

## 1995 Corn Gluten Meal Rate Weed Control Study - Year 2

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Corn gluten meal (CGM) was screened for efficacy as a natural product herbicide in turf. This trial is a long-term study started in 1995 that will be continued on the same area for several years. It is being conducted at the Iowa State University Horticulture Research Station north of Ames, Iowa. The experiment is located in an area of 'Ram 1' Kentucky bluegrass. The soil in this area is a Nicollet (fine-loamy, mixed, mesic Aquic Hapludoll) with an organic matter content of 3.7%, a pH of 7.1, 4 ppm P, and 100 ppm K. The initial broadleaf weed population exceeded 50% cover on most of the test area.

Individual experimental plots are 10 x 10 ft and there are five treatments with three replications. The experimental design is a randomized complete block. Corn gluten meal was applied at a yearly rate of 40 lb CGM/1000 ft<sup>2</sup> (equivalent to 4 lb N/1000 ft<sup>2</sup>) using four different regimes of single and split applications (Table 1). Four applications of 10 lb/1000 ft<sup>2</sup>, split applications of 20 lb/1000 ft<sup>2</sup>, an initial application of 30 lbs plus a sequential of 10 lb/1000 ft<sup>2</sup>, and a single application of 40 lb/1000 ft<sup>2</sup> were included with an untreated control.

Initial applications were made April 24. The second application for treatment 2 was made May 28. On August 8, the third application of treatment 2, and the sequential applications of treatments 3 and 4 were made. The final application for treatment 2 was made September 5.

The experimental plot was checked for phytotoxicity after applications. Visual quality data were taken May 22, June 10, June 26, July 10, July 30, August 23, and September 5. Visual quality was measured using a 9 to 1 scale: 9 = best quality, 6 = lowest acceptable quality, and 1 = poorest quality (Table 1). Crabgrass control was assessed counting the number of crabgrass plants per individual plot. Crabgrass control data were taken August 23 (Table 2). The first broadleaf control data for this study were taken in the spring of 1996. Broadleaf weed control was assessed by estimating the percentage of area in each plot covered by dandelion and clover. These data were taken June 10, June 26, July 10, and July 30 (Table 3). In addition, the percent cover of dandelion and clover were determined separately May 9, August 23, and September 5 (Tables 4 and 5).

Data were analyzed with the Statistical Analysis System version 6.10 (SAS Institute, 1989) using the Analysis of Variance (ANOVA) procedure. Fisher's Least Significant Difference test (LSD) was used to compare means.

There were no phytotoxic symptoms detected on the treated bluegrass. Visual turf quality was better in bluegrass treated with CGM than in the untreated controls for the entire season (Table 1).

Broadleaf weed species were well established when the crabgrass was emerging especially in the untreated controls. Competition from the broadleaves and the mature turf probably prevented the establishment of large crabgrass populations within the untreated plots. Consequently crabgrass numbers were quite low in all of the plots and when crabgrass data were taken August 23, the plants were still quite small with only two or three tillers. Corn gluten meal did not significantly reduce the number of crabgrass plants per plot (Table 2).

In 1996, there were fewer crabgrass plants in turf treated with CGM in split applications at 20 lb CGM and at 30 lb followed by 10 lb CGM/1000 ft<sup>2</sup> (treatments 3 and 4) than in the untreated controls (Table 2). In turf receiving the other CGM treatments, there were more crabgrass plants than in the untreated controls. Crabgrass numbers were much higher in 1995 than in 1996 and all CGM treatments reduced

crabgrass numbers when compared with the untreated controls. In 1996, crabgrass control was better in turf receiving 30 lb followed by 10 lb CGM/1000 ft<sup>2</sup> than in 1995.

Percent broadleaf cover was significantly reduced by corn gluten meal throughout the season (Table 3). The best broadleaf control was provided at 40 lb CGM/1000 ft<sup>2</sup> in a single, spring application but this level was not different from the other CGM rates.

Dandelion and clover cover were reduced in turf treated with CGM but the reductions were not significantly different than the untreated controls (Table 4 and 5). Treatment at all CGM rates except the split application of 30 lb followed by 10 lb CGM/1000 ft<sup>2</sup> (treatment 4) resulted in 50% dandelion cover reductions (Table 4). Reduction in percentage cover was 28% in turf treated with 30 lb followed by 10 lb CGM/1000 ft<sup>2</sup>. The best clover control was in turf treated with 3 lb followed by 10 lb CGM/1000 ft<sup>2</sup> and with 40 lb/1000 ft<sup>2</sup> in a single application (Table 5).

**Table 1.** Visual quality<sup>1</sup> of Kentucky bluegrass treated with corn gluten meal in the 1995 Corn Gluten Meal Rate Weed Control Study.

Material	CGM treatments (lb/1000 ft <sup>2</sup> )	Application timing <sup>2</sup>	May 22	June 10	June 26	July 10	July 30	Aug 23	Sept 5	Mean quality
1. Untreated control	0	NA	6	5	7	6	6	6	6	6
2. Corn gluten meal	10 fb 10 fb 10 fb 10	4 sequential	8	8	8	8	7	8	9	8
3. Corn gluten meal	20 fb 20	split	8	8	8	7	8	9	9	8
4. Corn gluten meal	30 fb 10	30 + 10 lb split	9	8	8	8	7	8	8	8
5. Corn gluten meal	40	1 single	9	8	9	9	8	8	8	8
LSD <sub>0.05</sub>			1	1	NS	1	1	1	1	1

<sup>1</sup> Visual quality was assessed using a 9 to 1 scale: 9 = best quality, 6 = lowest acceptable quality, and 1 = poorest quality.

