1989 WEED CONTROL, PGR, AND MANAGEMENT UPDATE

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This report will describe relevant field research conducted during 1989 at the Hancock Turfgrass Research Center and other sites around the state of Michigan. Topics include variety trial evaluations, fairway conversion studies, annual grass weed control, and broadleaf weed control.

1989 VARIETY TRIAL RESULTS

A trend which seems to be accerlerating at a rapid pace is the release of new turfgrass varieties. These varieties come largely from private plant breeding companies. For many years people in the industry have talked about "variety dilemna" which meant that there were so many varieties available that it was difficult to choose which ones to use in a seeding mix. This problem has increased steadily and has been helped by chronic seed supply shortages during the mid-1980's. If anything, it appears that the number of new varieties is growing at a faster rate than during the period when the term "variety dilemna" was coined. This is especially true for the perennial ryegrasses and the tall fescues. Data in tables 1-3 display the 1989 quality ratings for USDA national evaluations of Kentucky bluegrasses, perennial ryegrasses, and tall fescues. For the tall fescue varieties in table 1, notice that 6 out of the first 14 top varieties are experimentals. Look for most of these varieties to be available within the next 2-3 years. The new varieties generally set higher levels of quality, but the problem is often one of availability. Varieties that rank near the top of the USDA evaluations tend to be in high demand. Often the golf course superintendent or lawn care operator only has access to some of the older, more common varieties. Our advice to purchasers of grass seed is to use these results as guides in the selection of varieties. Generally, if you stick with varieties in the top 25% of the varieties in these trials you'll end up with high quality turf.

The perennial ryegrasses in table 2 also show some new varieties, although many of top performing varieties are already commercially available. Many of the perennial ryegrasses have the II designation such as Manhattan II or Dasher II. These designations generally mean that these selections are primarily from the original plant material and have been selected for improved disease resistance, better color, etc. However, there are no rules on what constitutes a II designation, so there is no assurance that these varieties are similar to the original variety.

The Kentucky bluegrasses continue to provide the highest quality grasses for the temperate region of our country. The data in table 3 shows the highest ranking varieties for 1989. Princeton 104 is a variety that is exceptionally uniform as well as having excellent dark green color. Midnight is notable because it is probably the darkest green of all the available Kentucky bluegrass varieties. Shortages of bluegrasses can be a problem not only because of the effects of demand but because the bluegrasses are not strong seed producers. In fact, some of the best looking experimental varieties have never become commercially available because they simply could not produce enough seed per acre to justify marketing them.

A variety trial was established in 1987 at Traverse City Country Club to look at bentgrasses, perennial ryegrasses, and fine fescues as fairway grasses in the Northern Michigan climate. Results for 1989 are shown in table 4. Surprisingly, the perennial ryegrasses are performing very well in Northern Michigan. All of the top 15 entries are perennial ryegrasses with the bentgrasses showing dramatically worse visual quality scores. Combinations of perennial ryegrass plus creeping bentgrass performed well and may be a way to reduce fairway disease problems by diversifying the number of species present. As mentioned above, this trial was initiated in August of 1987 and it is still too early to make recommendations since the concern with ryegrasses in this climate is winter kill and several more winters are needed before we would feel comfortable recommending ryegrasses for Northern Michigan.

ANNUAL GRASS WEED CONTROL

The prospect of several new grass herbicides for the turf market has created much interest in these products over the last several years. Our research has centered on two new products, dithiopyr (trade name Dimension, also known as MON-15100) and quinclorac (trade name Impact, also known as BAS 514) which should be on the market by 1990 or 1991. Dithiopyr is a primarily a preemergence herbicide although it also has significant postemergence activity. Quinclorac is principally a postemergence grass herbicide although it has significant preemergence grass activity as well as good postemergence broadleaf activity. Clearly, quinclorac has broad spectrum of herbicidal activity which will make it a unique product for the turf market. Data in table 5 displays the results of the preemergence trial for 1989. Dithiopyr (MON-15100) gave 100% control at all rates tested except for the 0.25 lb/A rate of the granular formulation and the 0.38 lb/A rate of the EC formulation. Even these rates gave excellent control, but not 100% as did the other rates. Another new preemergence herbicide is prodiamine, which is from Sandoz Crop Protection Corp., and also gives excellent preemergence control.

The dinitroaniline type herbicides such as PreM, Balan, and Team all gave good control, however, the higher rates or split applications performed better than the standard label rates.

The postemergence trial was conducted as three separate tests with applications at the 2-3 leaf crabgrass growth stage(appl. date 6-2-89), the 2-4 tiller growth stage (appl. date 6-23-89), and the 4-6 tiller growth stage (appl. date 7-7-89). Results (Table 6) indicate that Acclaim gave good to excellent control of crabgrass through the 2-4 tiller application. Combinations of Acclaim plus preemergence herbicides gave excellent control when applied on the 6-2-89 date. MON-15151 or other formulations of the dithiopyr active ingredient gave excellent postemergence control of crabgrass at the early (2-3 leaf) stage. At the later growth stages, however, the MON-15151 did not provide any control. The BAS 514 (to be named Impact when registered by the EPA) gave excellent control at all three growth stages with rates of 0.75 LB/A or above yielding 95% control or higher at 2 weeks after treatment.

BROADLEAF WEED CONTROL

Three separate broadleaf weed control studies were conducted in 1989 on four broadleaf weed species. The weed species were dandelion, white clover, buckhorn plantain, and creeping speedwell. Results are shown in tables 7-10. One new product which is attracting considerable attention is called Confront from Dow Chemical. Confront is a mixture of two broadleaf herbicides called triclopyr and clopyralid. Triclopyr plus 2,4-D make up the Turflon products so the Confront can be thought of as broadleaf herbicide without 2,4-D. The data displayed in tables 7-10 show that Confront performs as well as or better than the other commonly used broadleaf mixtures on dandelion, white clover, and buckhorn plantain but fell down on the control of creeping speedwell. The data also indicate that for most of the common broadleaf weeds, good control should be obtained if applications are made when the weeds are actively growing.

