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

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Objectives:
Evaluate and compare the adaptation and performance of native grass species and a new groundcover, Kurapia (*Lippia nodiflora*), in the southwest United States low desert arid region as a low input turfgrass replacement in non-play areas of golf courses.

Generate local research-based information on the feasibility of growing Kurapia and the native grass species by properly assessing their interactions with insect pests and weeds, water and fertility requirements.

Increase the awareness of stakeholders about the characteristics of Kurapia and native grass species for low water use requirements and potential water saving capacity.

Start Date: 2016
Project Duration: 3 years
Total Funding: $45,000

Golf courses in the southwest United States are affected by poor water quality and quantity for managing turfgrasses. To reduce water use on golf courses, the use of lesser input plant species in golf course landscapes is gaining interest. This project investigates native grass species and a new groundcover as a low input turfgrass replacement in non-play areas of golf courses. Eleven plant species were evaluated - nine grass species, a native forb, and an introduced horticultural groundcover (Table 1). Eight grasses are native to the southwest and one is an introduced forage grain from Africa. A laboratory experiment was conducted to determine the germination rate of the seeds of plant species. Two field trials were conducted and plant species seeded in 6 ft by 6 ft plots arranged in a randomized complete block design with three replicates in non-play areas of two golf courses: Camelback Golf Club in Scottsdale, AZ planted on 31 May 2016 and Whirlwind Golf Club planted on 1 June 2016 in Chandler, AZ. Field plots were installed with overhead sprinkler irrigation to deliver optimal daily water to germinate and establish the crop stands. Data were collected for: laboratory germination; weekly field plant emergence; plant height, percent ground cover; and overall plant quality for color and vigor.

In the laboratory, *Eragrostis tef* (teff), *Eragrostis intermedia* (plains lovegrass), and *Hilaria rigida* (big galleta) began to germinate within 24 hours (Figure 2). *Sporobolus cryptandrus* (sand dropseed), *Sporobolus airoides* (alkali sacaton) and *Muhlenbergia asperifolia* (alkali muhly) began to germinate within 48 hours. Teff and plains lovegrass had germination rates of over 76%; *Bouteloua gracilis* (blue grama) exhibited 40% germination; and sand dropseed, big galleta, alkali sacaton and alkali muhly showed less than 10% germination

within 7 days. *Bouteloua dactyloides* (buffalograss), *Sporobolus contractus* (spike dropseed), and the forb *Zinnia acerosa* (desert zinnia) failed to germinate within 21 days under room temperature conditions.

Field experiments showed all plant species except desert zinnia establishing a stand at Camelback Golf Club. At Whirlwind Golf Club, all species, except teff, failed to emerge or to establish. At Camelback, teff emerged within 3-5 days and there was better than 60% stand establishment at 1 week after seeding (WAS) (Figure 3). Big galleta emerged over a 3-week period to establish a 40% stand. Buffalograss and the dropseeds were very slow to establish a stand. Most of the grasses and Kurapia, that was plugged, covered the surface area of the plots within 5 to 8 WAS (Figure 4). Sand dropseed, plains lovegrass, and teff grew to a height of more than 25 inches at 8 WAS (Figure 5). Kurapia and buffalograss grew no more than 2 and 5 inches in height, respectively. Before first mowing in early July, all plant species exhibited good quality and vigor. Late summer observations showed that Kurapia was very aggressive and vigorous as a groundcover. All of the native grasses performed at varying and acceptable levels to establish and provide surface area coverage throughout the late summer (Figure 6).

Summary Points:

- Nine native and two non-native plant species were evaluated to provide ground cover under sprinkler irrigation.

- All plant species, except desert zinnia, emerged and established well under field conditions.

- Grasses and groundcovers germinated, established, and provided varied surface area coverage.

- Kurapia exhibited the most vigorous and aggressive growth when grown from plugs under optimal irrigation.

Table 1. List of native grasses and groundcovers evaluated in the low desert Arizona at Camelback Golf Club, Scottsdale, AZ, 2016.

