by Dr. James B. Beard

TURFGRASS RESEARCH REVIEW

Controlling bluegrass during bermudagrass overseeding

Annual bluegrass control in overseeded bermudagrass putting green turf. *S.W. Bingham, R.E. Schmidt and C.K. Curry. 1969. Agronomy Journal. 61(6): 908-911. (from the Departments of Plant Pathology-Physiology and Agronomy, Virginia Polytechnic Institute, Blacksburg, Va. 24061).*

The influence of five herbicides in controlling annual bluegrass during the overseeding of bermudagrass greens with cool season turfgrass species was investigated. The residual effect of the herbicides on the overseeded cool season grasses and the subsequent spring transition from cool season to warm season turfgrass species was evaluated also.

This investigation involved three phases. In the first phase, two experiments were conducted where annual bluegrass control was evaluated in a newly prepared seedbed. A third experiment was also conducted where the herbicide treatments were overseeded with Italian ryegrass and Pennlawn red fescue 30 days after herbicide application. The grasses were seeded in late August. The herbicides used were bensulide, DCPA, dichlobenil and diphenamid. Data taken involved plant species composition counts made in November.

The second phase involved a three year study conducted on a Tifgreen bermudagrass green. Bensulide, DCPA and dichlobenil were applied the first week in September of 1965, 1966 and 1967. Subsequently, three overseeding treatments consisting of (a) Italian ryegrass, (b) Pennlawn red fescue and (c) no overseeding were accomplished the first week in October of the same three years. The bermudagrass green was vertically mowed prior to overseeding and topdressed immediately afterward. Visual ratings of the annual bluegrass and cool season turfgrass percentages were made during late winter of each year, whereas the percentages of bermudagrass and cool season species were estimated in early summer.

The effect of plant competition on annual bluegrass growth was investigated in the third phase. A greenhouse study was conducted in which annual bluegrass seedlings were transplanted from the field to greenhouse pots, half of which contained bentgrass, to evaluate the relative degree of competition within the turfgrass community. Three levels of annual bluegrass contamination were used in the study which included six replications. The annual bluegrass-bentgrass community was maintained at a 0.4 inch cutting height. Data taken approximately one month after transplanting included measurements of tiller number, fresh weight and width of individual plants.

In the first series of experiments, bensulide and DCPA gave good control of annual bluegrass in newly-prepared soil with minimal injury to the Italian ryegrass or Pennlawn red fescue seeded one month after application of the herbicide. Diphenamid gave excellent control of annual bluegrass but did not have adequate selectivity to the cool season turfgrasses. Dichlobenil failed to give effective annual bluegrass control when applied to the soil surface during the warm temperature period of August.

In the second phase of the study conducted on a Tifgreen bermudagrass green, the annual bluegrass population ranged from 49 per cent to 68 per cent of the ground cover

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in dormant bermudagrass. Overseeding with either Italian ryegrass or Pennlawn red fescue resulted in a substantial reduction in the annual bluegrass population due to the competition provided by the cool season species. The bumpiness associated with thin annual bluegrass stands was also reduced. Italian ryegrass was more competitive and reduced the annual bluegrass stand to a greater extent than Pennlawn red fescue.

Bensulide and DCPA both gave good annual bluegrass control at rates normally recommended for crabgrass control. Bensulide had better selectivity to the overseeded cool season turfgrass species. The annual bluegrass control with diphenamid was good but resulted in substantial injury to the cool season species. Maleic hydrazide was evaluated in 1965 only. A December application resulted in serious injury to the overseeded cool season species and increased annual bluegrass encroachment compared to adjacent, untreated areas.

The rate of herbicide application required for control of annual bluegrass decreased as the seeding rate of the cool season turfgrass species was increased. Four times as much bensulide was necessary for the control of annual bluegrass when the dormant bermudagrass was not overseeded compared to an overseeding of Italian ryegrass.

The most promising herbicide, bensulide, was evaluated in the granular as well as the emulsifiable concentrate formulation. The granular formulation was significantly less effective in annual bluegrass control. The authors attributed this to the slower rate of herbicide release from the granular formulation in relation to the interval between time of application and time of annual bluegrass germination.

Evaluations of the transition from cool season turfgrass species to bermudagrass showed a very abrupt transition where an annual bluegrass cover was predominant. This rapid loss of annual bluegrass resulted in a thin, poor quality green for several weeks before adequate bermudagrass growth occurred. In contrast, both Italian ryegrass and Pennlawn red fescue gave a more gradual transition with minimum turfgrass thinning. Pennlawn red fescue persisted longer than Italian ryegrass.

In the third phase of studies, plant competition from bentgrass resulted in a drastic decrease in tiller number, fresh weight and width of spread of individual annual bluegrass plants. Field studies where various shoot densities of annual bluegrass were compared showed that a bumpy surface was associated with low annual bluegrass shoot densities.

Comments: The major criterion in effective winter overseeding of warm season turfs is a minimum transition time from a quality warm season turf to a quality cool season turf in the fall and from a quality cool season turf to a quality warm season turf again in the spring. Both Italian ryegrass and Pennlawn red fescue resulted in better spring transition than an-

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nual bluegrass in this study. Of the herbicides compared, bensulide and DCPA gave adequate control of annual bluegrass when combined with an overseeding of cool season turfgrass species. Higher overseeding rates reduced the amount of herbicide required to achieve adequate annual bluegrass control. An added benefit from this response is improved selectivity to the overseeded cool season turfgrass species. It should be indicated that the dates of herbicide application and overseeding reported in this study are for Virginia climatic conditions and can vary substantially depending on the lattitude, altitude and location relative to large bodies of water.