FAIRWAY MANAGEMENT STUDY

In August of 1987, a study was initiated at six golf courses around the state to determine the effects of Prograss, Cutless, and Scott's TGR on the competition betweeen annual bluegrass and creeping bentgrass. Treatments of the plant growth regulators were applied in August of 1987, 1988, and 1989 and in April of 1988 and 1989. Prograss was applied in September and October of 1987, 1988, and 1989. Results in table 11 show the percent

control of annual bluegrass taken in August of 1989. This study will be continued for at least one more year.

The data indicate that all three products increase the amount of creeping bentgrass present in the turf. The PGR's have shown the best results but have also had the most treatments, five, compared to three Prograss treatments. An interesting point is that at each course, the amount of increase in bentgrass in the untreated (control) plot is about one-half of the best PGR treatment. Thus, The PGR's simply speed up a process which is occuring naturally on its own. The Prograss does show some progress especially at the higher rates but there is a price to pay for that progress. Prograss works by either injuring or killing the annual bluegrass when it comes out of dormancy in the spring. This means that by the spring, the annual bluegrass in the turf is in poor condition and this is the time when the creeping bentgrass can outcompete and fill in the injured areas. But the early spring is not a time when the bentgrass is growing rapidly so while some gain in bentgrass is made, the annual bluegrass recovers and fills back in. Using Prograss can therefore be difficult because of the amount of early spring quality losses that have to be suffered to achieve the conversion. The PGR's, on the other hand, cause some discoloration but not to the extent of the Prograss. Also, these chemicals are generally applied in April and/or August and exert their effect for the next 6-8 weeks which is prime growing conditions for grasses which permits the bentgrass to fill in more rapidly.

Thus these products are both useful but in different ways. The PGR's make sense to use in a conversion program where there is still quite a bit of annual bluegrass present. Prograss would be useful in a situation where creeping bentgrass or another desireable species dominates the turf and the Prograss is used to kill any annual bluegrass that is present and to prevent more from filling back in. At this time, we would not recommend using Prograss on fairway turf containing less than 80% bentgrass unless low rates are used to achieve a slow transitition.

Table 1. 1989 Tall Fescue Variety Trial Evaluations.

	Quality Ratings (1-9)							
Variety	5/15	6/13	7/11	8/12	9/15	10/11	11/15	Grand Means
Pick 127	6.0	6.8	6.7	7.5	7.0	6.8	4.7	6.5
Pick DM	6.0	6.5	6.3	6.7	7.0	6.8	5.7	6.4
Eldorado	5.7	6.5	6.3	7.0	7.5	6.3	5.5	6.4
Tribute	6.2	5.8	6.2	6.7	7.2	6.5	5.7	6.3
Hubbard 87	6.3	6.5	6.2	7.0	6.7	6.5	4.8	6.3
PST-5MW	5.5	6.0	6.3	6.7	6.5	7.2	5.8	6.3
Cimmaron	6.3	6.2	6.0	6.5	6.7	6.3	5.7	6.2
Aztec	5.5	6.3	6.5	6.5	6.8	6.7	5.2	6.2
Pick GH6	5.8	6.0	6.0	6.5	7.2	6.8	5.2	6.2
Normac 99	6.2	6.7	5.5	6.5	7.0	6.5	5.0	6.2
Pick TF9	6.0	6.2	6.2	7.0	6.8	6.2	5.0	6.2
Jaguar II	5.8	6.0	6.0	6.2	6.7	6.5	5.7	6.1
Trailblazer	6.2	6.0	6.0	6.3	6.2	6.0	6.0	6.1
Pick 127	6.0	6.2	6.0	6.8	7.0	6.0	4.7	6.1
Bonanza	5.8	5.8	6.0	6.5	6.8	6.5	5.0	6.1
KWS-DUR	5.5	6.2	6.3	7.0	6.7	6.0	4.8	6.1
Legend	6.0	6.0	6.5	6.3	6.8	5.3	5.5	6.1
Wrangler	5.3	6.2	6.3	6.2	6.5	6.2	5.7	6.0
Winchester	6.0	6.2	5.7	6.5	6.5	6.2	5.3	6.0
Bel 86-1	5.5	6.0	6.0	6.5	6.5	6.7	5.0	6.0
PST-5AG	5.7	6.0	6.5	6.3	6.2	6.3	5.0	6.0
Emperor	5.8	6.2	6.2	6.2	6.0	6.2	5.3	6.0
Taurus	5.5	6.0	6.3	6.0	6.3	6.2	5.3	6.0
Bel 86-2	6.0	6.2	6.2	6.2	6.7	5.5	5.0	6.0
Rebel II	5.7	5.7	6.0	5.8	6.3	6.5	5.7	6.0
PST-5OL	5.7	5.7	6.0	5.8	6.0	7.0	5.3	5.9
Rebel	5.7	5.7	5.8	5.7	6.5	6.5	5.7	5.9
PST-5AP	5.8	6.2	5.7	6.5	6.3	6.0	5.0	5.9
Sundance	5.8	5.7	6.2	6.3	6.3	6.2	5.0	5.9
Pick 845PN	5.5	6.0	5.8	5.8	6.7	6.3	5.0	5.9
Thoroughbred	5.7	5.3	5.8	5.7	6.8	6.5	5.3	5.9
Monarch	5.8	5.7	5.5	6.5	5.8	6.7	5.0	5.9
PST-5EN	5.2	5.7	6.2	6.0	6.2	6.3	5.5	5.9
JB-2	5.2	5.3	6.0	6.2	6.0	6.7	5.7	5.9
Trident	6.0	5.5	5.7	6.3	6.3	5.7	5.3	5.8
PE-7	5.7	6.2	6.0	5.8	5.8	6.3	5.0	5.8
Normac 77	5.5	5.8	6.0	6.0	6.7	6.0	4.7	5.8
PST-DBC	5.3	5.2	6.3	6.0	6.3	6.7	4.7	5.8
Falcon	5.3	5.2	5.7	6.2	6.3	6.2	5.7	5.8
Mesa	5.8	5.7	5.7	6.0	6.2	6.2	5.0	5.8
Amigo	5.5	5.3	6.2	6.2	6.5	5.7	5.0	5.8
Silverado	4.7	5.8	5.7	6.2	6.3	6.3	5.3	5.8
Olympic	5.3	5.7	6.2	5.7	6.5	6.0	5.0	5.8
Carefree	5.7	5.7	5.7	6.0	6.0	6.2	5.2	5.8
Arid	4.7	5.2	5.3	5.8	6.5	7.0	5.7	5.7
PST-5DM	5.2	6.0	6.0	5.8	6.0	6.7	4.5	5.7
Tip	5.0	5.3	5.7	6.3	6.3	6.3	5.0	5.7
Apache	5.5	5.7	5.7	6.0	5.8	6.0	5.0	5.7
Syn Ga	5.7	5.8	6.0	6.0	5.8	5.7	4.5	5.6
Finelawn 1	5.2	5.0	6.2	5.8	6.3	6.0	5.0	5.6

