1990 TURF WEED CONTROL, PGR, AND MANAGEMENT UPDATE

Bruce Branham
Associate Professor
Department of Crop and Soil Sciences
Michigan State University

Research was conducted in 1990 in several areas but focused on the use of PGR's for fairway and greens management. In addition, several other studies were conducted on the effects of watering in preemergence herbicide applications, a general evaluation of preemergence annual grass control herbicides, and evaluations of turf variety trials for the selection of improved varieties for Michigan. Finally, a progress report will be given on the use of soil lysimeters to determine the leaching potential of fertilizers and pesticides used in turf.

Plant growth regulators have been used in turf management for a number of years to regulate growth and suppress seedheads. Their use has never been widespread because of the reduction in quality associated with their use. This reduction in quality can range from mild to severe and generally increases with increasing rate of PGR application. These products were primarily positioned for use in the roadside turf and homeowner market. They have been reasonably successful in the roadside turf market but have never caught on in the homeowner market. The homeowner market has always been approached from the viewpoint of getting 4-8 weeks of total growth stoppage. The rates of PGR's needed to achieve this kind of growth suppression generally result in unacceptable turf quality. However the golf turf market, one which was never initially considered for PGR use, is realizing that low rates of these PGR's can result in significant reductions in mowing frequency and clipping volume.

In order to measure the effect of PGR applications on clipping reduction, a study was initiated on May 2nd of 1990 to determine the effect of low rates of commonly available PGR's on clipping weights of a mixed stand of annual bluegrass and creeping bentgrass turf. Rates of Cutless (common name - flurprimidol), Scott's TGR, a granular fertilizer plus PGR product (common name of active ingredient - paclobutrazol), and Scott's Turf Enhancer (common name - paclobutrazol), a sprayable formulation without fertilizer. After application, individual plots were measured on Monday, Wednesday, and Friday of each week for turf height. When a plot reached 3/4" in height it was mowed at 1/2" and the clippings were collected, dried, and weighed.

All PGR rates and treatments reduced clipping weights significantly when reported as a percentage of the control weight (Figures 1-3). Cutless was tested at rates of 0.25 - 0.50 lbs AI/A and showed increased clipping reduction with increasing rate. All rates of Cutless provided four weeks of growth suppression with normal rates of growth returning by 5 weeks after treatment (WAT) (Figure 1). Rates of Scott's Turf Enhancer showed similar reductions in clipping weights (Figure 2) although this product was tested over a broader rate (0.09 - 0.53 lbAI/A) range than was

Cutless. The highest rates of the Scott's product gave complete growth suppression from 3 to 5 WAT. Clipping weights did not return to the control level until 7 WAT for the 0.53 lbAI/A. The two highest rates of the Scott's Enhancer product were choosen because they are the same as the currently labeled rates of Scott's TGR except that the Turf Enhancer product has no fertilizer.

The two active ingredients in Cutless and Scott's Enhancer (common names are flurprimidol and paclobutrazol) have similar modes of action and in my observations the Scott's product is about twice as efficacious as Cutless on an active ingredient basis. Thus the two lowest rates of Scott's Turf Enhancer provided similar growth suppression as did the two lowest rates of Cutless.

Each of these products can cause some phytotoxicity or discoloration to the turf. The effects of these products can be seen in Table 1. Increasing rates of these products cause increasing turf discoloration. Notice the effect of fertilizer when comparing Scott's TGR to Scott's Turf Enhancer, which have the same active ingredient except that Scott's TGR is formulated on a fertilizer carrier.

EFFECT OF PGR'S ON PUTTING GREEN SPEED

The putting green speed study examined the effects of mowing height, plant growth regulator use, and grooming reels on putting green speed. The four treatments were Cutless at 0.25 LB/A, grooming reels once per week, Cutless at 0.25 LB/A and grooming reels once per week, and an untreated control. These four treatments were studied at mowing heights of 5/32" and 4/32". Results showed that the PGR treatments did show an increase in green speed but only at the higher height of cut (Figure 4). The data in Figure shows only four of the eight treatments that were studied. However, these treatments most clearly show the benefit of using a PGR to increase putting green speed. A the lower height of cut,4/32", no benefit is seen. At the 5/32" height of cut, a consistent increase in putting green speed of 6-10" is seen for a period of 3 weeks following PGR application. This is quite beneficial since it is desirable to keep heights of cut higher while gaining the type of green speed normally only seen from lower heights of cut.

PREEMERGENCE HERBICIDE STUDIES

A concern of the lawn care industry is the increasing legislation with which they must deal. A potential concern is the watering in of preemergence herbicide applications. Technically speaking, if a lawn care operator does not ensure that an application is watered in, then they may be considered in violation of the herbicide label. In order to determine the effect of watering in preemergence herbicides, we tested eight preemergence herbicides at two or three rates of application by watering in one set of treatments immediately after application and keeping water off the other set of plots for 14 days. This is the second year of this test and the results again have indicated that there is no measurable benefit to watering in preemergence herbicides (Table

2). The statistical analysis of this study indicates that the watering in had no statistically significant differences and the only differences occurred between different herbicide treatments averaged over both watering in and not watering in treatment sets. Thus, the data in Table 2 is displayed in two different ways. The first sets of data displayed show the means for watering in and not watering in at the three evaluation dates. According to the statistical analysis, there were no differences between watering in versus not watering in for each herbicide treatment. The only statistically meaningful differences are shown in the single columns of percent crabgrass and these values represent the amount of crabgrass for each herbicide regardless of whether it was watered in or not. This data gives good information on the performance of the individual herbicide treatments. Notice the excellent control given by both rates of prodiamine. This new herbicide from Sandoz Crop Protection is expected to receive federal labeling very soon. Also notice the values for turf density found in the last column of the table. This visual data indicated that the high rates of prodiamine and Team herbicides caused noticeable thinning of the plots. Other rates of Team and Balan also seemed to cause some thinning although not statistically different from all of the controls. While this data showed quite a bit of variability, the prodiamine plots could be picked out rather easily and indicate that this product may cause unacceptable injury. Other products giving excellent control of crabgrass include Dimension at rates of 0.38 and 0.5 LB/A and the 3.0 LB/A rate of PreM (Table 2).

