2017-04-614

**Project title:** Bermudagrass rough conversion to no-mow, low-input grass area

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**Objectives:**

1. Evaluate the performance of low-input, alternatives grasses as an out-of-play area on a Central California golf course
2. Compare establishment rates of those alternative species
3. Test methods for bermudagrass termination
4. Develop best management practices for subsequent weed control

**Start date:** 2017

**Duration:** 3 years

**Total funding:** $50,000

**Summary text:**
To conserve natural resources, increase economic savings, and comply with legislative restrictions, golf course managers are having to maintain their landscapes at healthy conditions with lower inputs of water, fertilizer, pesticides, and energy. A worthwhile option to reduce inputs is using alternative grass species that perform well under lower-input management. Among golf course turfgrass areas, the rough is the largest component of maintained turfgrass and the most reasonable area to integrate lower-input grasses on a large scope with effective outcomes. Currently, bermudagrass (*Cynodon dactylon*) is the most dominant species on golf course roughs throughout California and the Southwest United States. Bermudagrass is popular for its superior functionality and appearance, but a healthy sward needs regular water, fertilizer, pesticides, mowing, and cultivation. Golf course managers are looking for ways to convert bermudagrass areas, especially in rough areas that are seldom in play and not worth the inputs to maintain. Alternative grass species exist that could provide a minimal-input, naturalized area without impairing playing conditions. However, there are major unknowns associated with the establishment and management of alternative grass species. Little research has been published and golf course superintendents are reluctant to install these species.

The goal of this project is to determine what alternative grass species will perform well and remain playable as an unmowed golf course rough, and to develop best management practices to terminate bermudagrass and establish a healthy, low-input stand of vegetation.

*Objectives 1 and 2*
Two field trials were established on rough areas of golf courses in Dinuba, CA and San Luis Obispo, CA, to measure the performance of different grasses. Ten cool-season grass species were seeded October 2017 in 3.7 x 1.5 m plots, at a rate of 324 pure live seed $m^{-2}$ (Table 1). Plots were arranged in a randomized complete block with 9 replications at the San Luis Obispo site and 4 replications at the Dinuba site. Field plots were irrigated daily with overhead sprinklers, and no fertilizer was provided. Data was collected for germination with a visual rating on a 1 to 5 scale, with 1 representing no germination and 5 representing maximum germination.

Data from 3 weeks after establishment was subjected to an ANOVA. No significant differences were detected for location or location by species interaction, so locations were combined. Differences were detected among grass species, and means were separated with Fisher's LSD (Figure 1). California brome (*Bromus carinatus*) and purple needlegrass (*Stipa pulchra*) made up the highest-ranked statistical group, with the most germination at rating time (Figure 2). The *Festuca* species and *Agrostis* species performed similarly within-genus, excluding sheep fescue (*Festuca ovina*).

In May 2018, two more field trials will be established on in Dinuba, CA and Parlier, CA, to evaluate 9 warm-season grass species (Table 2). Data will be collected from all trials on germination, plant growth stage, turf quality, pest susceptibility, above ground biomass, density, inflorescence counts, and lodging.

*Objective 3*
A healthy stand of bermudagrass on an active golf course rough will be subjected to different termination methods in 2018. Treatments for bermudagrass removal will include non-selective synthetic herbicide (glyphosate), non-selective organic herbicide, solarization, sod removal, and scalping. Data will be collected on recalcitrant bermudagrass and other weed invasion.

*Objective 4*
Best management practices for weed control may depend on the alternative grass planted and the bermudagrass termination method. Therefore, results from Objectives 1, 2, and 3 will be used to design experiments for Objective 4.