Table 1. cont. 1989 Tall Fescue Variety Trial Evaluations.

	Quality Ratings (1-9)							
Variety	5/15	6/13	7/11	8/12	9/15	10/11	11/15	Grand Means
Jaguar	5.5	5.5	5.5	5.8	5.9	6.2	5.0	5.6
Titan	5.8	6.0	5.8	5.7	6.2	5.5	4.3	5.6
Richmond	5.3	5.0	5.7	5.7	6.3	6.3	5.0	5.6
Willamette	6.0	5.0	6.0	5.7	6.0	5.5	5.0	5.6
Adventure	5.0	5.0	5.5	5.7	6.2	6.2	5.5	5.6
Finelawn 5GL	5.2	5.7	6.0	5.8	5.8	5.7	4.7	5.5
PST-5OL	4.8	5.7	5.3	5.7	5.9	6.0	5.1	5.5
Fatima	5.0	5.5	6.0	5.2	6.3	5.3	5.0	5.5
Chieftan	5.8	5.5	5.7	5.8	6.0	4.3	5.0	5.5
Pacer	5.3	5.0	5.3	5.8	5.5	5.7	5.0	5.4
KY-31	4.7	5.0	5.2	5.5	5.7	6.5	4.8	5.3

Table 2. 1989 Perennial Ryegrass Variety Trial Evaluations.