Common name	Scientific name	Seed rate/Acre
Alkali sacaton	*Sporobolus airoides*	3.0 lb
Alkali muhly	*Muhlenbergia asperifolia*	1.2 lb
Blue grama	*Bouteloua gracilis*	4.0 lb
Buffalograss	*Bouteloua dactyloides*	218 lb
Teff	*Eragrostis tef*	5.0 lb
Plains lovegrass	*Eragrostis intermedia*	1.00 lb
Big galleta	*Hilaria rigida*	174 lb
Sand dropseed	*Sporobolus cryptandrus*	1.0 lb
Spike dropseed	*Sporobolus contractus*	1.0 lb
Desert zinnia	*Zinnia acerosa*	2.2 lb
Kurapia	*Lippia nodifora*	43,560 plugs*
*Kurapia plugs planted on 12-inch spacing in 6 ft by 6 ft plots.		

Figure 1. Performance of native grasses and groundcovers under sprinkler irrigation at 7 weeks after seeding (WAS) in Scottsdale, Arizona, 2016.

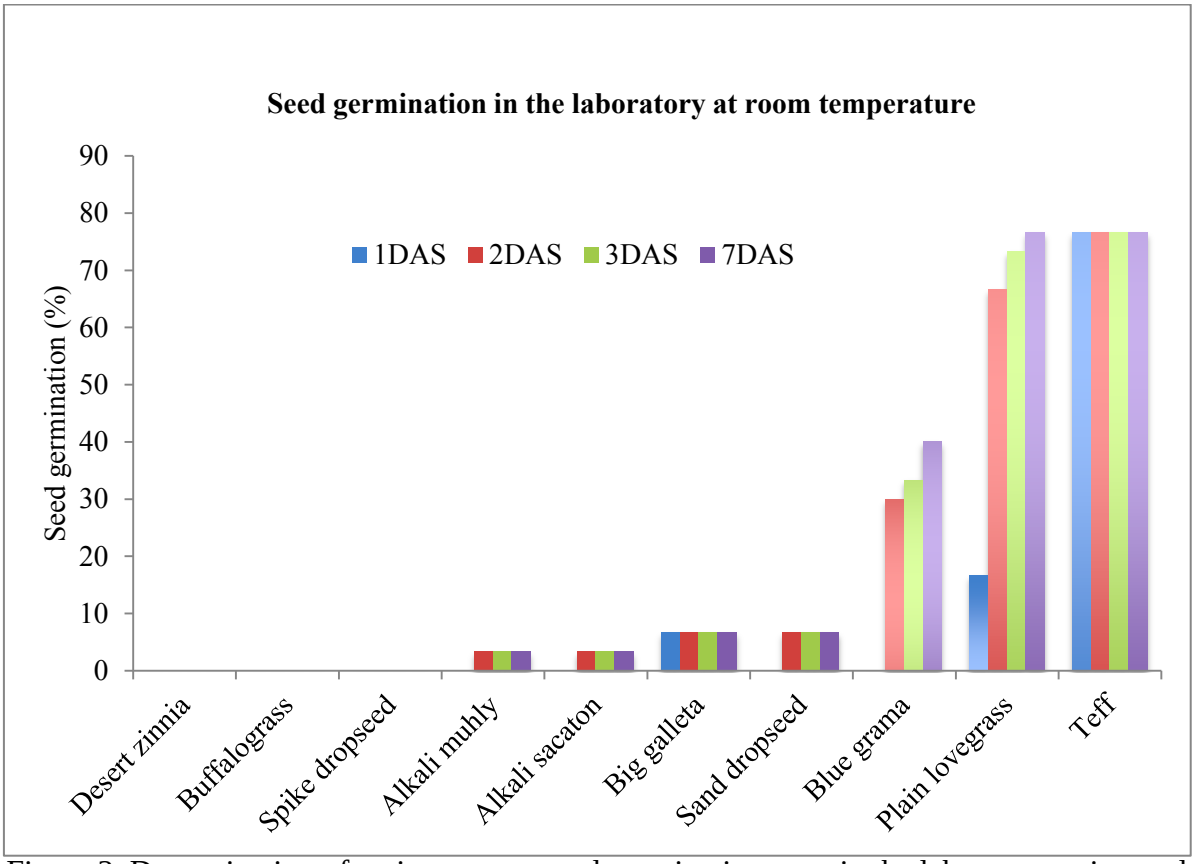

Figure 2. Determination of native grasses seed germination rates in the laboratory at intervals of days after seeding (DAS), June 2016.