LYSIMETERS FOR TURF LEACHING STUDIES

If you have followed the turf industry or agriculture in general for the last three years, you have to be aware of the intense public concern over the potential for ground and surface water contamination from chemicals and fertilizers used in turfgrass management. In response to this concern we have undertaken the construction of a unique system for measuring the amount of leaching of agrichemicals applied to turf. The general term used is a lysimeter, which is a device to collect drainage water from soils. A container lysimeter is one that works by building a large metal container into which soil is placed and a drain at the bottom is used to collect all the leachate coming through the soil. Lately, the influence of macropores on pesticide leaching has become a major concern. Macropores are channels through the soil that can conduct water (and pesticides or fertilizers as well) rapidly through the soil. Macropores can be formed by earthworms, decaying root channels, etc.

In order to preserve the natural soil structure, including macropores, our lysimeters were specially constructed and are termed intact soil monoliths to denote the fact that these lysimeters are an intact block of soil 1 m2 in diameter (approximately 45" in diameter) and 1.2 m deep. Two of these intact soil monolith lysimeters were excavated, captured, and installed at the Hancock Turfgrass Research Center. The process began in early September of 1989 and was finished in April of 1990.

The plots were sodded to a blend of Kentucky bluegrass turf in mid-August. Initial testing was conducted by applying bromide, Br-, to the lysimeters and then measuring the time it took for the bromide to leach through the soil cores. Bromide is an inorganic anion that behaves similarly to nitrate. Results of these leaching studies are discussed elsewhere in these proceedings (see article by Miltner in this issue).

We have received a grant from the United States Golf Association Green Section Research Committee to investigate the leaching of a variety of pesticides commonly used in turf management. We will also study the fate of nitrogen in turfgrass soils using the lysimeters to quantify the amount of nitrate leaching that occurs from a single application of 1 lbN/M of urea applied in the late fall or early spring.

1990 VARIETY EVALUATIONS

Seven active variety trials are currently being evaluated at Hancock Center and other sites around the state. Three of particular interest are presented here (Tables 3-5). Those trials are the bentgrass variety trial, the Kentucky bluegrass variety trial, and the tall fescue variety trial. The bentgrass variety trial is new and was seeded in the fall of 1989. The trial consisted of 21 varieties established as a green. Mowing height was 1/4" and will be lowered to 1/8" over the course of the next growing season. Ratings were taken at the end of the 1990 growing season as the trial began to mature. These data have to be evaluated with caution since these are strictly quality data without any traffic being applied to these plots.

The data on Kentucky bluegrass shows Princeton 104 to be an outstanding variety. A current list of recommended varieties can be obtained through the Cooperative Extension Service. Remember when picking varieties, a general rule-of-thumb is that any variety in the top 25% of the trial will give excellent turf quality. Many people look at these trials and want the variety at the top of the list. Often there is very little difference in quality between the top rated varieties in a trial. In fact the performance of Princeton 104 in this trial is very unusual in that it stands so far above the other varieties in performance.

The tall fescue varieties continue to be attractive for use in medium maintenance turfs especially where irrigation may not be available. The number of newly released varieties in this species is impressive but makes it difficult for the turf manager to keep up with all the new varieties. The tall fescues offer several advantages to Kentucky bluegrass in medium maintenance situations. First they have excellent disease tolerance with the most serious disease being brown patch which does not occur frequently in Michigan due to our cooler climate. The wear tolerance of this species is excellent and it needs less frequent irrigation because of its deep and extensive root system. Drawbacks of this species are that it does not blend well with other grass species and it is only weakly rhizomatous.

TABLE 1. EFFECT OF A SINGLE PGR APPLICATION ON FAIRWAY TURF QUALITY

PGR TREATMENT	RATE(LBAI/A)	COLOR RATING 1-9,9=DARK GREEN DATES 5/11	5/18	5/24	5/29	6/12	6/21
CONTROL		6.0	7.2	6.3	7.5	8.0	7.8
CUTLESS 50W	0.25	5.5	6.7	5.3	5.8	7.7	8.0
CUTLESS 50W	0.38	6.7	5.7	4.7	6.2	7.7	7.5
CUTLESS 50W	0.5	4.3	5.0	3.5	5.2	7.5	8.7
PP-333 50WP	0.0875	4.3	6.0	6.2	6.0	8.2	8.8
PP-333 50WP	0.175	6.3	5.8	5.0	5.3	7.8	8.7
PP-333 50WP	0.35	5.7	5.7	2.3	3.5	6.8	8.7
PP-333 50WP	0.53	4.7	4.0	1.7	2.0	4.7	6.8
SCOTT'S TGR	0.35	7.7	7.5	6.2	4.3	7.8	8.8
SCOTT'S TGR	0.53	8.0	7.7	5.7	3.7	7.0	8.3
CONTROL		6.7	6.8	7.0	7.3	8.2	7.8
LSD (P=0.05)		1.5	1.4	2.0	2.0	1.2	0.6

Table 2. Effect of post-application watering on crabgrass control by preemergence herbicides.