	1989 Quality Ratings (1-9)								
Variety	4/26	5/16	6/12	7/11	8/15	9/14	10/11	11/14	Grand Means
Saturn	5.7	6.3	6.0	5.2	7.0	6.5	6.0	4.8	5.9
PST-2H7	4.7	5.8	6.2	5.0	6.3	6.3	6.0	5.5	5.7
Allaire	5.3	6.0	5.7	4.3	5.8	6.0	5.8	5.3	5.5
Manhattan II	4.7	5.8	6.0	4.0	6.7	6.3	5.3	5.2	5.5
Palmer	4.7	6.0	5.7	5.2	5.5	5.8	6.0	5.2	5.5
Pennant	4.8	5.7	5.8	5.0	6.0	6.3	5.2	4.8	5.5
Tara	4.3	5.8	5.7	5.2	6.5	6.3	5.3	4.5	5.5
Belle	5.2	6.3	5.3	4.3	6.0	6.0	5.8	4.7	5.5
Runaway	4.8	6.2	6.5	4.3	5.5	5.5	5.5	5.2	5.4
Regal	5.3	5.3	5.3	5.0	5.7	6.5	5.0	5.3	5.4
Charger	4.3	6.0	5.7	4.3	6.2	6.2	5.7	5.0	5.4
SR 4100	4.3	6.0	5.7	4.7	6.0	6.2	6.2	4.3	5.4
Dasher II	4.3	5.7	5.3	4.0	6.5	6.5	5.7	5.0	5.4
SR 4000	4.0	5.5	5.8	4.0	6.2	6.2	5.8	5.5	5.4
Riveria	4.0	5.3	5.7	4.3	6.2	6.3	5.3	5.5	5.3
Lindsay	4.3	6.2	5.7	4.0	5.7	6.0	5.5	5.2	5.3
Bar Lp 410	4.7	5.8	6.2	4.8	6.0	5.8	5.0	4.0	5.3
Omega II	4.7	5.7	6.0	4.3	6.0	6.0	5.5	4.0	5.3
PST-2DD	4.5	6.0	4.7	4.0	6.2	6.2	6.0	4.7	5.3
PST-M2E	4.3	6.2	5.8	4.3	6.0	6.0	5.7	3.7	5.3
Competitor	4.7	6.0	5.7	4.0	5.8	6.0	5.7	4.2	5.3
Blazer II	4.3	6.2	6.3	5.0	4.8	6.0	5.5	3.7	5.2
Citation II	4.3	6.5	4.7	4.0	5.8	6.2	5.7	4.7	5.2
Prelude	4.7	5.8	5.3	4.3	5.5	5.8	5.7	4.3	5.2
Barry	4.3	5.7	5.3	4.3	5.8	5.7	5.2	5.0	5.2
Cowboy	4.8	6.2	5.0	4.0	5.8	6.0	5.3	4.2	5.2
Rodeo	4.3	5.2	6.0	4.2	5.7	5.8	4.8	5.3	5.2
Repell	3.7	5.0	6.0	4.3	5.8	6.0	5.5	5.0	5.2
Aquaris	4.0	5.3	5.7	4.3	6.0	5.8	5.8	4.3	5.2
NK 80389	3.3	5.0	6.7	5.0	5.5	5.2	6.0	4.7	5.2
Derby	4.7	5.7	5.3	4.7	5.7	5.7	5.0	4.5	5.1
Birdie II	4.0	5.7	5.3	5.0	5.8	5.8	5.2	4.3	5.1
Brenda	5.0	5.5	5.3	5.0	5.3	5.7	5.0	4.2	5.1
PSU-333	4.0	6.3	5.0	4.7	5.7	6.0	5.3	4.0	5.1
Rival	4.0	4.7	5.7	5.2	5.7	5.7	5.3	4.8	5.1
Sunrye	4.7	6.2	4.0	3.7	6.0	5.5	5.3	5.2	5.1
Yorktown II	4.0	5.3	5.8	4.3	5.3	5.3	5.0	5.2	5.0
Manhattan	4.0	5.3	5.8	4.2	5.5	5.0	5.2	5.2	5.0
Commander	4.0	5.7	4.7	4.7	6.0	5.8	5.3	4.0	5.0
Goalie	4.3	6.0	4.3	3.3	5.8	6.2	5.3	4.7	5.0
Ranger	3.7	4.7	5.7	4.3	5.3	5.8	5.3	5.0	5.0
Fiesta II	3.7	5.7	5.3	4.0	6.0	5.7	5.7	3.7	5.0
Del 946	4.7	6.2	4.7	3.8	5.8	6.0	4.7	3.7	4.9
Pick 715	4.0	5.8	5.3	3.7	5.2	5.5	5.3	4.7	4.9
PSU-222	4.5	5.3	5.7	3.7	5.0	5.7	5.3	4.3	4.9
Pennfine	4.3	5.3	4.7	5.0	5.3	5.5	5.3	4.0	4.9
SR 4031	4.7	5.7	4.7	3.7	5.8	5.7	5.3	4.0	4.9
Regency	4.7	5.0	4.7	3.3	5.7	6.0	5.3	4.5	4.9
Vintage	4.3	5.3	5.0	4.3	5.7	5.5	4.7	4.3	4.9
Acrobat	4.0	5.3	5.0	4.2	5.3	6.0	5.0	4.2	4.9

Table 2. cont. 1989 Perennial Ryegrass Variety Trial Evaluations.

	1989 Quality Ratings (1-9)								
Variety	4/26	5/16	6/12	7/11	8/15	9/14	10/11	11/14	Grand Means
Gator	3.5	5.3	6.2	4.2	4.8	5.7	5.3	4.0	4.9
Ovation	4.0	4.5	5.7	5.2	4.7	5.2	5.2	4.3	4.8
Dillon	3.7	4.7	5.8	4.7	5.0	5.3	4.7	4.7	4.8
Mom-Lp-763	3.7	5.0	5.7	4.0	5.3	5.3	5.2	4.3	4.8
Patriot	3.7	5.0	5.0	4.0	5.7	5.7	5.0	4.2	4.8
Ronja	3.7	4.7	6.5	4.0	4.7	4.7	5.0	4.8	4.8
Bar Lp 454	4.0	5.0	5.8	4.2	4.7	5.0	4.0	5.0	4.7
Caliente	3.7	5.5	5.0	4.0	5.2	5.3	5.2	3.8	4.7
J208	3.0	4.3	6.0	4.0	5.0	5.0	5.3	4.5	4.6
Diplomat	3.7	4.7	5.0	3.5	4.8	5.0	5.3	5.2	4.6
J207	3.7	5.3	5.0	4.0	5.2	4.7	4.7	4.3	4.6
Sheriff	4.2	5.3	4.7	3.7	4.7	5.2	4.8	4.3	4.6
Delray	3.7	5.5	4.7	3.7	5.5	5.3	4.3	3.3	4.5
Pavo	4.0	4.7	5.0	4.0	5.0	4.7	4.5	4.0	4.5
Linn	2.7	4.0	3.7	3.0	4.0	4.3	3.2	4.5	3.7