<sup>2</sup> All treatments were at an annual rate of 4 lbs N/1000 ft<sup>2</sup>. Initial applications were made on April 24; 2nd application of trt 2 on May 28; 3rd application of trt 2 and 2nd of trt 3 & 4 on August 8; and final application of trt 2 on September 5.

NS = means are not significantly different at the 0.05 level

**Table 2.** Crabgrass counts per plot<sup>1</sup> and crabgrass reductions<sup>2</sup> in Kentucky bluegrass treated with corn gluten meal (CGM) in the 1995 Corn Gluten Meal Rate Weed Control Study.

Material	Application timing <sup>3</sup>	Crabgrass counts <sup>1</sup>	Percent crabgrass reduction <sup>2</sup>	
		August 23	1995	1996
1. Untreated control	NA	4	0	0
2. Corn gluten meal	sequential	7	28	0
3. Corn gluten meal	split	3	45	33
4. Corn gluten meal	split	1	44	67
5. Corn gluten meal	single	5	54	0
LSD <sub>0.05</sub>		NS	NS	NS

<sup>1</sup> These data represent the number of crabgrass plants per plot.

<sup>2</sup> These values represent the percentage reductions in plants per plot as compared with the untreated controls.

<sup>3</sup> All treatments were at an annual rate of 4 lbs N/1000 ft<sup>2</sup>. Initial applications were made on April 24; 2nd application of trt 2 on May 28; 3rd application of trt 2 and 2nd of trt 3 & 4 on August 8; and final application of trt 2 on September 5.

NS = means are not significantly different at the 0.05 level.

**Table 3.** Percent broadleaf cover<sup>1</sup> in Kentucky bluegrass treated with corn gluten meal for the 1995 Corn Gluten Meal Rate Weed Control Study.

Material	Application timing <sup>2</sup>	June 10	June 26	July 10	July 30	Mean % cover	% cover reduction <sup>3</sup>
1. Untreated control	NA	58	40	50	62	53	0
2. Corn gluten meal	sequential	20	25	23	27	24	55
3. Corn gluten meal	split	20	15	20	20	19	65
4. Corn gluten meal	split	17	15	23	22	19	64
5. Corn gluten meal	single	13	15	22	18	17	68
LSD <sub>0.05</sub>		18	13	20	13	14	26

<sup>1</sup> Percent cover represents the area per plot covered by broadleaf species.

<sup>2</sup> All treatments were at an annual rate of 4 lbs N/1000 ft<sup>2</sup>. Initial applications were made on April 24; 2nd application of trt 2 on May 28; 3rd application of trt 2 and 2nd of trt 3 & 4 on August 8; and final application of trt 2 on September 5.

<sup>3</sup> These values represent the percentage reductions in plants per plot as compared with the untreated controls.

**Table 4.** Percentage dandelion cover<sup>1</sup> in Kentucky bluegrass treated with corn gluten meal in the 1995 Corn Gluten Meal Rate Weed Control Study.

Material	Application timing <sup>2</sup>	May 9	August 23	September 5	Mean % cover	% Cover reduction
1. Untreated control	NA	20	27	23	23	0
2. Corn gluten meal	sequential	10	15	12	12	48
3. Corn gluten meal	split	13	10	12	12	50
4. Corn gluten meal	split	15	15	20	17	28
5. Corn gluten meal	single	13	10	12	12	50
LSD <sub>0.05</sub>		NS	NS	NS	NS	NS

<sup>1</sup> Percentage cover represents the amount of area per plot covered by dandelion.

<sup>2</sup> Initial applications were made on April 24; 2nd application of trt 2 on May 28; 3rd application of trt 2 and 2nd of trt 3 & 4 on August 8; and final application of trt 2 on September 5.

NS = means are not significantly different at the 0.05 level.

**Table 5.** Percent clover cover<sup>1</sup> in Kentucky bluegrass treated with corn gluten meal in the 1995 Corn Gluten Meal Rate Weed Control Study.

Material	Application timing <sup>2</sup>	May 9	August 23	September 5	Mean % cover	% Cover reduction
1. Untreated control	NA	12	22	27	20	0
2. Corn gluten meal	sequential	8	12	13	11	45
3. Corn gluten meal	split	5	7	7	6	69
4. Corn gluten meal	split	2	4	1	3	90
5. Corn gluten meal	single	2	1	2	2	92
LSD <sub>0.05</sub>		NS	NS	NS	NS	NS

<sup>1</sup> Percentage cover represents the amount of area per plot covered by dandelion.

<sup>2</sup> All treatments were at an annual rate of 4 lbs N/1000 ft<sup>2</sup>. Initial applications were made on April 24; 2nd application of trt 2 on May 28; 3rd application of trt 2 and 2nd of trt 3 & 4 on August 8; and final application of trt 2 on September 5.

NS = means are not significantly different at the 0.05 level.