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

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.