Table 3. 1989 Kentucky Bluegrass Variety Trial Evaluations

Variety	Quality Ratings (1-9)								
	4/24	5/15	6/13	7/10	8/14	9/14	10/9	11/14	Grand Means
Princeton 104	3.7	6.0	7.7	7.3	7.8	7.8	8.3	6.7	6.9
Asset	4.3	6.7	6.5	6.2	7.3	7.0	6.5	6.3	6.4
Eclipse	4.0	6.3	6.8	6.7	7.0	6.7	6.7	6.5	6.3
Challenger	4.2	6.3	6.5	5.3	7.0	6.8	6.8	6.7	6.2
Midnight	3.0	6.0	6.8	5.3	7.0	6.2	7.5	7.3	6.1
Lofts 1757	4.3	6.0	6.3	6.3	6.7	6.7	6.0	6.0	6.0
PST-CB1	4.3	6.0	5.7	5.7	6.2	6.7	7.0	6.2	6.0
Aspen	3.7	5.0	6.2	6.2	7.0	7.0	6.3	6.3	6.0
Bristol	4.5	6.7	6.0	5.7	5.3	6.7	5.8	6.5	5.9
K3-178	4.7	5.8	6.0	5.7	6.2	6.7	6.7	5.5	5.9
Parade	4.5	5.0	5.7	5.5	6.0	6.8	7.2	6.3	5.9
Adelphi	4.7	6.0	6.0	5.7	6.5	6.3	6.2	5.5	5.9
Destiny	4.5	5.2	6.0	6.2	6.5	6.3	5.8	6.2	5.8
Freedom	4.3	6.0	6.0	6.0	5.8	6.5	6.3	5.7	5.8
Glade	4.0	6.0	6.3	5.3	5.5	6.8	5.8	6.7	5.8
Abbey	4.0	6.3	6.2	6.5	5.5	6.5	6.0	5.3	5.8
BA69-82	4.3	5.2	6.2	6.8	7.0	6.2	5.5	5.0	5.8
Cheri	4.0	5.3	6.5	6.8	6.8	5.8	5.2	5.5	5.8
Wabash	4.8	5.0	5.3	6.5	6.5	6.0	6.3	5.5	5.8
BA73-540	3.8	5.7	6.2	6.7	7.2	6.0	5.5	5.0	5.8
Dawn	4.0	5.3	5.7	5.7	6.3	6.3	5.8	6.5	5.7
RAM 1	4.3	4.7	6.5	5.7	6.5	5.8	6.2	5.8	5.7
Huntsville	5.0	5.0	5.0	6.0	6.7	6.0	5.8	5.8	5.7
Trenton	3.8	5.3	6.2	5.8	6.0	6.2	6.7	5.2	5.6
Touchdown	4.0	6.2	5.7	4.7	6.3	6.0	6.0	6.2	5.6
K1-152	3.7	5.7	6.0	5.3	6.0	6.2	6.2	5.8	5.6
Mystic	4.7	4.7	6.8	6.7	5.7	5.2	5.2	6.0	5.6
Blacksburg	3.0	4.3	7.0	5.3	7.3	7.2	5.5	5.0	5.6
Classic	3.7	5.2	5.7	6.0	6.7	6.8	5.3	5.3	5.6
Victa	3.7	5.5	6.3	6.2	6.2	6.0	5.3	5.2	5.5
Ba-70-242	4.2	5.8	6.3	6.2	5.7	5.5	5.3	5.3	5.5
NE 80-88	5.0	5.3	5.7	5.3	5.7	5.3	6.3	5.5	5.5
Suffolk	4.0	5.8	5.7	5.7	5.2	6.2	5.8	5.7	5.5
Gnome	4.3	5.8	5.8	5.8	6.5	5.2	5.3	5.2	5.5
Monopoly	5.0	4.3	6.0	5.7	5.5	5.8	6.2	5.3	5.5
WW AG 468	3.0	6.5	6.2	6.2	6.3	6.0	5.7	4.0	5.5
Georgetown	4.3	6.3	5.3	5.3	5.5	6.0	5.7	5.2	5.5
Haga	4.0	5.0	5.3	5.8	5.8	6.3	6.0	5.3	5.5
Tendos	3.8	4.5	5.0	5.7	6.3	6.0	5.8	6.5	5.5
Somerset	3.7	4.0	5.3	6.0	6.3	5.8	6.7	5.8	5.5
America	3.5	5.2	5.3	6.2	5.3	6.3	6.2	5.3	5.4
South Dakota Cert.	5.0	4.7	5.0	5.3	6.0	6.2	5.7	5.3	5.4
Ba-73-626	3.7	6.0	6.0	6.2	5.7	5.3	5.3	5.0	5.4
Liberty	4.0	5.7	5.7	5.5	5.2	6.3	5.2	5.5	5.4
Merion	3.3	4.7	5.7	6.2	6.7	5.5	6.0	5.0	5.4
Able-1	3.3	4.0	6.3	6.0	6.2	6.2	5.7	5.3	5.4
Majestic	4.0	5.3	5.0	6.0	5.7	6.0	5.7	5.2	5.4
Sydsport	4.2	5.5	6.0	5.7	6.5	5.7	5.0	4.2	5.3

