Mixing turfgrasses controls Fusarium blight

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Appealing color, density, texture, and overall uniformity make Kentucky bluegrass (*Poa pratensis* L.) the most commonly used cool-season turfgrass species in California. It grows best along the coast but also is planted in inland areas where it is not as well adapted because of high summer temperatures. During the summer, Kentucky bluegrass can be damaged by Fusarium blight, a disease caused by the fungus *Fusarium roseum*, which bleaches the leaves and causes a severe root rot, killing the grass.

Perennial ryegrass (*Lolium perenne*) is another cool-season turfgrass adapted to the same California climatic zones as Kentucky bluegrass. Excellent turf-type perennial ryegrass cultivars have been developed recently that closely resemble Kentucky bluegrass in color, texture, and overall appearance but are not susceptible to Fusarium blight. In a study designed to find a practical, nonchemical method for controlling Fusarium blight in Kentucky bluegrass, we evaluated various mixes of Kentucky bluegrass and perennial ryegrass for Fusarium blight resistance and overall turf quality response.

The study was conducted at the University of California South Coast Field Station in Santa Ana. Eleven bluegrass/ryegrass mixes were established in September 1975 in 25-square-foot plots, and each was seeded at a rate equivalent to 3 pounds of seed per 1,000 square feet. The treatments were replicated four times and arranged in a completely randomized block design. Once established, the experimental area was cut at a 1¾-inch height and fertilized with a slow-release nitrogen source at a rate equivalent to 3 pounds of nitrogen per 1,000 square feet per year. Irrigation was based on water loss from an evaporative pan. No other primary or secondary maintenance was performed.

TABLE 1. Study Treatments

Treatment	Weight		Seed count*	
	Kentucky bluegrass	Perennial ryegrass	Kentucky bluegrass	Perennial ryegrass
	%	%	%	%
1	100	—	100	—
2	95	5	98.7	1.3
3	90	10	97.2	2.8
4	85	15	95.8	4.2
5	80	20	94.1	5.9
6	75	25	92.4	7.6
7	70	30	90.4	9.6
8	65	35	88.1	11.9
9	60	40	86.0	14.0
10	55	45	82.2	16.8
11	50	50	80.2	19.8

*Based on 2,463 seeds of Kentucky blue per gram and 608 seeds of perennial rye per gram.

Park Kentucky bluegrass and a blend of 50 percent Manhattan and 50 percent Pennfine perennial ryegrass were used in all treatments. Table 1 shows weight and seed count percentages of the 11 treatments.

Observations were made regularly on plot appearance. At least two persons made monthly turf scores (visual appearance ratings based on color, texture, density, pest activity, and uniformity of the turfgrass treatments). The plots were rated for color intensity three times during 1976. Fusarium blight was noted in August 1978, and data were recorded as percent area affected by the disease. During the winter of 1978-79, the Kentucky bluegrass and perennial ryegrass tillers were counted in three 2-inch plugs harvested from each plot. All data were subjected to an analysis of variance, and significant differences determined by the Duncan's Multiple Range Test.

During the warm season (May to September), all bluegrass/ryegrass mixes had a somewhat better overall appearance than the 100 percent Kentucky bluegrass plots, although the differences were not great (fig. 1). In comparison, all mixes of bluegrass/ryegrass had significantly higher turf scores than the straight bluegrass treatment during the cool season (October to April). The perennial ryegrass, which has excellent vigor during those months, obviously exerted a positive response in the mix. When the turf scores were combined and analyzed for the two-year period, we found that all mixes were given significantly higher appearance ratings than the straight bluegrass (table 2).

Even a small amount of ryegrass added to the Park Kentucky bluegrass improved turf color (fig. 2). Five percent perennial ryegrass gave significantly better color than 100 percent bluegrass, and the treatment with 10 percent ryegrass was significantly better than either the 5 percent or no ryegrass treatments. There were no further significant increases in color ratings when 15 percent or more ryegrass was used as part of the mix.

