MIXING KENTUCKY BLUEGRASS AND PERENNIAL RYEGRASS

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Over the past 20 years, perennial ryegrass has caught the eye of many turf managers because of its ability to rapidly establish new seedings. Because of its large seeds and ample stored reserves, perennial ryegrass can emerge in as short as 5 to 7 days after planting. While this presents many advantages to the turf manager, it also presents a potential problem when mixing perennial ryegrass with other desirable turfgrasses, such as Kentucky bluegrass. Kentucky bluegrass has long been the mainstay of lawns in Michigan. Kentucky bluegrass does take longer to germinate than perennial ryegrass, commonly 7 to 14 days.

Because of the germination disparity of Kentucky bluegrass and perennial ryegrass, turf managers often have a difficult time establishing a 50/50 mixture of the two. A stand planted to one pound of perennial ryegrass and one pound of Kentucky bluegrass frequently yields a stand comprised of 99% perennial ryegrass tillers. This obviously defeats the intended purpose of genetic and adaptive diversity of two species in a stand. The stand becomes predominately ryegrass because of the aggressive nature of perennial ryegrass in the seed bed. The first 6 weeks after planting are crucial in the competition between competing species.

Plant Competition:

"Competition" is easy to understand in human terms: one person runs faster, jumps higher, or shoots a lower golf score than another. But, plant competition is rather cryptic, since plants seem to be in a state of suspended animation. However, plants do fiercely compete for the requisites of light, nutrients, and water. A species that can send a root down faster to obtain nutrients than another species, will have a competitive edge and will "out compete" its neighbor.

We assessed plant competition between Kentucky bluegrass and perennial ryegrass in the seedbed in a series of experiments done in Pennsylvania, Oklahoma, and Idaho over the past 14 years. In summary, perennial ryegrass was able to produce 4 times the tiller, 10 times the leaf mass, and 15 times the root mass in the first six weeks after planting as Kentucky bluegrass. Our studies found that perennial ryegrass was able to assert this competitive advantage because of its ability to compete with Kentucky bluegrass underneath the ground. This was determined in a series of partitioning studies, where we used plexiglass partitions to separate the tops or roots of Kentucky bluegrass-perennial ryegrass mixtures. Kentucky bluegrass, as it turned out, was quite a vigorous competitor for

light. Where the two species were partitioned beneath the soil surface (eliminating root competition), Kentucky bluegrass tended to overpower perennial ryegrass.

Managing Plant Competition:

There are several ways a turf manager can "swing" the competition to favor establishment of Kentucky bluegrass in mixtures. The most obvious way is with seeding ratio. A seeding ratio of approximately 75 to 95% Kentucky bluegrass (5 to 25% perennial ryegrass by weight) will usually yield a 50/50 mixture of the two species in the mature stand. Vigorous cultivars such as Touchdown or Glade require lesser percentages of bluegrass in the mixture (closer to 75%) than do weaker cultivars such as Park or Newport (95% bluegrass in the seed mixture will yield a 50/50 mix).

Delayed planting of ryegrass is another technique that can be used by the turf manager to create a 50/50 mixture. Sod farmers in California have employed a technique whereby Kentucky bluegrass is sown as a monoculture, and later (at about a month after planting) perennial ryegrass is oversown. In our partitioning studies, we found this to be a highly effective technique in establishing a true mixture, giving Kentucky bluegrass every competitive advantage.

Initial mowing can also effect the eventual mixture ratio of a bluegrass - ryegrass stand. A stand mowed close (½ to 1 inch) within the first three weeks after planting will yield a higher percentage of Kentucky bluegrass tillers in the mature stand than a stand mowed at 1½ to 2 inches at 5 weeks after planting. This early mowing treatment can boost the amount of bluegrass in the stand by as much as 40%.

An experimental technique being investigated for its potential in shifting competition is "seed priming." Seed priming is a aqueous - chemical pre-treatment that gives Kentucky bluegrass a competitive edge in establishment. We found in test trials in Pennsylvania that primed Kentucky bluegrass seed, in mixtures with perennial ryegrass, can double the amount of bluegrass in the stand over that of unprimed plots.

In spite of the difficulties in establishing the perfect ratio of bluegrass and ryegrass, there are numerous advantages to mixing these two grasses. Not only are they ideally compatible visually, but a mixture of these two grasses has been scientifically proven to be more dense than a monoculture of either component. Furthermore, trials in California have shown that a 50/50 mixture of bluegrass and ryegrass resist disease damage (such as dollar spot or red thread) above and beyond monocultures of either species.

