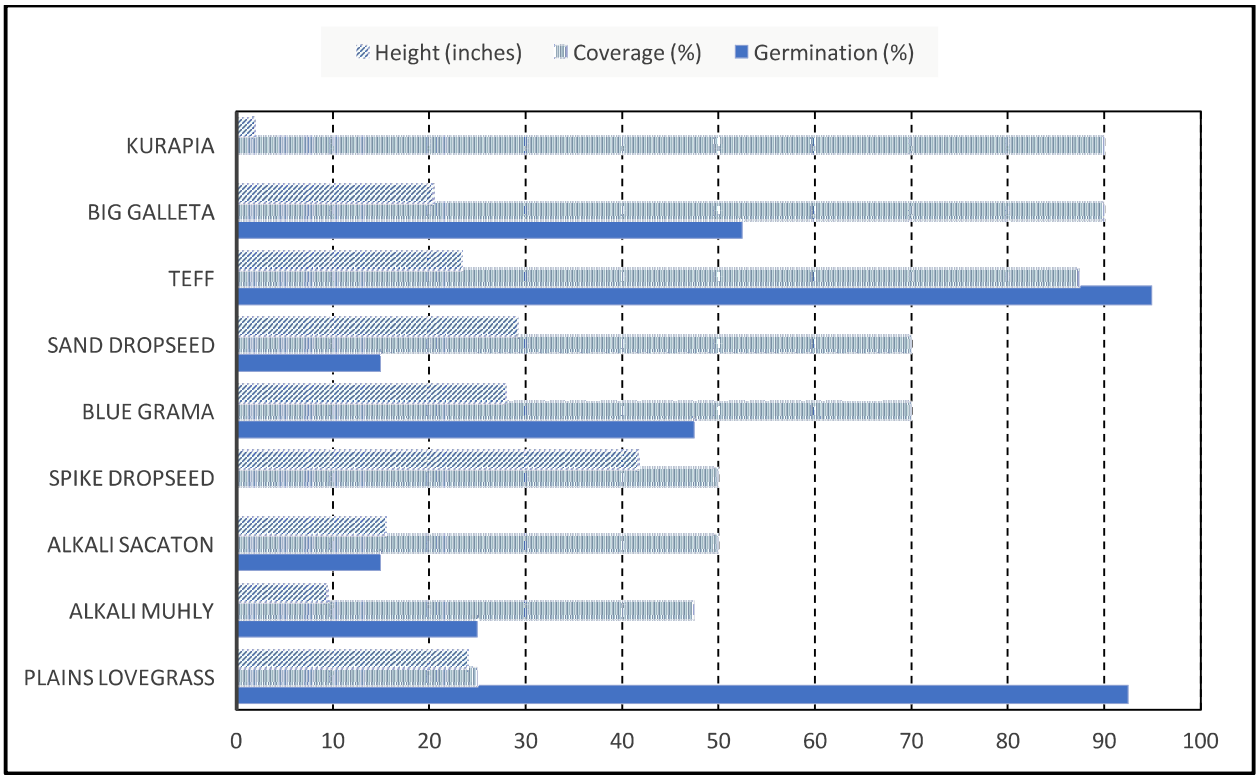

Figure 1. Percent seed germination of grasses in the laboratory at room temperature a week after seeded, ground surface coverage (%) and plant height (inches) of nativegrasses and groundcovers at 12 weeks after planting in the Sun City West, Arizona, 2017. Kurapia was planted as plugs.

Figure 2. Field demonstration of nativegrasses and groundcovers performance at Briarwood Country Club in the Sun City West, AZ on September 15, 2017.

