Innovations in Turfgrass

Rising costs of energy and water and high labor costs have intensified the search for low maintenance turfs that make maximum use of resources. Reduced mowing, lower fertilizer requirements, and resistance to pests and diseases highlighted research in this area.

Strawberry clover with bermudagrass for low-maintenance turf

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Turf has a direct effect on the way most Californians live. Many recreational facilities depend on a uniform, vigorous, well-maintained turf sward as the medium of play. Examples include golf courses; bowling greens; picnic areas and parks; soccer, lacrosse, polo, baseball, and football fields; and school grounds. Gardening is important to many Californians, and lawn maintenance is a constant source of challenge and pride for the home gardener. Turf also is used in ornamental settings to create a desired aesthetic appearance.

Turfgrasses directly improve people's environments as well. Turf and other plant materials reduce discomforting glare, especially in urban areas, and can reduce traffic noise considerably. Soil erosion is reduced or controlled by turf, and chemical and particulate air pollution is decreased. Because of transpirational cooling, turf modifies high temperatures by heat dissipation. We have all felt the obviously different temperature when standing on asphalt in comparison with turf. Most Californians now live in urban centers and the function of turf in improving these environments is significant.

A trend toward minimum maintenance in turf selection and care has been noted for a dozen years, because of the increasing costs of energy and labor, and the availability and cost of water. Minimum-maintenance turfs have increased efficiency in resource requirements and utilization.

Common bermudagrass (*Cynodon dactylon*) is very well adapted to much of California and, when well maintained, forms a dense, wear-resistant turf of good color and medium texture throughout the warm season. It is drought-tolerant and highly efficient in water use. Unfortunately, bermudagrass is dormant and straw-colored for several months during the late fall, winter, and early spring. Also, the grass has a moderate to high nitrogen fertility requirement, depending on the variety used.

Species can coexist

A few casual observations of bermudagrass/strawberry clover (*Trifolium fragiferum*) combinations have suggested that this clover can coexist with bermudagrass if given proper maintenance. Clover can fix atmospheric nitrogen, and strawberry clover stays green year-round throughout the bermudagrass growing regions of California.

The objective of this study was to determine whether common bermudagrass and strawberry clover would be compatible, providing a low-maintenance turf of good quality that would have satisfactory color throughout the year. Field experiments conducted at the UC South Coast Field Station in Irvine and at UC Riverside included: germination tests of strawberry clover varieties under various environmental conditions; a strawberry clover variety evaluation; experiments to determine the best method of establishing a common bermudagrass/strawberry clover mix; and a cultural maintenance study to determine optimum mowing and nitrogen fertility practices for the grass/clover mix.

In the tests, 'O'Connors' strawberry clover germinated quickly and at a high germination percentage. 'Fresa' strawberry clover had a comparatively low germination rate (30 percent) with a very high number of hard seeds in the seed lots

Field tests have shown that, with proper maintenance, bermudagrass and strawberry clover can coexist harmoniously. Bermudagrass is tough, drought-tolerant, and highly efficient in water use but turns brown in fall and winter; clover fixes atmospheric nitrogen for both species and stays green year-round.

that were tested. Chemical scarification, depth of seeding, or light-dark treatments did not alter the germination characteristics. A seeding rate of between 1 and 2 pounds per 1,000 square feet gave complete cover after a 12-week period. An Australian seed source of 'O'Connors' was faster to establish than a domestic 'O'Connors', which, in turn, was slightly better in establishment rate than 'Fresa'. Both cultivars were virtually identical in appearance and color when mature.

Evaluating results

Field tests evaluated the results of establishing the common bermudagrass/strawberry clover mix together, seeding common bermudagrass into a previously established strawberry clover sward, and seeding strawberry clover into a previously established common bermudagrass sward. It was determined that seeding strawberry clover in the fall at a rate of 1 to 2 pounds per 1,000 square feet, to an established common bermudagrass sward that had been vertical-mowed and/or close-mowed, resulted in the most uniform mix of the two species.

A uniformly mixed stand of common bermudagrass and 'O'Connors' strawberry clover (innoculated with type B *Rhizobium*) was established and allowed to mature. Mowing-height treatments of 0.75, 1.25, and 1.75 inches and soluble nitrogen treatments of 0, 0.25, 0.50, 0.75, and 1 pound of nitrogen per 1,000 square feet per month were tested for one year.

Measurements of shoot density made before nitrogen fertilization began showed that the ratio of bermudagrass to clover shoots was approximately 1:1. Shoot density of both species declined significantly as the mowing height increased. Mowing height also had a significant influence on clover leaf size. Leaf size increased as mowing height increased. The rate of nitrogen fertilization had no effect on leaflet length.

Turf quality during the warm months was unaffected by nitrogen level or mowing height. Mixing of the two species was excellent at all cutting heights and fertility rates. Bermudagrass became more obvious as nitrogen rates increased.

During the cool months, turf quality declined significantly with higher nitrogen levels. Dormant bermudagrass was most noticeable in the high-nitrogen treatments, decreasing the turf quality ratings. Dormant bermudagrass was also more obvious with low cutting heights.

The clover flowered abundantly during the summer, with less flowering measured under lower cutting heights. It was noted that this flowering attracted a large number of bees, which would be a distinct disadvantage in facilities such as parks, playgrounds, or home lawns during the summer. Also, gophers and squirrels found the clover to be an attractive food source. A less serious problem, but one worthy of note, was that the succulent clover growth resulted in a mowing problem, often clogging the rotary mower.

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