1985 RESEARCH UPDATE

B. E. Branham and M. Collins
Crop and Soil Sicences
Michigan State University

Several different research topics will be discussed in this paper. Those areas are timing of plant growth regulators for seedhead control, effects of cultivation and time of cultivation on preemergent herbicide activity, ethofumesate for annual bluegrass control, and variety trial evaluations in 1985.

In 1985, two studies were conducted to evaluate seedhead suppression using plant growth regulators. The first study used mefluidide (Embark) at different rates and timings to control seedheads on annual bluegrass turf. Rates evaluated included 1/8, 1/16, and 1/32 lb AI/A. Applications were made based on accumulated growing degree days. Growing degree days can be accumulated through a number of mathematical formulae. We used a microprocessor based instrument which records temperatures every ten minutes and then uses a sine curve to approximate diurnal temperature flux. The advantage of this method is that it is very accurate; however, the disadvantage is that the instrumentation required is somewhat expensive.

The anthracnose Predictor which is commercially available, is the instrument we used to measure growing degree days. An approximation which should give satisfactory results uses the following formula:

$$\frac{\text{Max T} + \text{Min T}}{2} - \text{base T} = \text{GDD}$$

where

Max T = highest temperature recorded during the day

Min T = lowest temperature recorded during the day

base T = temperature at which plant species begins to grow (10 c or 50 F for annual bluegrass)

GDD = growing degree days for that day

We routinely report our results in centigrade, however, either temperature scale will give the same results. As an example, if the maximum temperature for the day was 20 C and the low temperature was 10 C then (20 + 10)/2 - 10 = 5 GDD, and five GDD would be accumulated on that day. You keep adding the GDD's from each day until you reach 50 at which time you should treat. If (Max + Min)/2 is less than the base temperature,you do not subtract the growing days, simply treat any negative value as zero GDD.

If you feel more comfortable using fahrenheit then the base temperature would be 50 F and the target would be 90 GDD (1 C = 9/5 F so 50 x 9/5 = 90). As an example, if Max T = 70 F and Min T = 50 F then (70 + 50)/2 - 50 = 10 GDD. The difference is that you would need 90 GDD on the fahrenheit scale. Results from 1985 are shown in Table 1. Examination of table 1 shows that 1/8 lb/A rate gives the best results when applied between 25 and 50 GDD. While 50 GDD has normally been the single best time to apply, dates between 25 and 50 are probably satisfactory.

A second study was set-up to examine the effect of mefluidide (Embark) and amidochlor (Limit) applied at different growing degrees on the seedhead and vegetative growth suppression of 'Kenblue' kentucky bluegrass. Seedhead suppression was excellent for applications made at 25, 50, 75, and 100 GDD. Seedhead control was lost at the 150 GDD date. Figure 1 shows the effect of application date on clipping yields. Suppression of clipping yield was a fairly constant percentage of the check. It would appear that applications at or before 100 GDD will provide excellent seedhead and vegetative growth suppression of annual bluegrass. This is unusual since ethofumesate is considered a preemergent herbicide. Rainfall within 24-48 hours after application appears to reduce its effectiveness, contrary to most preemergent herbicides which need rainfall to activate the herbicide. Tables 4 and 5 show the effect of ethofumesate on Penncross and Penneagle creeping bentgrasses. Injury to Penncross at the 1.5 lb/A rate was noticeable, however, not severe enough to cause loss of turf. The optimum rate would appear to lie between 1 and 1.5 lbs/A. We did observe a shift to more Kentucky bluegrass and creeping bentgrass and less annual bluegrass in plots treated with ethofumesate. This study will be expanded in 1986.

Variety Trial Evaluations

Our variety trial evaluation program is expanding and in 1985 fine fescue, Kentucky bluegrass and low maintenance variety trials were established. Results from the 1985 evaluations of Kentucky bluegrass, fine fescue and perennial ryegrass trials are shown in Tables 6, 7, and 8. In examining these tables, the LSD value at the bottom of each column should be used as guide in evaluating the cultivars. Cultivars whose means differ by less than LSD value are not considered statistically different in terms of performance.

Preemergent Herbicides and Cultivation

This study was designed to examine the effect of cultivation and time of cultivation on the performance of three commonly used preemergent turf herbicides. This was the second year of this study. Four herbicide treatments, benefin, bensulide, DCPA, and a control, were applied on May 1 of 1984 and 1985. Immediately after herbicide treatment, four cultivation treatments were applied to one half of the plot area. The cultivation treatments consisted of core cultivation one pass or three passes, vertical mowing, and a control. Four weeks after herbicide application, the cultivation treatments were applied to the other one half of the plot area. Results are shown in Tables 2 and 3. After two years of data, it appears that cultivation operations can be safely performed without significantly decreasing annual grass control.