Herbicide	Form	Rate	Percent Crabgrass						Percent Crabgrass			Turf Density (1 = Low 10=Dense)	
			7/9/90 watering in		8/9/90 watering in		9/4/90 watering in		7/9/90*	8/9/90*	9/4/90*	8/9/90	
			no	yes	no	yes	no	yes					
MON-15104	1EC	0.25	0	0	2.3	2.7	2.3	5.3	0	2.5	3.8	5.2	ABCD
MON-15104	1EC	0.38	0.3	0	2.7	1.3	3.7	1.7	0.2	2.0	2.7	6.0	ABCD
MON-15104	1EC	0.50	0	0	1.0	0.3	1.7	0.7	0	0.7	1.2	5.0	ABCDE
PRODIAMINE	65WDG	0.5	0	0	1.0	0.7	0.7	0	0	0.8	0.3	4.8	BCDE
PRODIAMINE	65WDG	0.75	0	0	0.3	0	0.3	0	0	0.2	0.2	3.3	E
PREM	60WDG	1.5	0.7	0.3	6.0	4.0	7.0	8	0.5	5.0	7.5	6.0	ABCD
PREM	60WDG	3.0	0.3	0	3.0	1.7	6.7	2.0	0.2	2.3	4.3	5.0	ABCDE
TEAM	2G	2.0	0.3	0.7	4.0	3.3	7.0	6.0	0.5	3.7	6.5	5.3	ABCD
TEAM	2G	3.0	0	0.3	2.3	2.0	3.0	3.3	0.2	2.2	3.2	3.3	E
BALAN	2.5G	2.0	0.3	1.7	6.0	9.3	16.3	17.7	1.0	7.7	17.0	4.3	DE
BALAN	2.5G	3.0	0.3	0	3.3	4.7	4.3	12.0	0.2	4.0	8.2	4.7	CDE
DCPA	75WP	7.5	1.3	1.0	9.3	7.0	14.3	6.3**	1.2	8.2	10.3**	4.7	CDE
DCPA	75WP	10.5	0.3	1.0	6.3	8.0	12.3	26.0**	0.7	7.2	19.2**	5.3	ABCD
LESCOSAN	4EC	12	0	1.0	1.7	3.0	2.3	10.7	0.5	2.3	6.5	6.5	AB
LESCOSAN	4EC	10	0.3	0	2.3	2.3	2.7	2.0	0.2	2.3	2.3	5.5	ABCD
LESCOSAN	4EC	7.0	1.0	0.7	5.7	3.3	6.3	5.7	0.8	4.5	6.0	5.8	ABCD
RONSTAR	2G	2.0	1.7	0.7	9.7	4.7	13.3	4.7	1.2	7.2	9.0	6.7	A
RONSTAR	4G	4.0	0.7	0.7	3.7	5.0	5.0	10.3	0.7	4.3	7.7	5.3	ABCD
CONTROL			1.3	1.3	10.7	8.7	14	17.3	1.3	9.7	15.7	6.7	A
CONTROL			2.7	2.7	18.3	20	31.7	32.7	2.7	19.2	32.2	5.7	ABCD
CONTROL			2.7	2.7	25.0	14.3	38.3	30.7	2.7	19.7	34.5	6.2	ABC
	LSD (P=0.05)		NS		NS		NS		0.8	4.0	9.7	1.8	

*These values represent the average of both the post-watering in and no post-watering in treatments. Plots were covered in the event rain and precipitation were withheld for 10 days. There was no difference in crabgrass control between watered in and not watered in plots.

**The DCPA treatments precipitated and less than the stated rate was applied.

Table 3. 1990 Evaluations of the Bentgrass Variety Trial.

Variety	8-13-90	9-26-90	Grand Mean	Yellow Tuft
88.CBE	7.3	8.5	7.9	1.8
PROVIDENCE	7.5	8.2	7.8	0.3
88.CBL	7.5	7.8	7.7	0.7
NORMARC 101	7.2	8.0	7.6	0.3
SR 1020	6.7	8.0	7.3	1.3
COBRA	7.2	7.3	7.3	1.0
PENNCROSS	7.3	7.0	7.2	0.7
PENNLINKS	7.3	7.0	7.2	0.7
PUTTER	5.8	7.7	6.8	2.3
MSCB-6	6.0	7.0	6.5	0.2
UM 84-01	5.8	7.0	6.4	2.5
TAMU 88-1	6.5	6.2	6.3	1.0
MSCB-8	5.7	6.8	6.3	1.5
CARMEN	6.0	6.3	6.2	2.8
FORBES 89-12	5.3	6.8	6.1	2.0
WVPB 89-D-15	5.3	6.7	6.0	1.7
EMERALD	6.2	5.0	5.6	1.0
NATIONAL	5.2	5.8	5.5	2.3
EGMONT	2.3	1.0	1.7	0.0
BARDOT	2.0	1.0	1.5	0.0
ALLURE	1.3	1.0	1.2	0.0
TRACENTA	1.3	1.0	1.2	0.0
BR 1518	1.0	1.0	1.0	0.0

Table 4. 1990 Evaluations of the National Kentucky bluegrass trial established in 1986.

