MANAGEMENT OF MIXED ANNUAL BLUEGRASS / CREEPING BENTGRASS FAIRWAYS

M. G. HENDRICKS AND B. E. BRANHAM
MICHIGAN STATE UNIVERSITY E. LANSING, MI

The loss of turf this year because of environmental stress and disease has resulted in increased interest in methods of shifting from annual bluegrass to creeping bentgrass fairways. Historically, most attempts to shift species composition have failed.

Three overseeding studies were conducted at the Hancock Turfgrass Research Center to examine the effects of cultivation, seeding rate, and chemical treatment on the success of overseeding creeping bentgrass into annual bluegrass. Each study area was treated with Fusilade 2000 (fluazifop-butyl) on June 18, 1987, at a rate of 0.25 lb ai/a, to eliminate the wild type creeping bentgrass. In each study following cultivation, starter fertilizer (19-19-19) was applied at 1 lb N/M. All plots were overseeded at the various seeding rates by hand with Penncross creeping bentgrass seed. Following overseeding, each area was dragged with a mat to incorporate the seed, rolled to ensure good seed to soil contact, and irrigated to keep moist. Liquid formulations were applied using a backpack CO_2 sprayer equipped with 8002 nozzles. The sprayer was calibrated to deliver 50.5 gpa at 30 psi. Granular materials were applied using a drop-type spreader. The grid method was employed to determine the percent creeping bentgrass in each study.

The overseeding studies conducted this year result from information gained from the 1986 overseeding study. The 1986 study was a large factorial study which examined the effects of cultivation, seeding rate, and chemical treatment on creeping bentgrass establishment.

The results of the 1986 study indicated that the method of cultivation did not significantly increase bentgrass establishment; and that 2 or 4 lbs. of creeping bentgrass seed resulted in significantly more creeping bentgrass establishment than the 1 lb seeding rate, with no significant difference between the 2 and 4 lb seeding rate. The results also indicated that chemical treatment resulted in greater creeping bentgrass establishment.

When examining the results of the chemical treatments (Table 1) the fall 1986 data indicate that the Round-up and Round-up + Prograss treatment had 20% and 11% bentgrass cover which was significantly more than the Embark, Embark + Prograss, and no chemical treatments. However, when percent

bentgrass cover was determined the following year (summer 1987) the Round-up + Prograss treatment had 81%, the Round-up treatment 50%, and the Embark + Prograss treatment 42% creeping bentgrass cover. The extremely wet fall of 1986 resulted in decreased bentgrass germination and establishment. Prograss treatment initially decreased bentgrass establishment but, this was reversed the following spring with less than 10 and 25 % annual bluegrass in the Round -up + Prograss and the Embark + Prograss treated plots respectively. There was also an increase in the amount of Kentucky bluegrass in the Prograss treated plots.

The first overseding study conducted this year (Study 1) was designed to examine which herbicide, plant growth regulator (PGR), or combination of herbicide and PGR would result in the greatest establishment of overseeded creeping bentgrass. The treatments, rates, and application dates are listed in Table 2. Prior to starter fertilizer application and seeding, the study area was vertical mowed in two directions at a depth of 0.3 cm (1/8 inch). The area was overseeded with 2 lb/M Penncross creeping bentgrass seed on August 13, 1987. The chemical treatments were applied as noted (Table 2), with the Cutless treatments being applied two weeks, Round-up 12 days, and Embark two days prior to seeding.

The results of this experiment are summarized in table 2. The analysis of variance of percent creeping bentgrass cover indicated that chemical treatment significantly influenced the establishment of overseeded creeping bentgrass. The Round-up (62%) and Round-up + Prograss (50%) treated plots had significantly more creeping bentgrass than the control (5%). Except for the Prograss treatment applied five weeks after emergence and the Cutless + Prograss treatment, all other treatments which contained Prograss resulted in greater establishment of creeping bentgrass. The Embark (0.38 lb ai/a) + Prograss (0.75 + 0.75 lb ai/a six weeks after emergence) treatment resulted in 33.7% creeping bentgrass establishment which was the greatest bentgrass establishment of all the Embark treatments. However, the other plots treated with Embark did contain more creeping bentgrass than the no chemical treatment. When Cutless or Cutless + Prograss was applied it resulted in 8.3 and 2.3% creeping bentgrass respectively, indicating that these treatments were not successful in establishing overseeded creeping bentgrass.

The second overseeding study (Study 2) was designed to reexamine the effect of cultivation and seeding rate. The seeding rates used in this study were 1, 2, and 4 lb/M Penncross creeping bentgrass. The cultivation treatments were vertical mowing, core cultivation, and no cultivation. The core cultivation treatment consisted of one pass with a Ryan Greensaire aerifier with 3/8 inch tines. The cores

were allowed to dry and then broken using a vertical mower with the blades set deep enough to break up the cores but not the soil surface. The vertical mowing treatment was applied using walk behind vertical mower with the blades set to penetrate the soil to a depth of 0.3 cm. On August 11, 1987 the cultivation treatments, starter fertilizer, and overseeding were completed.

The analysis of variance on plant counts indicates that seeding rate and cultivation treatment were highly significant in the establishment of creeping bentgrass. Seeding with 4 lb/M creeping bentgrass seed resulted in significantly more creeping bentgrass than the 1 or 2 lb/M rates (Table 3). The vertical mowing treatment also resulted in significantly more creeping bentgrass while there was not a significant difference between coring and no cultivation on the establishment of creeping bentgrass (Table 4). Although seeding rate and vertical mowing resulted in significantly more creeping bentgrass both factors increased creeping bentgrass cover less than 10% When you compare the results of this study with the first study, it demonstrates how important the use of chemicals are in the establishment of overseeded creeping bentgrass.