Ethofumesate for annual bluegrass control

Ethofumesate (Prograss) is a herbicide used to control annual bluegrass in established Perennial Ryegrass. A study was established to determine its activity on annual bluegrass and tolerance on creeping bentgrass. Applications were made at rates of 0.75, 1.0, and 1.5 lbs/A. Most treatments were applied two to three times at one month intervals. Figure 2 shows injury patterns on annual bluegrass treated at four different rates. A 0.75 lb/A rate was applied three times on 9/6, 10/1, and 11/1. The other three treatments were applied 9/15 and 10/15 at rates of 0.75, 1.0, and 1.5 lbs/A on each application date. Injury to annual bluegrass showed a typical rate response with 1.5 lbs/A

causing severe injury to the annual bluegrass. Interestingly, the application made on September 6 showed no activity until a second application was made on October 1. The September 6 application corresponded to a period of wet weather. This indicates that ethofumesate acts as a postemergence herbicide on Table 1.

Table 1. Annual bluegrass seedhead production as influenced by mefluidide rate and timing.

Treatment	Application time(GDD)	Seedheads/400cm
1/8 lb/A	25	77
1/8 lb/A	40	117.7
1/8 lb/A	50	69.7
1/8 lb/A	75	226.3 1/16
lb/A	40	187.7
1/16 lb/A	50	152.7 1/32
lb/A	40	210
1/32 lb/A	50	267
Check		334.7

Table 2. Effect of cultivation, time of cultivation, and preemergent herbicide on crabgrass populations rated August 20, 1985.

	Cultivation Treatments							
	At Herbicide Treatment				4 Weeks After Herbicide Treatment			
Herbicides	CC1X	CC3X	VM	Control	CC1X	CC3X	VM	Control
DCPA	0	0	2	0	0	2	0	2
Bensulide	2	0	4	3	2	1	6	8
Benefin	1	1	2	2	4	6	2	3
Control	23	19	28	28	18	7	23	27
	LSD(P=0.05)=10.7							

+ - CC1X, CC3X, VM, Control, Indicate core cultivation one pass, core cultivation three passes, vertical mowing, and no cultivation, respectively.

Table 3. Effect of cultivation, time of cultivation, and preemergent herbicide on crabgrass populations rated August 15, 1984.

	CULTIVATION TREATMENTS							
	At Herbicide Treatment				Weeks After Herbicide Treatment			
Herbicides	CC1X	CC3X	VM	Control	CC1X	CC3X	VM	Control
DCPA	0	2	-	0	3	1	0	0
Bensulide	2	3	7	7	4	5	8	5
Benefin	5	3	5	7	2	8	4	7
Control	46	42	27	47	33	47	58	32
	LSD(P=0.05)=17.9							

+ - CC1X, CC3X, VM, Control, Indicate core cultivation one pass, core cultivation three passes, vertical mowing, and no cultivation, respectively.

Table 4. Prograss Injury on Bentgrass* (cv. Penncross).

Prograss treatment	Date					
(lb ai/A: Appl. date)	9/30	10/8	10/14	10/22	11/5	11/18
0.75: 9/6 + 10/2 + 11/1	0	0.7	1.0	0.7	0.7	1.0
1.0: 10/2 + 11/1	0	0.3	0.7	1.0	1.0	1.7
1.5: 10/16	-	-	0	0	0	0
1.5: 9/16 + 10/16	1.0	2.3	5.3	5.7	4.0	2.7
check	0	0	0	0	0	0
LSD	0	0.9	1.5	1.5	2.1	1.2

*Inquiry rating based on scale of 0-9: 0 = no inquiry, 9 = dead

Table 5. Prograss Injury on Bentgrass (cv. Penneagle).

Prograss treatmemt	Date				
(lbs ai/A: Appl. date)	10/8	10/14	10/22	11/5	11/18
0.75: 10/2 + 10/22 + 11/12	0	0.3	0	0.7	1.0
1.0: 10/2 + 11/1	0	0.3	0	0.3	1.3
1.5: 10/2 + 11/1	0	0.3	0	1.3	1.7
check	0	0	0	0	0
LSD. 05	0	0	0	0.7	0.9