Variety	Quality Ratings					Grand Means
	6-4-90	7-11-90	8-8-90	9-7-90	10-7-90	
P-104	8.2	6.5	8.7	7.7	7.5	7.6
MIDNIGHT	7.0	6.0	7.3	7.0	7.2	6.7
ECLIPSE	6.8	7.7	6.8	5.8	6.0	6.6
CHALLENGER	6.2	6.7	6.8	5.8	6.3	6.3
LOFTS 1757	6.0	6.3	6.7	6.2	6.3	6.3
SOMERSET	5.2	5.7	6.7	6.8	6.2	6.3
ASSET	7.0	6.3	6.3	5.8	5.7	6.3
K3-178	5.3	5.3	6.5	6.2	6.2	6.2
ASPEN	6.0	6.8	6.3	7.0	6.2	6.1
MYSTIC	5.5	6.3	7.7	6.7	5.3	6.1
ADELPHI	6.2	5.8	6.5	6.0	5.8	6.1
BA 72-441	6.0	6.3	6.2	5.2	5.5	5.8
BA 70-242	5.8	6.0	6.3	5.7	5.3	5.8
MERION	4.8	6.2	6.7	6.5	5.0	5.8
ABLE 1	5.8	6.2	7.0	5.5	5.2	5.7
WABASH	4.8	6.3	6.2	5.8	5.0	5.7
NE 80-88	5.3	6.2	6.3	6.5	4.5	5.7
PARADE	5.5	5.3	5.5	5.8	5.7	5.7
HUNTSVILLE	5.2	6.0	6.5	5.7	5.0	5.6
AQUILA	5.7	5.7	6.8	4.5	5.3	5.6
MONOPOLY	5.0	5.8	5.8	6.3	4.8	5.6
VICTA	6.0	5.8	6.3	5.2	5.2	5.6
DAWN	5.8	5.2	5.7	5.2	6.5	5.6
PST-CB1	5.2	5.5	6.2	5.2	5.7	5.6
BAR VB 577	5.2	5.7	6.0	6.0	4.8	5.6
BA 73-626	6.0	6.0	6.2	5.7	5.3	5.5
TENDOS	5.7	5.8	6.2	4.8	5.2	5.5
MERIT	5.7	5.7	6.7	5.0	5.0	5.4
GNOME	5.5	5.8	6.2	5.0	4.8	5.4
WW AG 468	6.7	5.8	6.2	5.0	4.3	5.4
JOY	4.8	5.3	5.3	5.2	5.3	5.4
MAJESTIC	5.7	5.0	5.7	5.2	4.5	5.4
F-1872	5.3	5.3	6.0	4.7	5.2	5.3
BRISTOL	5.7	5.2	4.8	5.0	5.7	5.3
CLASSIC	5.3	5.5	6.3	5.3	5.2	5.3
RAM-1	5.8	5.7	5.7	4.3	4.7	5.3
BA 70-139	5.7	5.3	6.0	5.2	4.5	5.3
K1-152	5.2	4.8	6.2	4.7	5.5	5.3
GLADE	6.2	6.0	5.7	4.8	4.3	5.3
SYDSPORT	5.3	5.0	6.2	5.0	5.7	5.3
CHERI	5.2	5.5	5.5	4.5	5.5	5.3
WELCOME	6.5	5.3	5.5	4.7	4.8	5.2
TRENTON	4.7	5.3	5.3	5.2	6.0	5.2
TOUCHDOWN	5.5	4.8	6.0	4.7	5.2	5.2

Table 4. 1990 Evaluations of the National Kentucky bluegrass trial established in 1986 cont'd.

Variety	Quality Ratings					Grand Means
	6-4-90	7-11-90	8-8-90	9-7-90	10-7-90	
AMERICA	5.3	6.3	5.7	5.5	5.0	5.2
HARMONY	5.8	5.3	6.2	4.5	4.7	5.2
DESTINY	5.7	5.5	6.0	4.0	4.7	5.2
239	5.3	5.2	5.5	4.2	5.5	5.2
BLACKSBURG	5.8	5.2	5.8	4.5	5.3	5.1
LIBERTY	5.7	5.3	5.7	4.0	5.3	5.1
SOUTH DAKOTA CERT.	4.8	5.3	5.3	4.7	5.0	5.1
KENBLUE	4.3	4.8	5.2	5.5	4.8	5.0
ANNIKA	4.3	5.8	6.0	5.5	5.2	5.0
NASSAU	5.2	5.5	5.8	4.5	4.8	4.9
HAGA	5.0	5.0	6.0	4.0	5.2	4.9
BARON	5.2	5.0	5.7	5.2	4.5	4.9
IKONE	5.8	4.3	5.0	4.5	4.8	4.9
HV 97	5.3	4.8	5.2	4.5	4.7	4.9
BA 72-500	5.5	5.5	5.8	4.0	4.5	4.8
CONNIE	4.8	4.8	5.8	5.0	4.7	4.8
BA 73-540	6.2	4.2	5.8	3.8	4.0	4.8
RUGBY	5.5	4.8	5.3	4.0	4.7	4.8
GEORGETOWN	4.3	4.8	5.3	4.0	5.3	4.7
BA 69-82	5.7	4.0	5.7	4.2	4.2	4.7
WW AG 491	5.3	4.7	5.7	4.3	4.0	4.7
COMPACT	4.8	4.8	5.3	4.3	4.5	4.6
JULIA	5.3	4.5	5.2	4.5	4.0	4.6
AMAZON	4.7	4.7	5.0	4.8	4.0	4.5
CYNTHIA	4.2	4.2	5.3	4.7	4.5	4.5
WW AG 496	5.3	4.3	5.0	3.7	4.2	4.4
BARZAN	4.0	5.0	5.0	4.5	4.7	4.4
WW AG 495	4.8	4.7	5.7	3.5	4.0	4.4
BAR VB 534	4.3	5.0	4.7	4.7	4.0	4.3
A-34	5.3	4.8	5.0	3.2	3.5	4.3
BA 72-492	4.7	3.8	4.7	3.0	3.7	4.0

Table 5. 1990 Evaluation of the Tall Fescue Variety Trial.