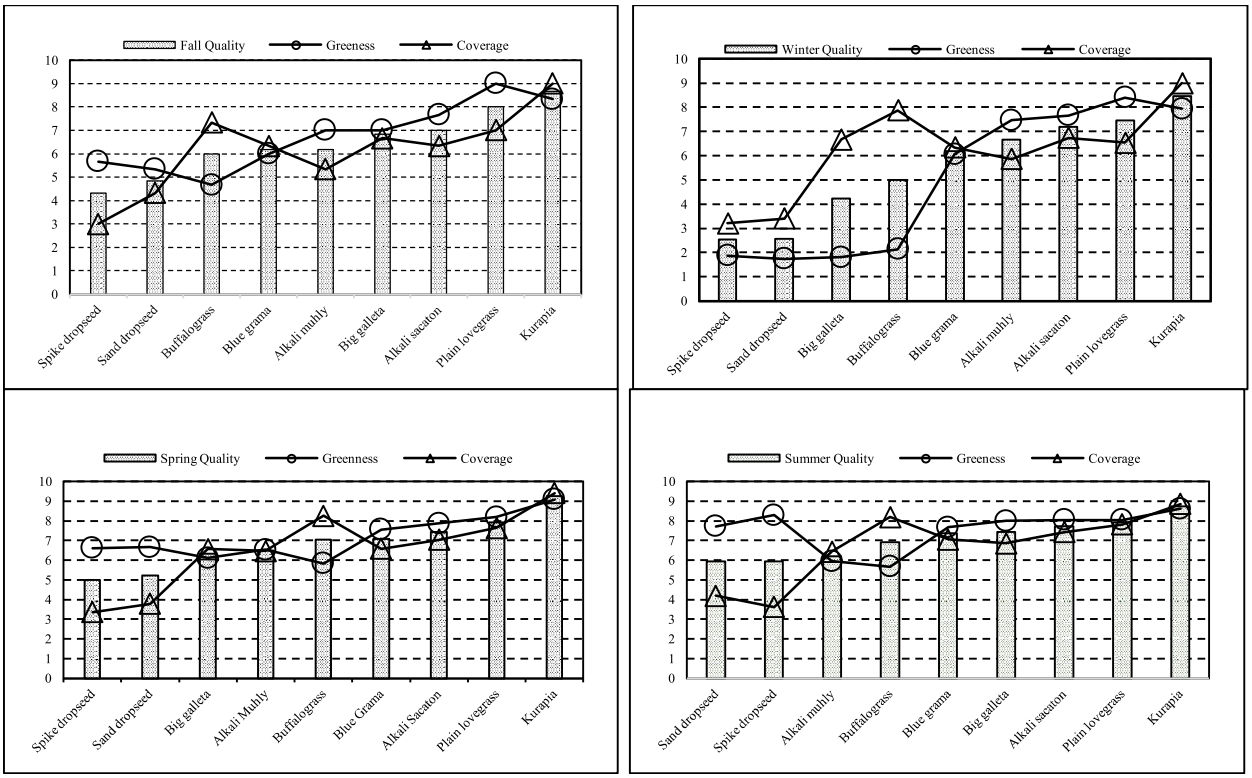

Figure 3. Performance of nativegrasses and groundcovers during fall (0.157 inch/day irrigation), winter (no irrigation), spring (0.157 inch/day) and summer (0.30 inch/day) time at Scottsdale, AZ in 2016-17.

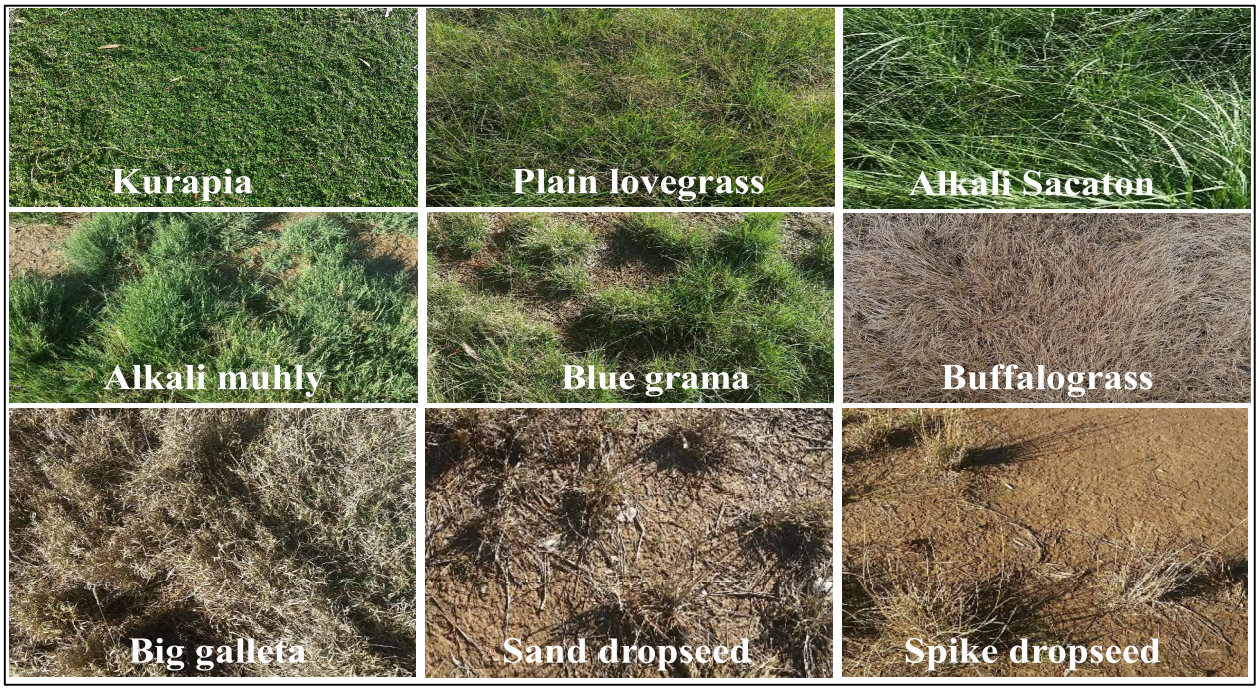

Figure 4. Evaluating quality of nativegrasses and groundcovers in winter at the end of January, 2017 in Scottsdale, AZ. Greenness retained by Kurapia, lovegrass, sacaton, muhly, and grama. No irrigation during the winter.