TABLE 2. Turf Scores for 1977 to 1979 for Bluegrass/Ryegrass Mixes at Santa Ana

Mix (by weight)		
Kentucky bluegrass	Perennial ryegrass	Turf score*
%	%	
100	—	6.8 Z
95	5	7.3 Y
90	10	7.5 XY
85	15	7.4 XY
80	20	7.7 X
75	25	7.7 X
70	30	7.7 X
65	35	7.6 XY
60	40	7.7 X
55	45	7.8 X
50	50	7.8 X

*Score is on a scale of 0 to 10, where 0 is dead turf, and 10 is an ideal turfgrass stand. Values followed by the same letter are not significantly different at the 5 percent level (Duncan's Multiple Range Test).

After the experimental area was subjected to moisture stress in the summer of 1978, Fusarium blight occurred that August. Fusarium blight on the 100 percent Park Kentucky bluegrass plot was devastating: about 30 percent of the plot area was killed (fig. 3). The amount of affected area decreased markedly in plots with only 5 percent ryegrass in the mix. The disease symptoms, in essence, were eliminated in all treatments containing 10 percent ryegrass or more, and there was no significant difference in Fusarium blight incidence among any treatments above 10 percent ryegrass. These results definitely show that mixing even small amounts of perennial ryegrass with Kentucky bluegrass can mask or control the disease symptoms. The amount of perennial ryegrass needed falls in the 10 to 15 percent range on a seed weight basis.

The count of bluegrass and ryegrass tillers in the 2-inch plugs showed that Kentucky bluegrass decreased very rapidly and perennial ryegrass increased when even a small percentage of ryegrass on a seed-weight basis was added to the mix (fig. 4). There was no significant difference in bluegrass/ryegrass plant counts in mixes con-

taining more than 15 percent ryegrass on a seed-weight basis (85 percent or less bluegrass). The bluegrass/ryegrass balance assumed approximately a 50/50 plant count relationship with 15 percent ryegrass or more in the seed mix.

These results tend to support and explain the results on turf scores, color, and Fusarium blight activity. Evidently, the quick-germinating and rapid-growing perennial ryegrass was able to establish and remain competitive, even when very small seed numbers per unit area were seeded. The slower germinating and growing Kentucky bluegrass was able to fill in around the established ryegrass plants, and the species mix was maintained for the duration of this three-year test.

In conclusion, mixes of Kentucky bluegrass and perennial ryegrass practically eliminated Fusarium blight activity, whereas control plots of straight bluegrass were damaged. The mixture of the two species resulted in a better color and higher turf appearance ratings than the bluegrass alone. A seeding of 15 percent or more perennial ryegrass, and 85 percent Kentucky bluegrass or less, by weight, resulted in approximately a 50/50 bluegrass/ryegrass plant count after three years.

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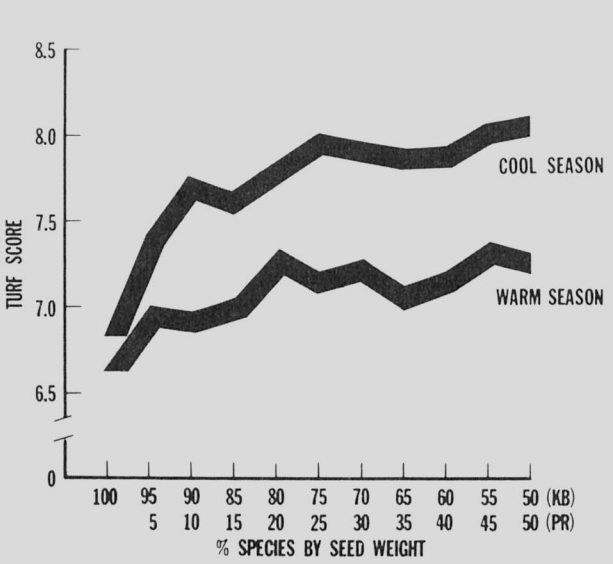

Fig. 1. Average scores of Kentucky bluegrass (KB) and perennial ryegrass (PR) mixes in warm (May-September) and cool (October-April) seasons. Scale from 0 to 10; 10 is best turf.