Variety	5-1-90	6-4-90	7-11-90	8-9-90	9-7-90	10-7-90	Grand Means
Aztec	6.0	6.0	7.5	8.0	7.2	6.7	6.9
Eldorado	7.0	6.5	6.8	7.0	7.2	6.2	6.8
Avanti	6.7	6.2	7.2	7.7	7.0	6.0	6.8
Normak 99	6.2	6.2	7.7	7.0	7.7	5.8	6.8
Crossfire	6.0	6.5	6.8	7.7	7.0	6.3	6.7
Cohise	5.8	6.3	7.0	7.3	7.5	6.3	6.7
Hubbard 87	6.5	6.2	5.8	6.8	6.5	6.7	6.4
Guardian	5.8	6.2	6.3	6.7	7.5	6.0	6.4
PE-7	5.5	6.7	6.3	7.0	6.5	6.2	6.4
Legend	6.0	6.0	6.8	7.0	6.2	6.2	6.4
Shortstop	5.8	6.2	5.8	7.3	7.0	5.8	6.3
PST-5MW	6.0	6.0	6.0	7.3	6.8	5.8	6.3
Cimmaron	6.3	6.3	6.0	6.3	6.8	6.0	6.3
PST-5AG	6.2	6.5	5.7	7.3	6.7	5.5	6.3
Phoenix	6.0	6.2	6.8	6.3	7.0	5.3	6.3
Monarch	6.0	6.3	6.2	7.0	6.7	5.5	6.3
Tribute	5.5	5.7	6.7	6.5	7.2	6.2	6.3
KWS-DUR	5.5	6.2	7.0	6.7	6.3	6.0	6.3
Silverado	6.0	5.7	6.7	6.7	6.8	5.8	6.3
Mesa	6.5	6.0	6.3	6.2	6.8	5.5	6.2
Maverick II	5.7	5.7	6.0	7.0	7.2	5.8	6.2
Amigo	5.8	6.2	6.7	6.8	6.3	5.3	6.2
Bel 86-2	6.0	6.7	6.8	6.2	6.0	5.3	6.2
Winchester	6.0	6.2	6.3	5.8	6.8	5.7	6.1
Wrangler	6.2	5.8	6.0	6.8	6.0	6.0	6.1
Trailblazer	6.2	6.5	6.5	5.0	6.2	6.2	6.1
Thoroughbred	5.0	6.0	5.8	6.3	7.0	6.2	6.1
Taurus	5.3	6.0	6.5	6.0	6.3	6.2	6.1
Rebel II	5.3	5.5	6.2	6.0	6.8	6.3	6.0
Bonanza	6.3	6.3	5.8	6.3	6.0	5.3	6.0
PST-5EN	5.7	6.5	6.7	5.0	6.7	5.7	6.0
Chieftan	5.7	6.2	6.0	6.0	6.7	5.7	6.0
Olympic II	5.5	6.0	6.3	6.3	6.5	5.3	6.0
PST-5DM	5.5	6.0	5.7	6.3	6.3	5.7	5.9
Jaguar II	5.2	5.8	6.0	6.3	6.5	5.7	5.9

Table 5. 1990 Evaluation of the Tall Fescue Variety Trial cont'd.

Variety	5-1-90	6-4-90	7-11-90	8-9-90	9-7-90	10-7-90	Grand Means
Bel 86-1	6.5	6.3	6.3	5.3	5.7	5.3	5.9
PST-5AP	6.2	5.5	6.0	6.0	6.3	5.5	5.9
JB-2	5.5	5.5	6.3	6.0	6.7	5.2	5.9
Olympic	5.8	5.8	6.2	4.7	7.3	5.3	5.9
Sundance	5.7	5.5	6.0	5.0	6.5	6.0	5.8
Apache	5.5	5.7	5.3	6.2	6.5	5.3	5.8
Trident	5.2	5.8	5.8	5.3	6.3	5.8	5.7
PST-DBC	5.3	5.5	5.5	6.3	6.8	4.8	5.7
Rebel	4.7	5.8	6.0	5.2	6.8	5.5	5.7
Jaguar	5.0	6.0	5.8	5.3	6.0	5.3	5.6
Murietta	5.0	6.0	5.7	5.7	5.8	5.3	5.6
Richmond	5.5	4.8	5.3	5.0	7.0	5.7	5.6
Titan	4.8	5.3	5.7	6.7	5.8	5.0	5.6
Arid	4.8	5.0	5.7	6.0	6.2	5.5	5.5
Emperor	5.8	5.2	6.2	4.3	6.0	5.5	5.5
Carefree	5.5	4.8	5.8	5.2	6.0	5.5	5.5
Falcon	5.5	5.3	5.3	5.0	6.5	5.2	5.5
Willamette	5.0	5.3	5.2	5.3	6.3	5.3	5.4
Finelawn 5GL	4.7	5.5	5.5	5.3	6.2	5.3	5.4
Aquara	5.2	5.0	5.2	5.3	5.8	5.3	5.3
Finelawn I	5.5	5.5	5.3	4.3	6.0	5.2	5.3
Adventure	4.7	5.0	5.5	6.3	5.8	4.3	5.3
Tip	5.2	4.7	5.5	3.7	6.3	5.3	5.1
Pacer	4.7	5.2	5.3	4.0	5.8	5.5	5.1
Fatima	5.3	4.5	5.3	4.3	6.3	4.5	5.1
KY-31	4.3	4.7	5.0	3.0	5.3	4.5	4.5

Figure 1.