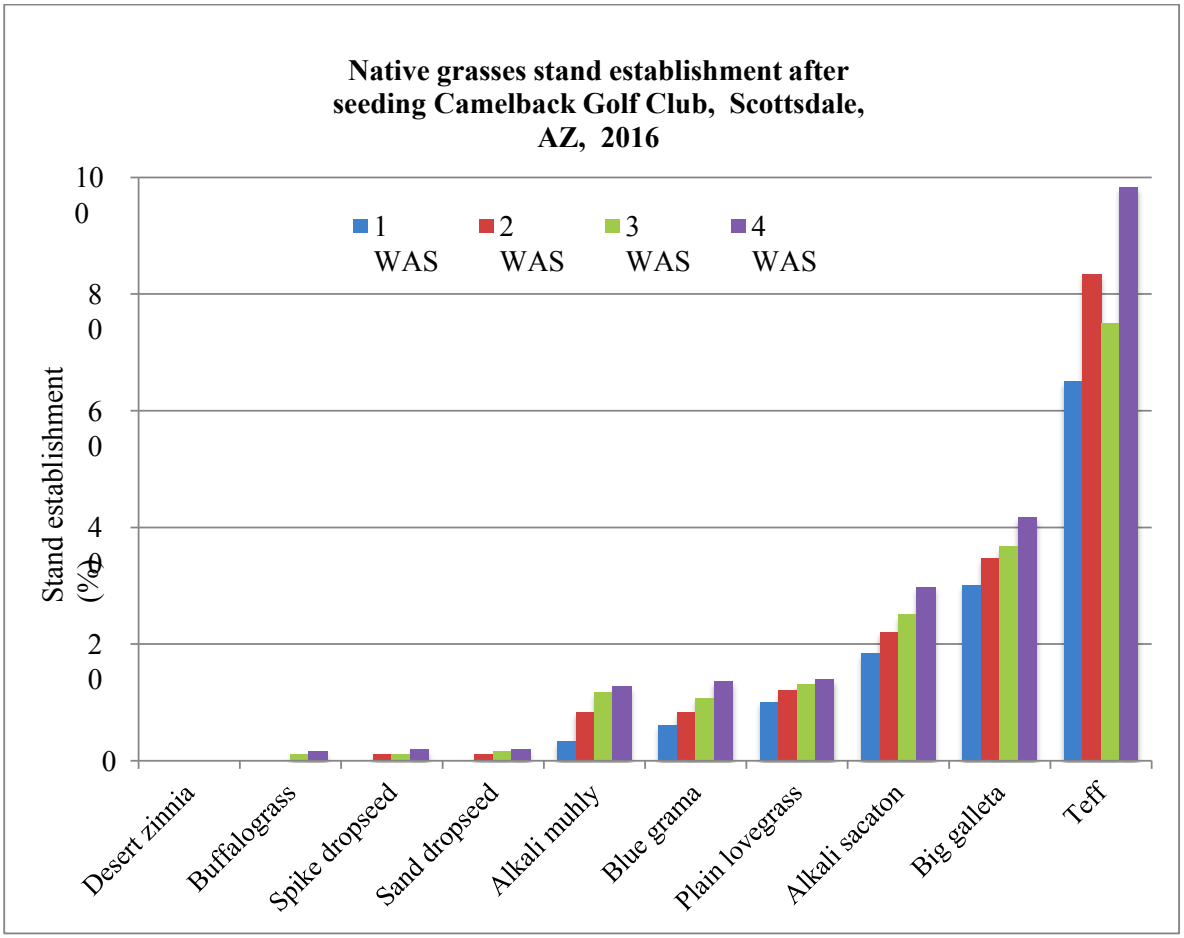

Figure 3. Germination and emergence of 10 plant species in the field for 4 weeks after seeding (WAS) to establish a stand.