Table 3. cont. 1989 Kentucky Bluegrass Variety Trial Evaluations

Variety	Quality Ratings (1-9)								
	4/24	5/15	6/13	7/10	8/14	9/14	10/9	11/14	Grand Means
Coventry	3.7	5.2	5.7	6.3	6.0	6.0	4.8	5.0	5.3
Merit	3.7	5.2	5.8	5.5	5.5	5.7	5.5	5.3	5.3
Joy	5.2	5.7	4.7	5.0	5.8	5.3	5.3	5.2	5.3
Nassau	4.0	4.7	6.0	5.3	6.2	5.5	5.5	4.7	5.2
Rugby	3.5	5.0	5.3	6.0	5.7	5.7	5.5	5.0	5.2
Aquila	3.7	4.7	5.0	5.5	5.7	4.7	5.5	6.7	5.2
WW Ag 496	4.0	5.3	6.0	5.2	5.2	5.7	5.0	5.0	5.2
HV 97	3.3	4.7	5.3	5.7	5.3	6.0	5.3	5.5	5.1
Kenblue	5.0	4.0	4.7	5.3	6.0	5.5	5.2	5.3	5.1
Chateau	3.8	4.2	5.8	5.8	6.2	5.7	4.7	4.8	5.1
Bar VC 577	4.0	4.3	4.7	5.3	5.7	5.7	5.7	5.5	5.1
WW Ag 491	3.7	4.7	5.7	5.7	5.5	5.2	5.2	5.2	5.1
Harmony	3.2	4.7	5.7	5.2	6.0	5.3	5.0	5.5	5.1
Welcome	4.0	4.0	5.8	5.7	5.0	5.0	5.2	5.3	5.0
Conni	3.3	3.3	5.7	5.3	6.0	5.7	5.3	5.2	5.0
Compact	3.8	4.5	5.2	5.8	5.3	5.3	4.7	4.7	4.9
Baron	3.5	4.7	5.7	6.0	5.3	5.2	4.3	4.3	4.9
A-34	3.3	4.7	6.0	5.0	4.8	5.0	5.3	4.7	4.9
Amazon	3.0	3.7	5.8	5.0	5.0	5.3	5.2	5.2	4.8
Ikone	3.7	3.7	5.0	4.3	5.2	6.0	5.2	5.2	4.8
Estate	3.3	4.2	6.2	5.0	5.2	5.2	4.3	4.7	4.8
Barzan	3.3	4.0	4.3	5.0	5.3	5.2	5.0	5.7	4.7
WW Ag 495	3.5	4.0	5.7	5.3	5.2	4.7	4.7	4.7	4.7
Cynthia	3.3	3.7	4.3	4.7	5.5	5.8	5.0	5.3	4.7
Julia	3.0	4.0	5.7	5.0	5.7	4.8	4.5	4.7	4.7
Bar VB 534	2.7	3.7	4.7	5.0	5.3	5.2	4.0	5.0	4.4
Annika	2.7	3.0	4.0	4.7	5.0	5.2	4.3	4.0	4.1

Table 4. Traverse City fairway trial 1989 data.

Variety	Species	5/11	6/15	7/19	10/26	Grand Means
Fiesta	PR	7.3	8.0	6.7	6.0	7.0
Manhattan II	PR	7.2	8.0	6.8	5.5	6.9
Blazer	PR	7.0	8.5	6.7	5.0	6.8
Gator	PR	6.7	8.0	6.2	6.2	6.8
Palmer + Penncross	PR + CB	6.8	8.0	6.3	5.3	6.6
Saturn	PR	6.7	7.5	6.2	5.8	6.5
Palmer	PR	6.5	7.7	6.2	5.7	6.5
Fiesta II	PR	6.3	8.2	6.2	5.2	6.5
Lindsay	PR	6.3	7.7	5.7	5.8	6.4
Derby	PR	6.7	7.8	6.0	4.5	6.3
Pennant	PR	6.5	6.3	5.7	6.0	6.1
Dillon	PR	5.8	7.2	6.3	5.0	6.1
Allstar	PR	6.5	6.7	5.5	4.8	5.9
Palmer + Penncross + Exeter	PR + CB + ColB	5.5	6.8	5.5	5.3	5.8
Dasher II	PR	6.0	6.0	5.2	5.8	5.8
Birdie	PR	6.0	6.0	5.7	5.2	5.7
Yorktown II	PR	5.8	6.8	5.5	4.3	5.6
Penncross	CB	4.3	7.3	5.8	4.5	5.5
Omega II	PR	5.3	6.7	5.2	4.7	5.5
Ovation	PR	5.3	6.0	5.3	5.2	5.5
Pennlinks	CB	4.3	7.2	5.8	4.3	5.4
Prelude	PR	5.5	5.3	4.7	4.7	5.0
Cobra	CB	4.0	6.7	4.5	4.8	5.0
Regal	PR	5.2	5.7	4.3	4.2	4.8
Putter	CB	3.7	6.7	3.8	4.5	4.7
Jazz	PR	5.3	5.3	4.2	3.7	4.6
Penneagle	CB	3.7	6.3	3.8	3.8	4.4
National	CB	4.0	4.3	4.0	4.5	4.2
Citation II	PR	4.2	5.0	3.7	3.8	4.2
Spartan	HF	3.0	4.5	3.5	4.0	3.8
Scaldis	HF	3.3	3.3	3.0	4.0	3.4
Shadow	ChF	2.3	4.0	3.0	3.7	3.3
Cindy	CrF	2.7	3.7	3.0	3.3	3.2
Highland	ColB	2.3	3.7	2.2	3.2	2.8
Exeter	ColB	2.2	3.7	2.7	2.7	2.8
Tournament	HF	2.0	3.2	2.7	3.2	2.8
Aurora	HF	2.3	2.7	2.5	3.2	2.7
Serra	HF	1.7	2.3	2.3	4.2	2.6
Flyer	CrF	1.7	2.7	2.0	2.8	2.3
Fortress	CrF	1.7	1.3	1.7	3.0	1.9

TABLE 5. 1989 Preemergence Crabgrass Control Study

Herbicide	Formulation	Rate (lbs AI/A)	% Crabgrass 7/12	% Crabgrass 8/2
MON 15151	1 EC	0.5	0	0
MON 15151	1 EC	0.75	0	0
MON 15104	1 EC	0.38	0	0
MON 15104	1 EC	0.5	0	0
MON 15104	1 EC	0.75	0	0
MON 15175	0.25 G	0.38	0.3	0
MON 15175	0.25 G	0.5	0	0
MON 15112	0.35 G	0.75	0	0
Prodiamine	65 WDG	0.75	0.3	0
PreM	60 WDG	3.0	0	0
DCPA	75 WP	7.5	0.3	0
PremM	60 WDG	1.5 + 1.0	0	0
Balan	2.5 G	2 + 1	0	0
Team	2 G	2 + 1	0	0
MON 15151	1 EC	0.38	0	0.3
MON 15112	0.35 G	0.5	0	0.3
MON 15175	0.25 G	0.25	0.3	0.7
Team	2 G	3.0	0	0.7
DCPA	75 WP	10.5	0	0.7
MON 15111	0.27 G	0.38	0.3	1.0
Betamec	4 EC	12	0	1.0
Balan	2.5G	2	0.3	1.3
Prodiamine	65 WDG	0.5	0	1.7
MON 15111	0.27 G	0.25	0.7	2.3
Balan	2.5 G	3	0.3	2.3
DCPA	75 WP	10.5 + 7.5	0.3	2.3
PreM	60 WDG	1.5	0.3	6.7
Team	2 G	2.0	0.3	7.3
Control			4.0	10.3
Control			3.0	13.0
		LSD	1.4	5.5

TABLE 6. Effect of pre- and postemergence herbicides on crabgrass control.