A third overseeding study (Study 3) was initiated to determine if intensive core cultivation and the application of Embark, applied two days following overseeding, would increase the success of overseeded creeping bentgrass. Embark has been shown to result in a thinning and a reduction in vigor of the turf, and it was believed that this thinning could be used to give the creeping bentgrass a better chance of getting established. This experiment was also designed to see how long following treatment damage from Embark would last. Intensive core cultivation consisted of two passes with the Ryan aerifier (3/8 inch tines). Following cultivation the cores were allowed to dry and reincorporated into the turf using a vertical mower. The study was overseeded by hand with 2 lb/M Penncross creeping bentgrass and then drag matted, rolled, and irrigated as described previously. Two days following overseeding, Embark was applied at 0, 0.25, 0.5, and 1.0 lb ai/a.

The analysis of variance of percent plant cover indicated that rate of Embark did not significantly increase the establishment of creeping bentgrass. Application of Embark two days following overseeding may have resulted in a decrease in germination and establishment of creeping bentgrass (Table 5). This is more evident when you compare the Embark treatments of this study with those of the first studywhich had greater creeping bentgrass establishment at all rates and combinations of Embark. It also appears that intensive core cultivation did not make an adequate seedbed

which resulted in decreased establishment of creeping bentgrass.

Embark however, was successful at opening up the canopy with the 0.25 lb rate resulting in a 25% reduction in cover which lasted for about three weeks. The 0.5 lb rate resulting in a 25 to 50% reduction in cover, with recovery occurring in about 4 to 5 weeks. The 1 lb rate resulting in an unacceptable reduction in turf density, which led to a severe invasion of crabgrass.

In summary the overseeding studies conducted this year emphasize two points. First the use of a chemical herbicide or PGR to reduce the competitiveness of the annual bluegrass is absolutely necessary. Round-up and Round-up + Prograss result in the greatest establishment of creeping bentgrass but, there is a period unacceptable turf quality. The Embark + Prograss 3/8 + (34 + 3/4) resulted in slightly less creeping bentgrass but also resulted in less reduction in turfgrass cover. Lastly, some cultivation technique must be used in combination with chemical treatment to ensure good overseeding results.

TABLE 1 CREEPING BENTGRASS COVER 1986 OVERSEEDING STUDY

TREATMENT	PERCENT COVER FALL 1986	SUMMER 1987
ROUND-UP	20	50
ROUND-UP +PROGRASS	11	81
EMBARK	3	16
EMBARK + PROGRASS	2	42
NO CHEMICAL	5	19

TABLE 2 TREATMENT, RATE OF APPLICATION, DATE OF APPLICATION, AND PERCENT CREEPING BENTGRASS COVER

TREATMENT	RATE (lb/a)	DATE APPLIED	% COVER
ROUND-UP	1.0	7/30	62.3
ROUND-UP+PROGRASS(6W)*	1.0 + (.75+.75 ai)	7/30 +(9/29 +10/27)	50.0
EMBARK	.25	8/10	12.7
EMBARK	0.38 ai	8/10	25.7
EMBARK	.50	8/10	18.3
PROGRASS(4W)	(.38+.75 ai)	(9/15 + 10/15)	33.7
PROGRASS(5W)	(.38+.75 ai)	(9/21 + 10/19)	4.3
PROGRASS(6W)	(.75+.75 ai)	(9/29 + 10/27)	29.3
EMBARK+PROGRASS(3W)	.38ai + (.25+1.0 ai)	8/10 +(9/9 + 10/6)	23.0
EMBARK+PROGRASS(3W)	.38ai +(.38+.75 ai)	8/10 +(9/9 + 10/6)	22.3
EMBARK+PROGRASS(6W)	.38ai + (.75+.75 ai)	8/10 +(9/29 +10/27)	33.7
CUTLESS	1.0	7/28	8.3
CUTLESS+PROGRASS(6W)	1.0ai + (.75+.75 ai)	7/28 +(9/29 +10/27)	2.3
NO CHEMICAL	----------	----------	5.3
PROGRASS(DORMANT)	(.75 + .75 ai)	(9/15 + 10/15)	----
PROGRASS(DORMANT)	(1.5 + 1.5 ai)	(9/15 + 10/15)	----
LSD (0.05)			28.6

* 3W, 4W,5W, AND 6W INDICATES FIRST PROGRASS APPLICATION AND IS 3,4,5, OR 6 WEEKS AFTER EMERGENCE

TABLE 3 EFFECT OF SEEDING RATE ON PERCENT CREEPING BENTGRASS (OVER87B)

SEEDING RATE (lb/M)	% COVER
1	2.6
2	2.8
4	6.8
LSD (0.05)	2.5

TABLE 4 EFFECT OF CULTIVATION TREATMENT ON PERCENT CREEPING BENTGRASS COVER (OVER87B)

TREATMENT	% COVER
VERTICAL MOWING	6.7
CORE CULTIVATION	2.8
NO CULTIVATION	2.7
LSD (0.05)	2.5

TABLE 5 PERCENT CREEPING BENTGRASS COVER FROM EMBARK TREATMENT AND INTENSIVE CORE CULTIVATION (OVER87C)

EMBARK RATE (lb ai/a)	% BENTGRASS COVER
0	2.7
0.25	3.7
0.50	2.7
1.0	2.7