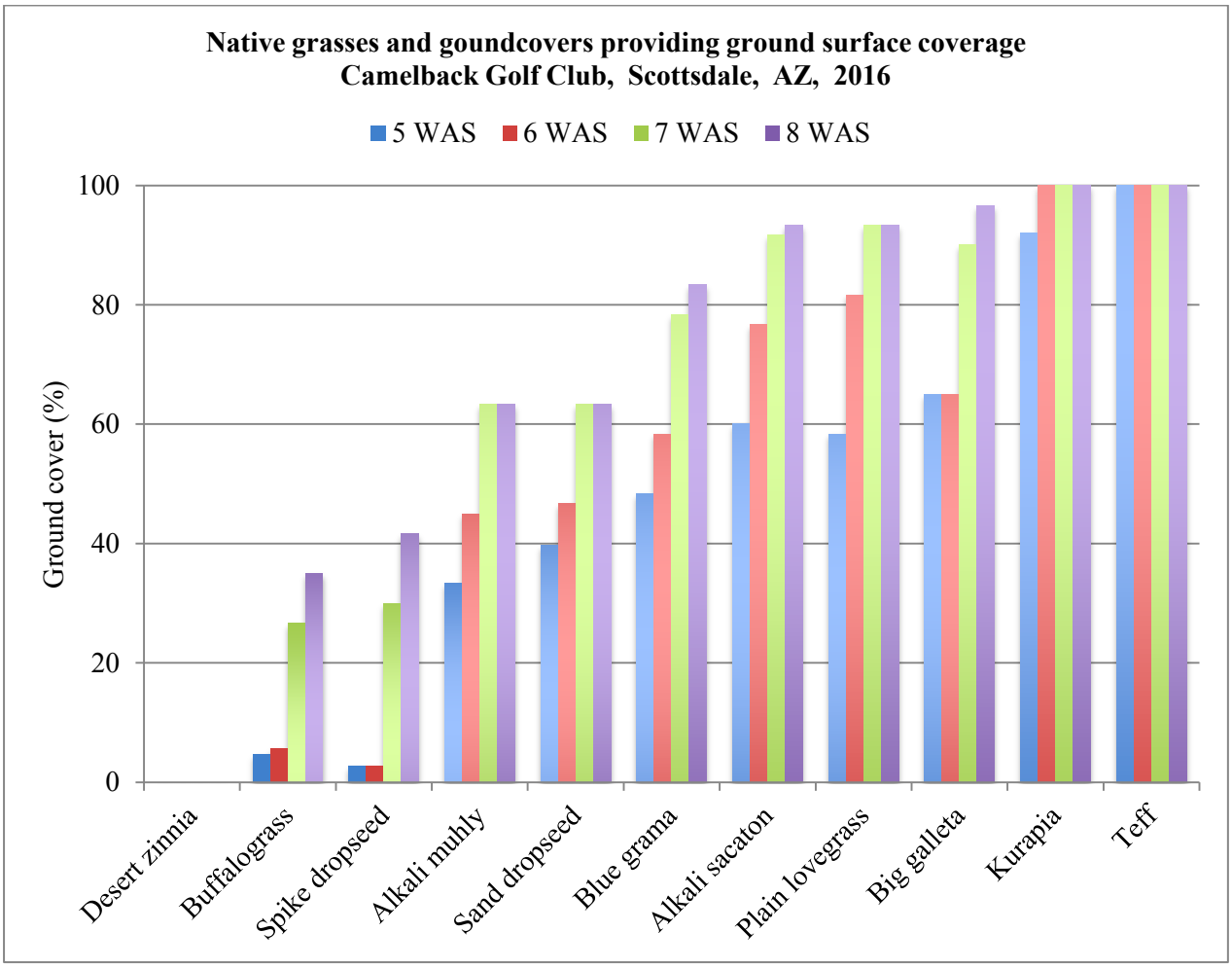

Figure 4. Performance of 11 plant species to provide ground surface coverage at intervals of weeks after seeding (WAS). Kurapia was planted as plugs.