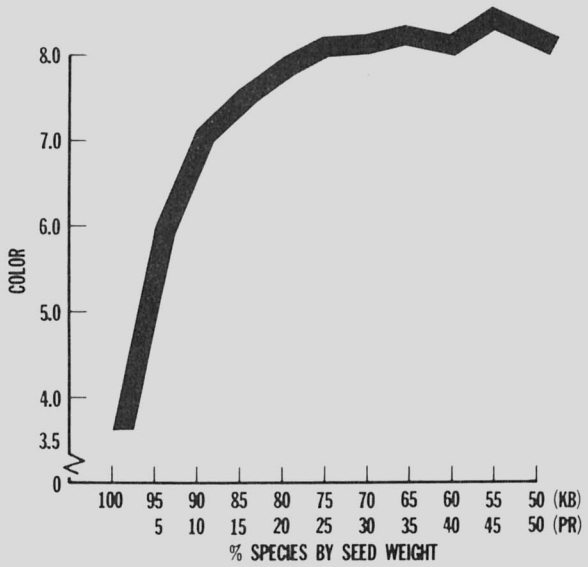

Fig. 2. Color intensity visual ratings for Kentucky bluegrass/perennial ryegrass mixes. Scale from 0 to 10; 0 is turf sward without green color; 10 is deepest green.

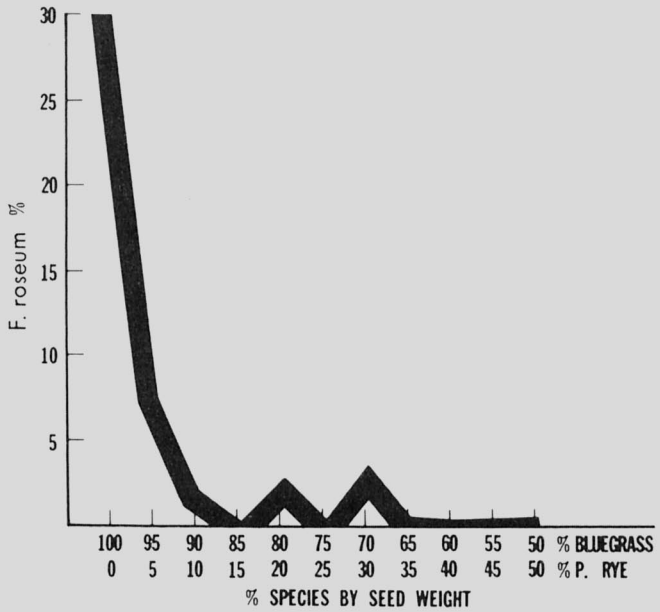

Fig. 3. Percentage of *Fusarium roseum* observed in Kentucky bluegrass/perennial ryegrass mixes in August 1978.

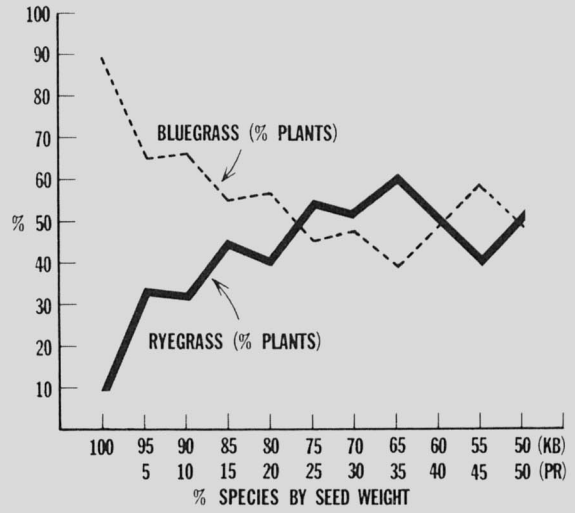

Fig. 4. Percentage of Kentucky bluegrass and perennial ryegrass plants 40 months after mixes were established.