Treatments	Rate (lbs ai/A)	PERCENT CRABGRASS CONTROL				
		1 WAT	2 WAT	4 WAT	6 WAT	8 WAT
Growth Stage: 2-3 leaf Application Date: 6-2-89						
BAS 514*	1.0	67	91	93	86	54
BAS 514 + 090	0.75 + 2 pts/A	93	98	94	7	0
BAS 514 + 090	1.0 + 2 pts/A	100	100	85	35	0
BAS 514 + 090**	0.75 + 2 pts/A	100	100	97	97	97
BAS 514 + 090**	1.0 + 2 pts/A	93	100	80	87	87
Acclaim + Pendimethalin	0.08 + 1.5	67	83	90	47	17
Acclaim + Pendimethalin	0.12 + 1.5	50	93	90	47	0
Acclaim + Team	0.08 + 2.0	91	100	91	33	0
Acclaim + Team	0.12 + 2.0	90	98	98	72	10
DCPA + Acclaim***	10.5 + 0.25	72	90	89	41	27
MON-15151	0.38	27	48	98	82	65
MON-15151	0.5	50	76	93	67	60
MON-15104	0.38	50	78	89	61	56
MON-15104	0.5	38	54	76	72	42
MON-15104	0.75	30	57	100	90	75
MON-15175	0.38	22	33	33	22	22
MON-15175	0.5	33	17	50	40	23
MON-15111	0.38	11	60	87	44	31
MOn-15112	0.5	27	45	85	72	27
MON-15112	0.75	27	58	89	76	51
Acclaim	0.12	73	73	80	20	0
Acclaim	0.18	62	53	73	0	0
MSMA	2.0	28	38	17	0	0
MSMA**	2.0	0	0	0	0	0
Control		13	0	0	0	0
Control		20	13	0	0	0
	LSD	42	36	31	46	46

TABLE 6 cont. Effect of pre- and postemergence herbicides on crabgrass control.

Treatments	Rate (lbs ai/A)	PERCENT CRABGRASS CONTROL 1 WAT	2 WAT	4 WAT	6 WAT	8 WAT
Growth Stage: 2-4 tiller						
Application Date: 6-23-89						
BAS 514 + 090	0.75 + 2 pts	98	98	95	93	88
BAS 514 + 090	1.0 + 2 pts	100	97	93	92	90
MSMA**	2.0	22	6	0	0	0
MSMA	2.0	19	6	0	0	0
Acclaim	0.18	44	86	20	0	0
Acclaim	0.25	38	93	68	8	0
HOE-46360	0.06	40	86	0	0	0
HOE-46360	0.09	66	76	24	0	0
HOE-46360	0.125	69	84	51	0	0
HOE-46360	0.18	77	96	81	21	0
HRAV 01129	0.18	0	0	0	0	0
MON-15151	0.38	0	0	0	0	0
MON-15151	0.5	15	0	0	0	0
MON-15151	0.75	15	10	10	0	0
Acclaim + Pendimethalin	0.12 + 1.5	37	90	47	11	0
Acclaim + Pendimethalin	0.18 + 1.5	54	88	53	27	0
Acclaim + Pendimethalin	0.25 + 1.5	17	93	70	50	3
Control		0	0	0	0	0
Control		0	0	0	0	0
	LSD	42	36	31	46	46
Growth Stage: 4-6 tiller						
Application Date: 7-7-89						
BAS 514 + 090	0.75 + 2 pts	97	95	81	65	58
BAS 514 + 090	1.0 + 2 pts	95	96	74	61	58
MSMA**	2.0	7	20	0	0	0
MSMA	2.0	31	53	18	0	0
Acclaim	0.18	23	70	77	34	22
Acclaim	0.25	22	59	79	52	29
MON-15151	0.38	6	0	12	0	0
MON-15151	0.5	20	0	0	0	24
MON-15151	0.75	2	0	26	6	8
Acclaim + Pendimethalin	0.18 + 1.5	33	76	82	54	46
Acclaim + Pendimethalin	0.25 + 1.0	14	72	78	49	33
Acclaim + Pendimethalin	0.35 + 1.0	45	70	96	70	67
Control		4	2	0	0	0
Control		0	0	0	0	11
	LSD	23	25	24	37	43

* - Applied as a late preemergent on 5/23/89.
** - Treatment repeated after 30 days.
*** - DCPA applied as a late preemergent on 5/23/89.
Acclaim applied at 2-4 tiller stage on 6/23/89.

TABLE 7. Control of white clover at the Crops Research Center on the MSU campus.