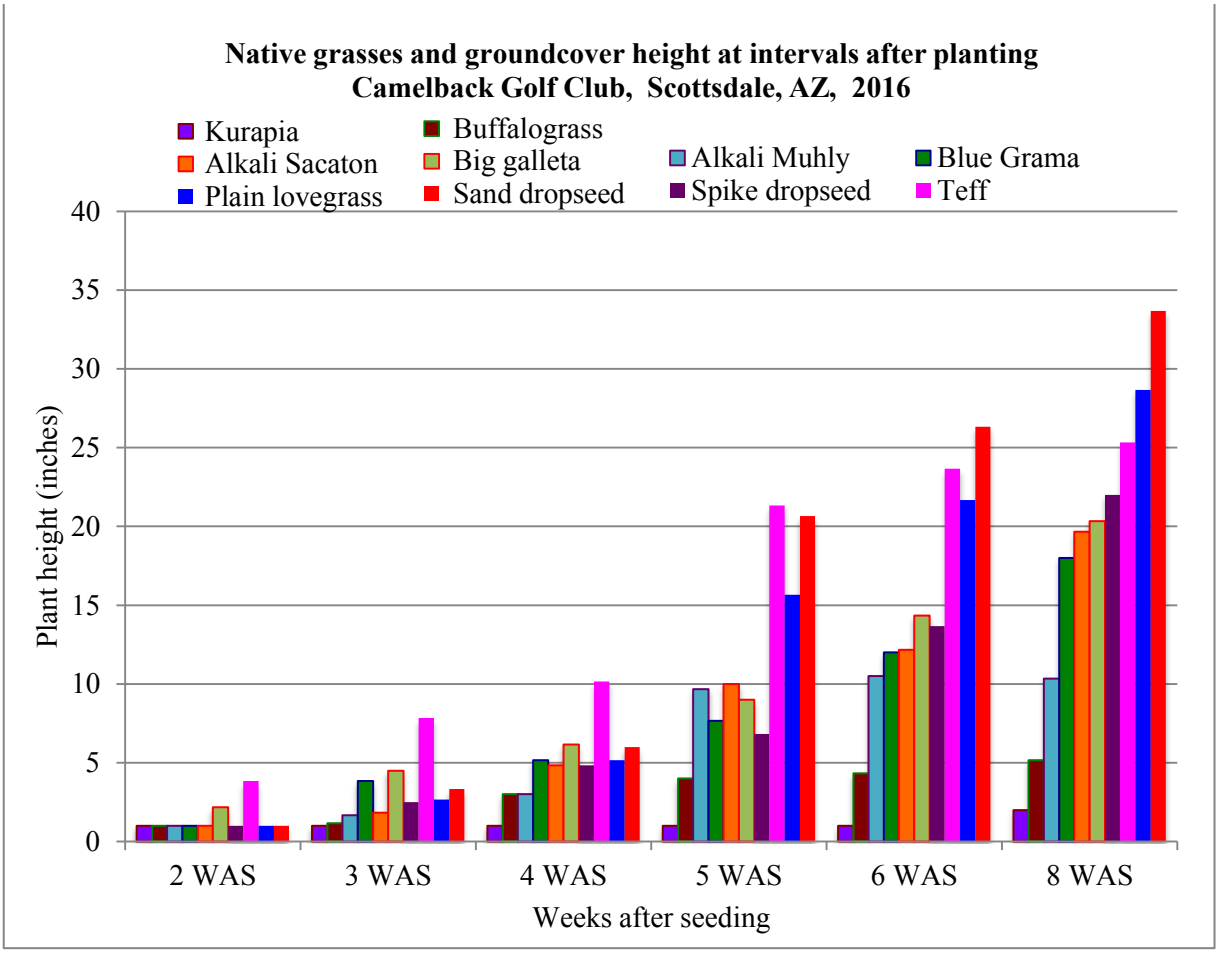

Figure 5. Native grasses and kurapia groundcover heights before first mowing.