Influence of ryegrass and Kentucky bluegrass types and seeding rates on turfgrass establishment. *B.W. Keckley. 1969. MS Thesis, Pennsylvania State University. pp. 1-85. (from the Department of Agronomy, Pennsylvania State University, University Park, Pa. 16802).*

The objective of this study was to evaluate the competitive ability and persistence of various percentages, rates and varieties of ryegrass planted with three varieties of Kentucky bluegrass (Delta, Merion and Pennstar). Manhattan perennial ryegrass, Linn perennial ryegrass and domestic ryegrass (a mixture of Italian and perennial, coarse textured types) were included at six levels: 0, 33, 57, 75, 89, and 100 per cent ryegrass by seed weight. Persistence and competitiveness were determined by individual plant population counts and weight determinations made on four inch diameter plugs taken six weeks and one year after seeding. The experiment was conducted at two seeding times: fall and spring.

A comparison of the turfgrass quality among the three ryegrasses showed Manhattan to have superior turfgrass quality. It had a finer leaf texture, more diminutive plants, improved mowing quality and reduced seedhead formation which was difficult to cut off with a reel mower. The establishment rate of Manhattan was similar to Linn and domestic ryegrasses. Domestic ryegrass was more competitive than Linn and Manhattan during the seedling stage. Manhattan proved to be more persistent because of improved low temperature hardiness and turf-forming qualities.

The rate of turfgrass establishment was enhanced when Manhattan was included in the seed mixtures with Kentucky bluegrass at a seed weight percentage of 33 per cent. Using higher percentages of Manhattan was not beneficial under the conditions of this experiment in central Pennsylvania. The susceptibility to damping-off and *Helminthosporium* leaf spot diseases as well as a proneness to low temperature kill were the factors limiting the percentages of Manhattan perennial ryegrass which could be utilized in a seed mixture with Kentucky bluegrass. Effective,

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rapid turfgrass establishment was achieved when Kentucky bluegrass and Manhattan perennial ryegrass were seeded in a mixture at rates of 1.6 and 0.8 pounds per 1,000 square feet, respectively.

Investigation of the relative competitiveness of the three Kentucky bluegrass varieties showed Delta to be more competitive with the three ryegrasses during the seedling stage. Following establishment, Merion and Pennstar proved successful in competitiveness and formed a superior quality turf to Delta.

Comments: The classical concept of the ryegrasses for turfgrass use is that it is a rapid establishing, vigorous, highly competitive species which fails to persist in permanent turfgrass communities due to a lack of tolerance to environmental stress. As a result, the use of ryegrass in turfgrass situations has generally been limited to a temporary, companion planting where rapid establishment is desired (a) to control erosion on sloping areas or (b) where conditions are not favorable for rapid establishment of Kentucky bluegrass or red fescue.

The classical concept of ryegrasses is changing with the development of new perennial ryegrass varieties. The newer varieties possess a more diminutive plant size, a slower rate of vertical shoot growth, reduced competitiveness, and somewhat improved tolerance to environmental stresses. Manhattan perennial ryegrass is an example of this type of perennial ryegrass. It was released by the New Jersey Agricultural Experiment Station in 1967. Manhattan possesses a bright moderately dark green color, medium fine leaf texture, medium high shoot density, profuse tillering, a more diminutive growth habit, a slow vertical shoot growth rate and improved mowing quality.

These characteristics have altered the maximum amount of ryegrass that can be utilized in a mixture with Kentucky bluegrass. Previous studies utilizing the more vigorous, classical ryegrass types generally indicate that no more

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than 20 per cent to 25 per cent ryegrass seed by weight should be utilized in a mixture whereas 33 per cent was shown to be acceptable in this study. Unfortunately a 20 per cent level was not included in this experiment so that actual comparative evaluations could be made.

The professional turfman can look forward to further improvements in mowing quality, disease resistance and tolerance to environmental stresses of the perennial ryegrass varieties. As a result, perennial ryegrass could become a significant part of permanent, cool season turfgrass communities. □

Other papers of interest:

1. ***Progress report: electricity in climate control for wintergreen bermudagrass.*** *H. Hamilton Williams. 1969. California Turfgrass Culture. 19(4):28-30. (from the Los Angeles State and County Arboretum, Arcadia, Calif. 91006).*

2. ***Highlights of our turfgrass research program.*** *C.R. Skogley. 1970. Summary of Twenty-First Annual RCGA National Turfgrass Conference. pp. 35-37. (from the Department of Plant and Soil Science, University of Rhode Island, Kingston, R.I. 02881).*

3. ***Golf course operations: How does yours compare.*** *Florida Turfgrass Association Bulletin. 14(1): 6-8. 1967. (Florida Turfgrass Association, 406 University Boulevard North, Jacksonville, Fla.).*

4. ***Subsurface irrigation.*** *D. Bingham. Proceedings of the 1967 Midwest Regional Turf Conference. pp. 7-50. 1967. (Department of Agronomy, Purdue University, West Lafayette, Ind.).*

5. ***History of* Poa annua.** *J.C. Harper H. 1967 Massachusetts Turfgrass Conference Proceedings. pp. A-2 to A-9. 1967. (Department of Plant and Soil Science, University of Massachusetts, Amherst, Mass. 01003).*