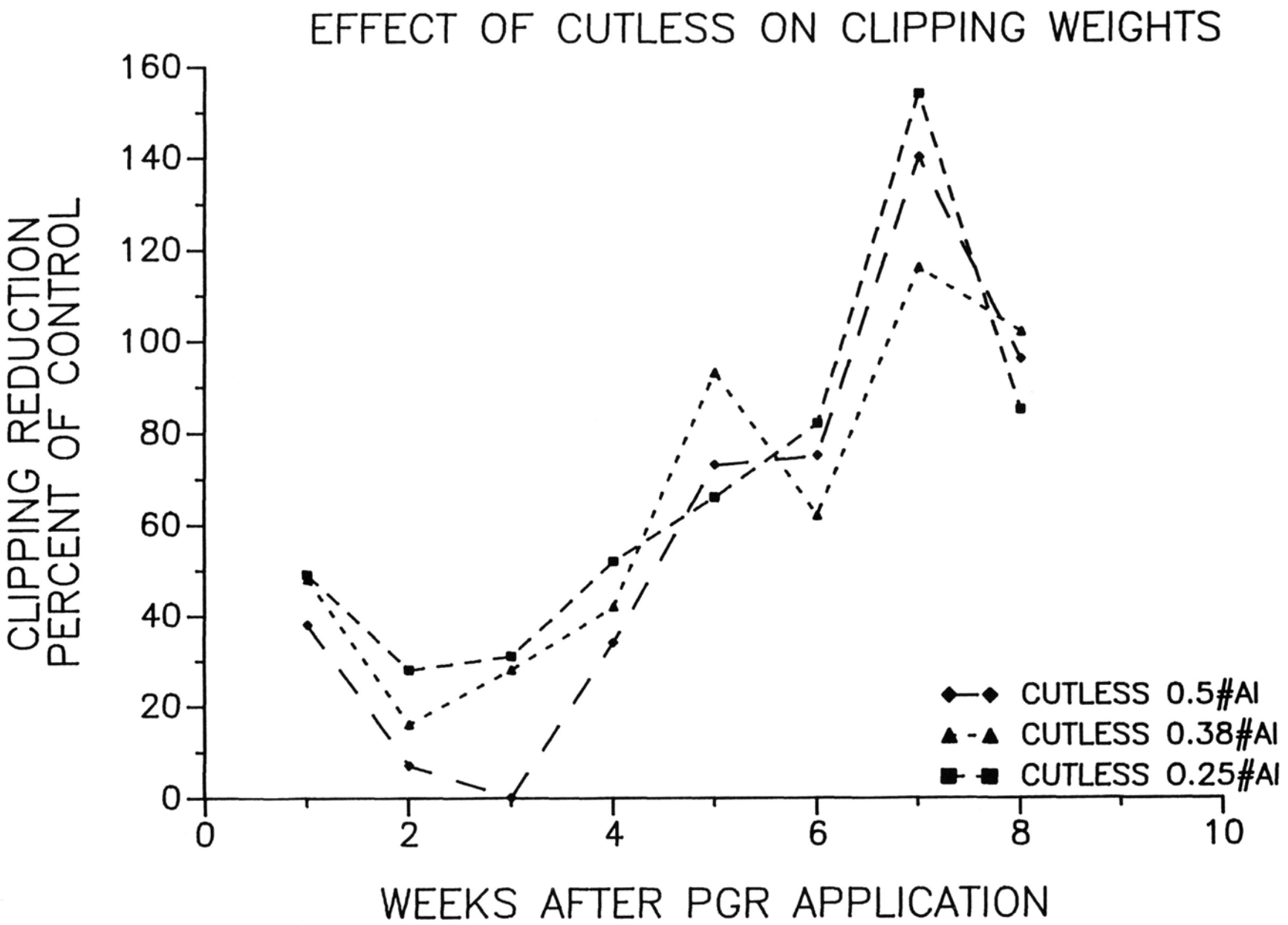

EFFECT OF CUTLESS ON CLIPPING WEIGHTS
CLIPPING REDUCTION
PERCENT OF CONTROL
160
140
120
100
80
60
40
20
0
0
2
4
6
8
10
WEEKS AFTER PGR APPLICATION
CUTLESS 0.5#AI
CUTLESS 0.38#AI
CUTLESS 0.25#AI

Figure 2.