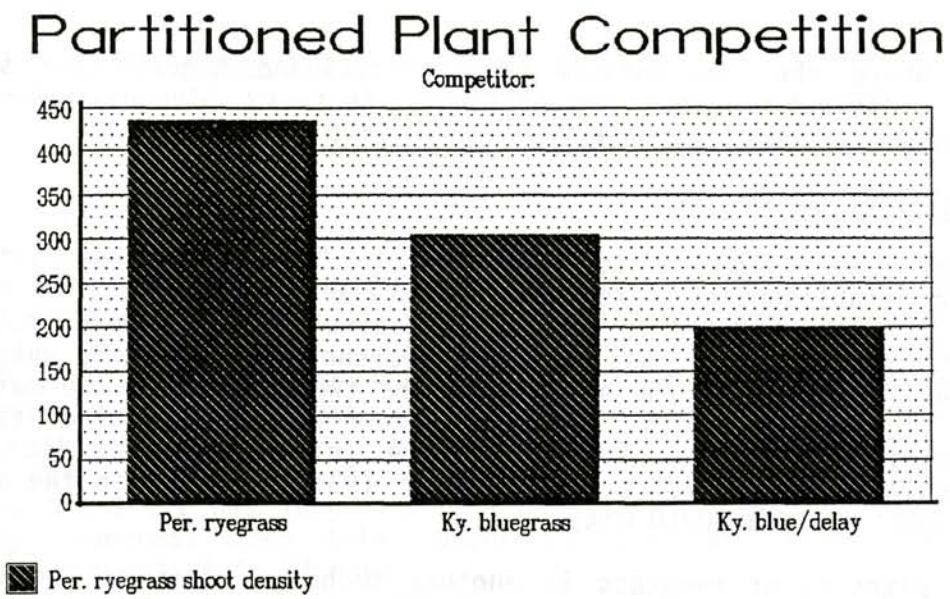

Fig. 1 - Perennial ryegrass shoot density per square decimeter as affected by three competing treatments, where below-ground partitions separated roots of the various treatments, while allowing shoots to freely compete for light. The three treatments (l. to r.) evaluated for their effect on perennial ryegrass shoot density were: (1) perennial ryegrass (a control treatment, measuring the effect of a species on itself), (2) Kentucky bluegrass, and (3) Kentucky bluegrass where the ryegrass was sown 1 month later in the experiment than the bluegrass. The graph illustrates the concept that Kentucky bluegrass is an effective competitor with perennial ryegrass for light. A related experiment verified the highly competitive nature of perennial ryegrass below ground (root competition).

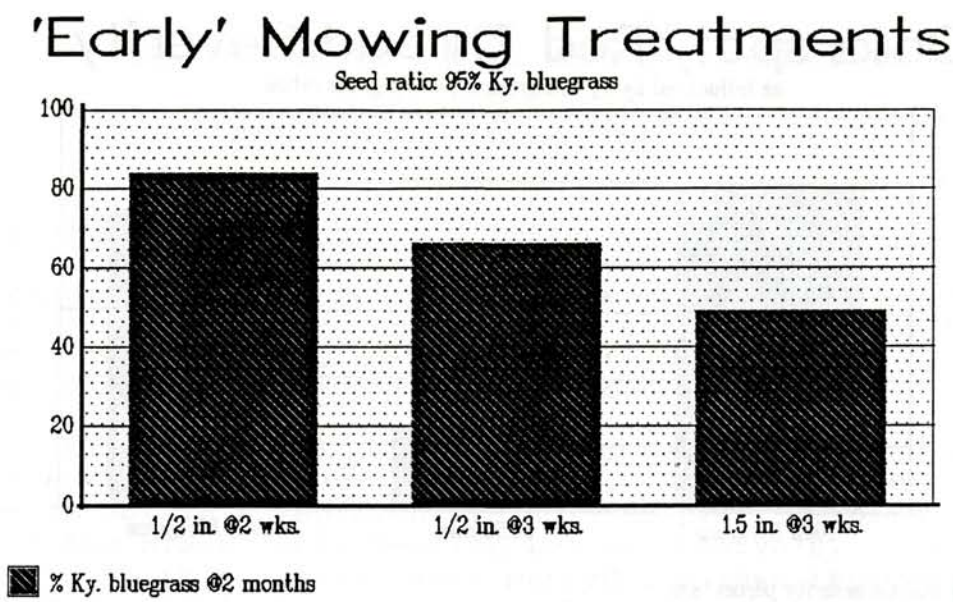

Fig. 2 - Percentage of Kentucky bluegrass in mixed stands with perennial ryegrass, as affected by three initial mowing treatments. Early and close mowing favored the Kentucky bluegrass because the ryegrass germinated faster and was more highly affected by the early mowing treatments. This graph shows that a turf manager can use cultural practices to influence the percentages of grasses in mixed stands.

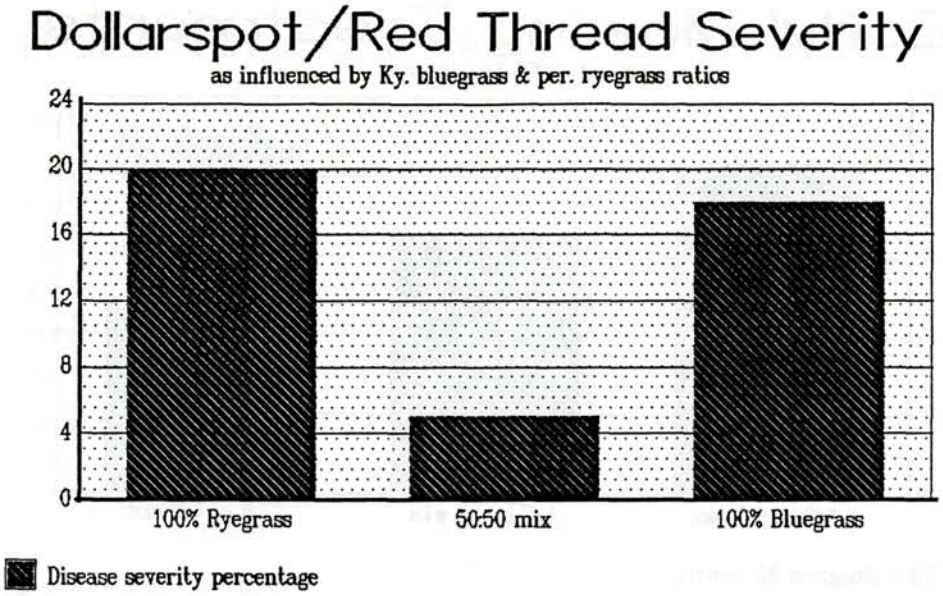

Fig. 3 - Results from a mixture study of perennial ryegrass and Kentucky bluegrass in California (U of Calif. Riverside) shows the beneficial effect of mixing these two grasses. The mixture was less affected by dollarspot and red thread disease than a monoculture of either species.