**Summary points**:

- Ten alternative grass species were established at 2 golf course sites in Central California
- All species germinated and differences were detected at 3 weeks after seeding
- California brome and purple needlegrass exhibited maximum germination at 3 weeks after seeding

Table 1. Cool-season grass species seeded fall 2017 on golf courses in Dinuba and San Luis Obispo.

| | | |
|---|---|---|
| Spike bentgrass | *Agrostis exarata* | * |
| Dune bentgrass | *Agrostis pallens* 'Camp Pendleton' | * |
| California brome | *Bromus carinatus* | * |
| Tufted hairgrass | *Deschampsia cespitosa* | * |
| Sheep fescue | *Festuca ovina* | |
| Hard fescue | *Festuca longifolia* | |
| Molate fescue | *Festuca rubra* 'Molate' | * |
| Chewings fescue | *Festuca rubra* ssp. *commutata* | |
| Prairie junegrass | *Koeleria macrantha* | * |
| Purple needlegrass | *Stipa pulchra* | * |

*California native

Table 2. Warm-season grass species to be evaluated summer 2018 at 2 locations.

| | | |
|---|---|---|
| Purple threeawn | *Aristida purpurea* | * |
| Buffalograss | *Buchloe dactyloides* | |
| Sideoats grama | *Bouteloua curtipendula* | * |
| Blue grama | *Bouteloua gracilis* | * |
| Bermudagrass | *Cynodon dactylon* | |
| Weeping lovegrass | *Eragrostis curvula* | |
| Big galleta | *Hilaria rigida* | * |
| Deer grass | *Muhlenbergia rigens* | * |
| Alkali sacaton | *Sporobolus airoides* | * |

*California native

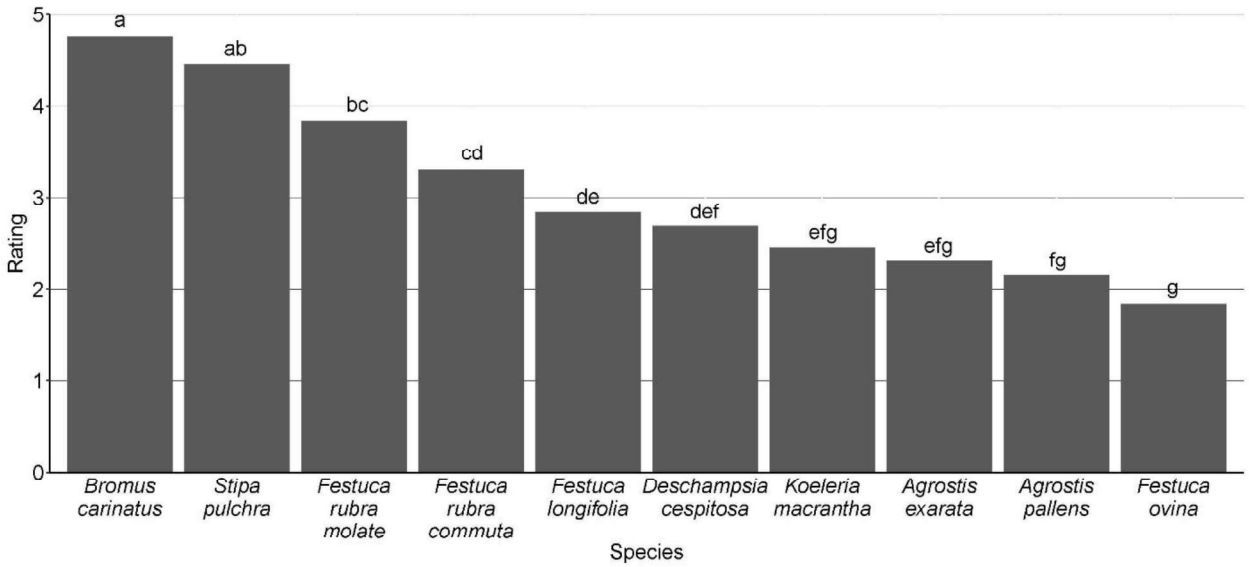


Figure 1. Mean germination rating for each species at 3 weeks after seeding. Bars labeled with the same letter are not statistically different using Fisher's LSD (α=0.05).

Figure 2. California brome (*Bromus carinatus*) plot in San Luis Obispo, 3 weeks after seeding.