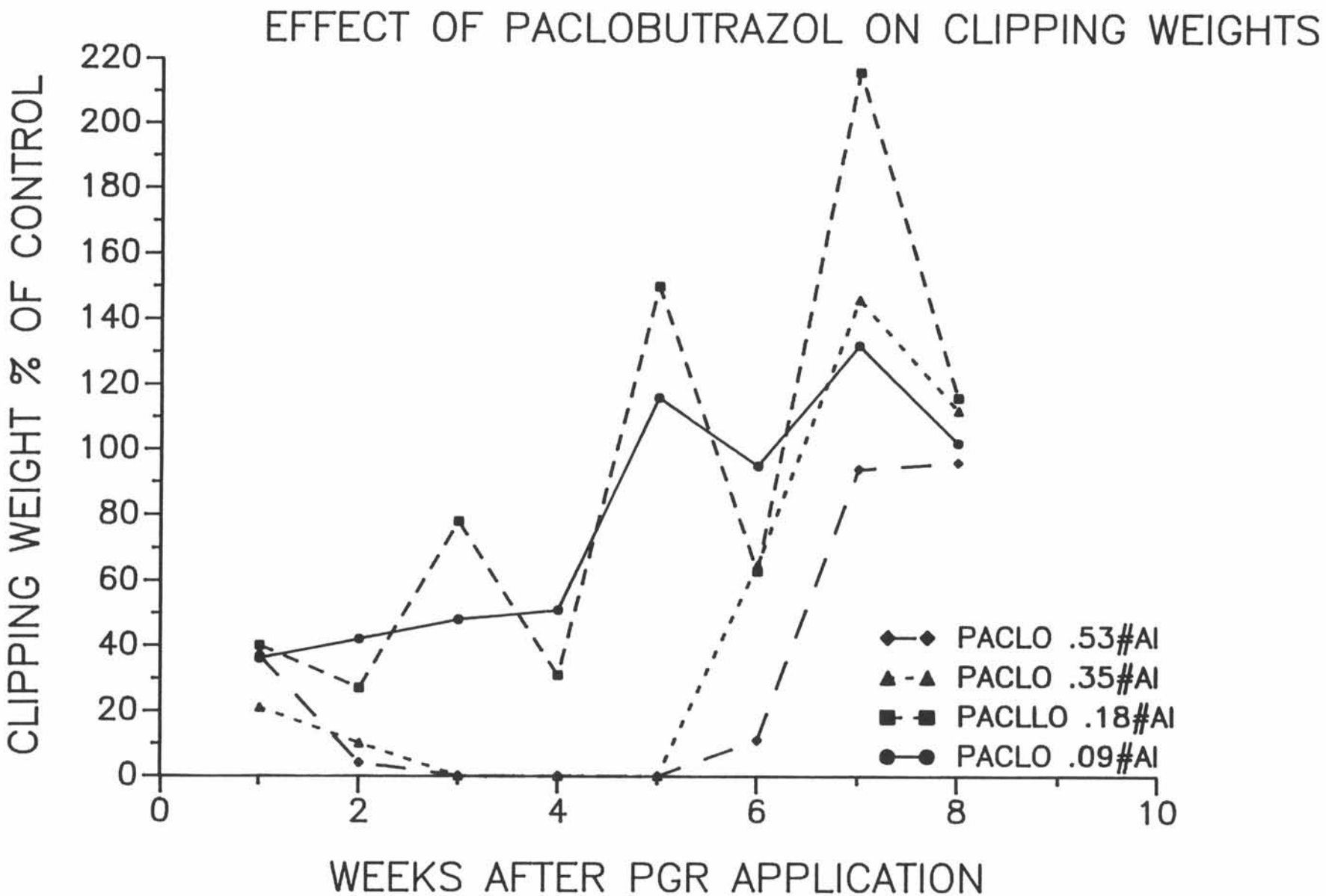

EFFECT OF PACLOBUTRAZOL ON CLIPPING WEIGHTS
CLIPPING WEIGHT % OF CONTROL
220
200
180
160
140
120
100
80
60
40
20
0
0
2
4
6
8
10
WEEKS AFTER PGR APPLICATION
PACLO .53#AI
PACLO .35#AI
PACLLO .18#AI
PACLO .09#AI

Figure 3.