		% Clover Control		
Treatment	Rate (lbs AI/A)	2 WAT	4 WAT	6 WAT
2,4-D + XRM-3724 + XRM-3972	1.25 + .125 + .063	97	100	100
Confront	1.5 pts/A	100	100	100
Confront	2 pts/A	98	100	100
Confront	1 pt/A	99	100	100
2,4-D + XRM-3724 + XRM-3972	1.67 + .17 + .083	98	100	100
2,4-D + XRM-3724 + XRM-3972	.83 + .083 + .042	96	99	100
Fermenta 2 + 2	2.0 ozs/M	96	99	99
Trimec Encore	4.0 pts/A	97	99	99
Fermenta 2 + 2 + Frigate	1.5 ozs/M + 1% V/V	98	98	98
Turflon II	2 qts/A	96	98	97
Trimec	4.0 pts/A	87	97	95
Fermenta 2 + 2	1.5 ozs/M	88	97	93
Fermenta 2 + 2 + Frigate	2.0 ozs/M + 1% V/V	95	97	97
Weedone DPC Amine	4 pts/A	89	95	88
Turflon II	1 qt/A	93	91	92
Trimec Encore	3.25 pts/A	88	89	87
Weedone DPC Amine	3 pts/A	95	87	60
2,4-D Granular Treatment	high rate	79	87	87
2,4-D Granular Treatment	low rate	60	57	38
Control		53	18	21
Control		41	18	20
LSD.05		17	17	22

Table 8. Control of Dandelion at the Crops Research Center on the MSU campus.

		% Dandelion Control		
Treatment	Rate (lbs AI/A)	2 WAT	4 WAT	6 WAT
Fermenta 2 + 2 + Frigate	2.0 ozs/M + 1% V/V	65	96	96
Fermenta 2 + 2	1.5 ozs/M	65	96	93
Turflon II	2 qts/A	67	92	93
Fermenta 2 + 2 + Frigate	1.5 ozs/M + 1% V/V	71	90	92
Fermenta 2 + 2	2.0 ozs/M	77	89	98
Weedone DPC Amine	4 pts/A	70	89	92
2,4-D + XRM-3724 + XRM-3972	1.67 + .17 + .083	67	88	97
Turflon II	1 qt/A	68	87	91
Confront	1.5 pts/A	83	86	95
Trimec Encore	4.0 pts/A	81	82	95
Trimec	4.0 pts/A	77	81	97
2,4-D Granular Treatment	high rate	66	77	84
Confront	2 pts/A	77	77	96
2,4-D + XRM-3724 + XRM-3972	.83 + .083 + .042	64	73	81
Weedone DPC Amine	3 pts/A	71	72	69
Trimec Encore	3.25 pts/A	71	72	79
2,4-D + XRM-3724 + XRM-3972	1.25 + .125 + .063	70	71	89
Confront	1 pt/A	62	60	83
Control		70	58	53
2,4-D Granular Treatment	low rate	63	56	47
Control		69	48	62
LSD.05		19	23	20

Table 9. Control of narrow leaf plantain at the Fairway Driving Range in Okemos, MI.

		% Plantain Control		
Treatment	Rate (lbs AI/A)	2 WAT	4 WAT	6 WAT
Trimec Encore	3.25 pts/A	70	98	98
Weedone DPC Amine	4 pts/A	69	93	99
Confront	1 pt/A	65	93	96
Trimec Encore	4.0 pts/A	73	92	97
2,4-D + XRM-3724 + XRM-3972	.83 + .083 + .042	64	92	98
Confront	2 pts/A	73	92	99
2,4-D + XRM-3724 + XRM-3972	1.67 + .17 + .083	63	91	100
Confront	1.5 pts/A	59	91	99
2,4-D + XRM-3724 + XRM-3972	1.25 + .125 + .063	38	90	98
Turflon II	2 qts/A	66	88	96
Fermenta 2 + 2	2.0 ozs/M	61	83	92
Fermenta 2 + 2 + Frigate	2.0 ozs/M + 1% V/V	60	83	90
Turflon II	1 qt/A	43	79	90
Weedone DPC Amine	3 pts/A	54	72	91
Trimec	4.0 pts/A	47	72	97
Fermenta 2 + 2	1.5 ozs/M	53	69	87
Fermenta 2 + 2 + Frigate	1.5 ozs/M + 1% V/V	38	65	92
2,4-D Granular Treatment	high rate	50	57	70
2,4-D Granular Treatment	low rate	24	38	33
Control		41	20	34
Control		25	17	17
LSD.05		27	24	20

Table 10. Control of creeping speedwell (Veronica filiformis) at the Beal Garden site on the MSU campus.

		% Veronica Control		
Treatment	Rate (lbs AI/A)	2 WAT	4 WAT	6 WAT
DPCA 75WP	10.5	33	100	87
Fluroxypyr	0.5	98	98	100
Fluroxypyr	0.25	89	94	94
Turflon D	4 pts/A	70	87	85
Turflon II	4 pts/A	75	85	83
Trimec	4 pts/A	47	85	92
Weedone DPC	4 pts/A	72	78	68
Esteron 99	1.0	70	58	60
Turflon II	3 pts/A	46	53	74
Confront	2.0 pts/A	0	37	23
Confront	1 pt/A	0	36	40
Triclopyr	0.5	0	25	29
Confront	1.5 pts/A	0	19	19
Control		0	0	13
LSD.05		38	40	35

Table 11. Percent control of AB at 6 Locations in Michigan rated 8/89.

	LOCATIONS					
TREATMENT	1	2	3	4	5	6
Flurprimidol 0.6 kg/ha	11	67	34	73	24	60
Flurprimidol 0.8 kg/ha	9	74	54	77	40	63
Paclobutrazol 0.4 kg/ha	49	70	66	75	57	52
Ethofumesate 0.8 + 0.8 kg/ha	1	33	18	79	36	19
Ethofumesate 0.8 + 1.7 kg/ha	6	62	64	80	48	46
Ethofumesate 0.4 + 1.7 kg/ha	2	37	32	72	44	48
Control	0	47	28	67	3	52
Location Avenue	11	56	42	75	36	47