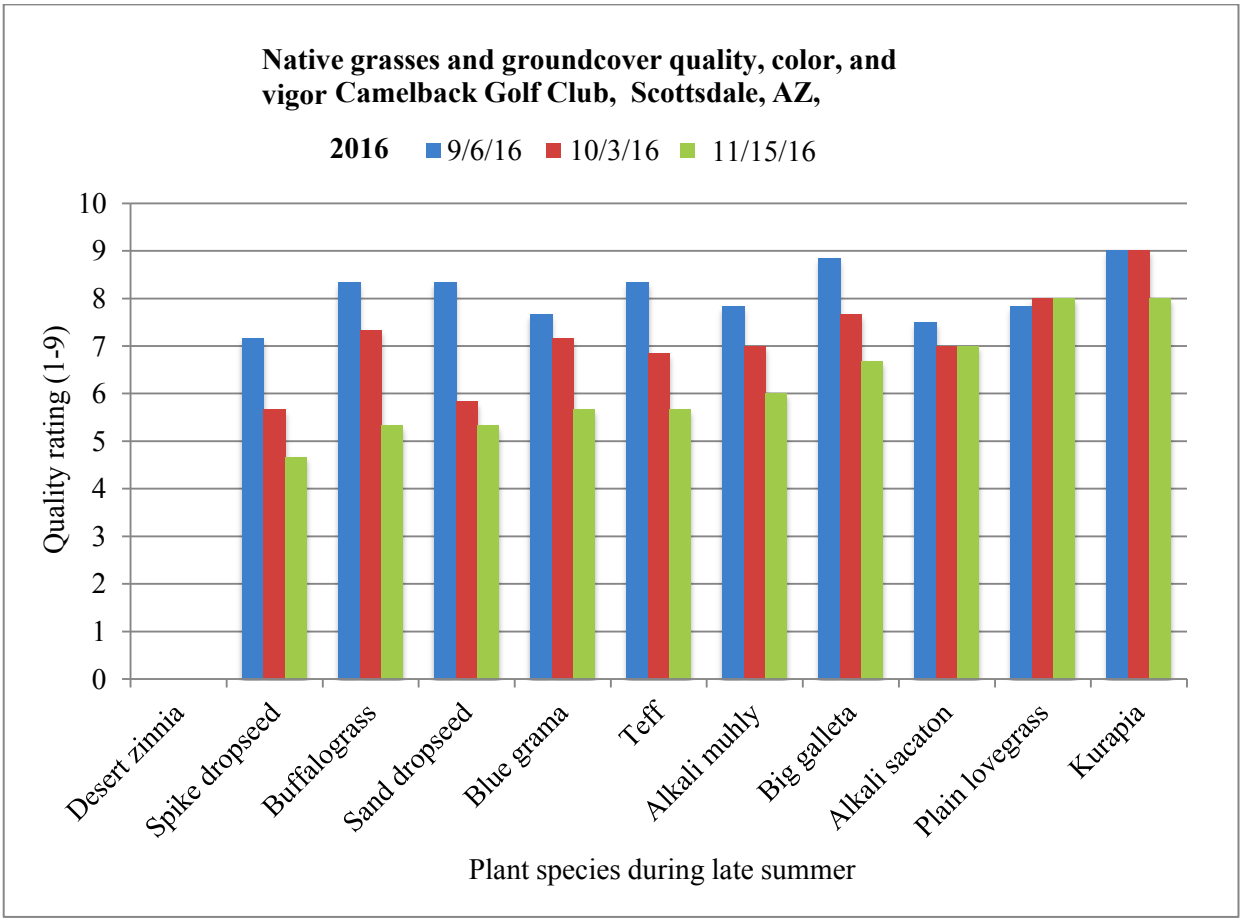

Figure 6. Native grasses and groundcover appearance at intervals during the late summer following three mowing events.

Figure 7. Native grasses and groundcover performance under sprinkler irrigation at 4 weeks after a third mowing on 12 October 2016 and under deficit irrigation at once per week.