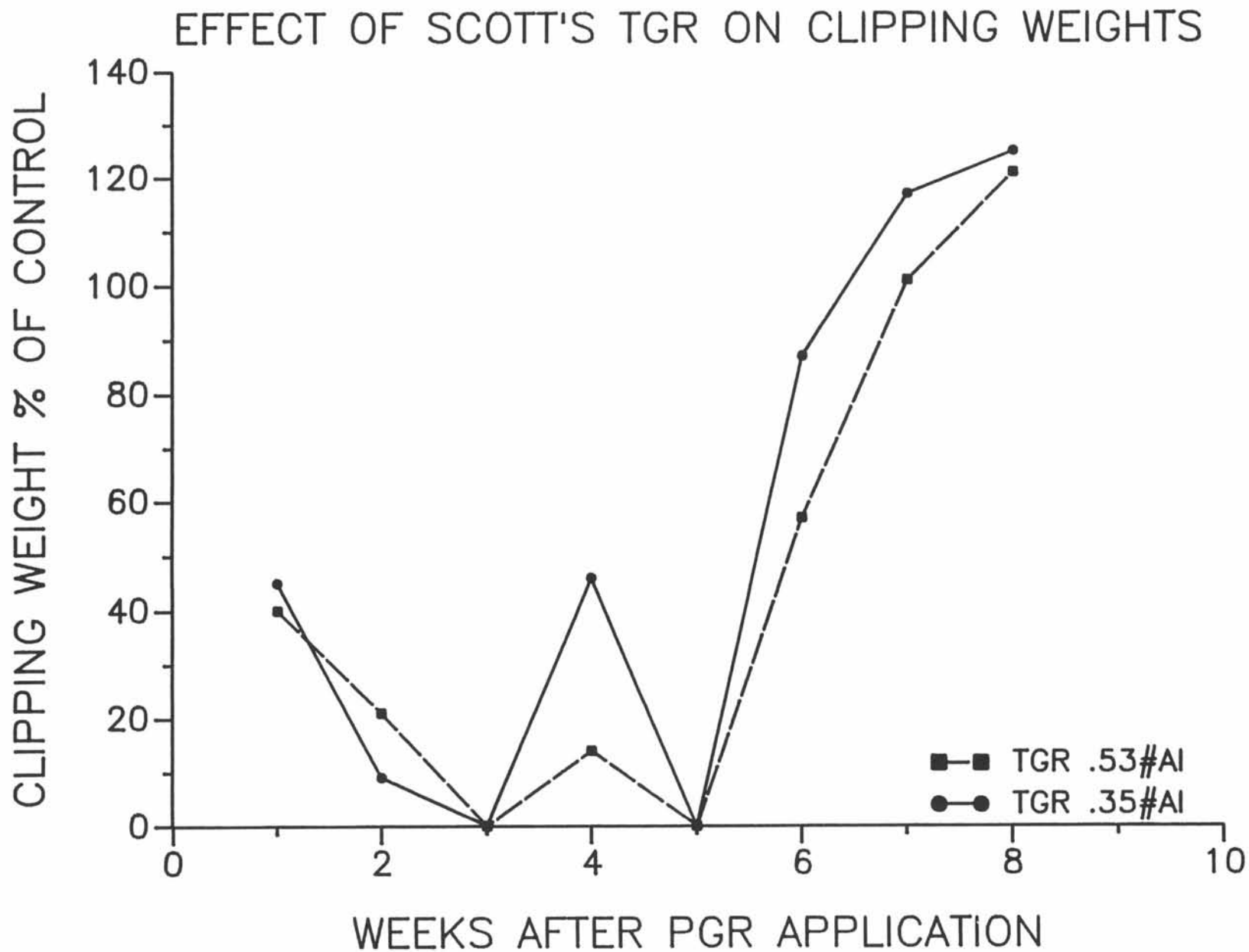
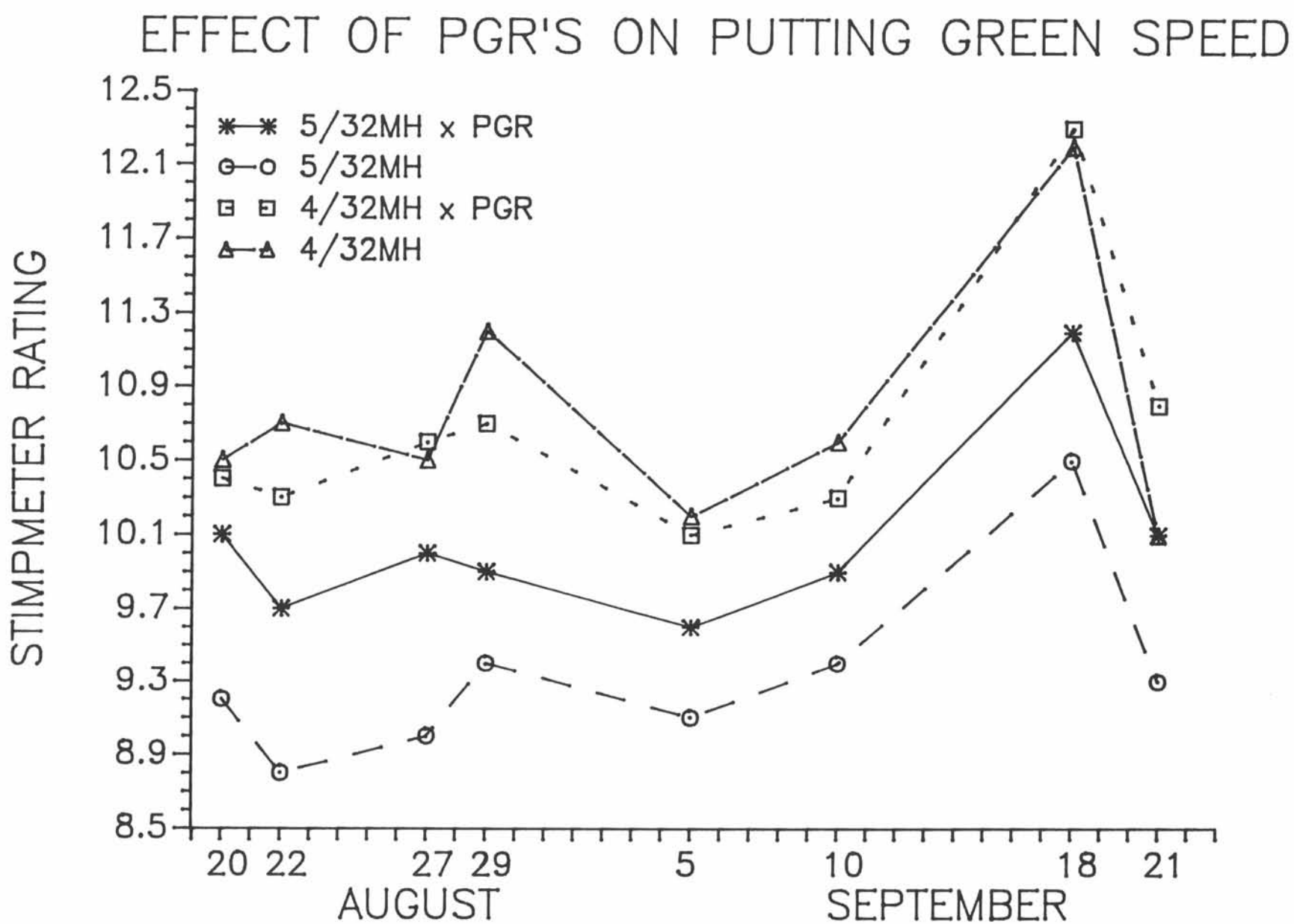

EFFECT OF SCOTT'S TGR ON CLIPPING WEIGHTS
CLIPPING WEIGHT % OF CONTROL
140
120
100
80
60
40
20
0
0
2
4
6
8
10
WEEKS AFTER PGR APPLICATION
TGR .53#AI
TGR .35#AI

Figure 4.


EFFECT OF PGR'S ON PUTTING GREEN SPEED
STIMPMETER RATING
12.5
12.1
11.7
11.3
10.9
10.5
10.1
9.7
9.3
8.9
8.5
5/32MH x PGR
5/32MH
4/32MH x PGR
4/32MH
20 22 27 29 5 10 18 21
AUGUST
SEPTEMBER