1983 HERBICIDE EVALUATIONS

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Herbicide and plant growth regulator field trials were begun in 1983 to provide the people in the state of Michigan an opportunity to compare the performance of currently available and experimental herbicides and formulations. These herbicide evaluations will be continued and expanded in the coming years. The report will describe field studies and laboratory research on pesticide fate.

Premergent Crabgrass Control

This year's study examined several new formulations of a preemergent herbicide being tested by The Andersons. The results of the study are seen in Table 1. The study consisted of 28 treatments which were applied on May 4. The best crabgrass control was achieved with split applications of DCPA W-75 at 10.5 lbs/A initially plus 7.5 lbs/A applied 50 days after the initial treatment. 1983 saw a heavy amount of crabgrass pressure, so a secondary application was needed to achieve optimum control. This was the only treatment in which a split application was used. Single applications of bensulide at 10.0 lbs/A and DCPA 6F at 10.5 lbs/A also provided excellent control of crabgrass. Benefin, another commonly used preemergent herbicide, didn't perform very well this year. Balan as well as all of The Andersons sprayable treatments were formulated as a pel-tech material. Consultations with scientists from The Andersons indicated the that filter screen mesh size may have been too small in our research plot sprayer to pass all of the suspended pel-tech material through the nozzles. This may explain the poor performance of benefin and The Anderson's formulations.

Table 1. 1983 Preemergent Crabgrass Herbicide Study

Treatment		Percentage Crabgrass in Each Plot (.1 = none 100 = complete crabgrass)			
Chemical	Rate	7-7-83	7-21-83	8-9-83	9-8-83
Bensulide	10.0 lbs. ai/A	.1 A	.1 A	2.4 A-C	4.4 A
DCP 6F	10.5 lbs. ai/A	.1 A	.1 A	.1 A	5.7 A
DCPA W-75	10.5 lbs. ai/A	.1 A	1.7 AB	4.0 A-C	11.7 AB
DCPA W-75	10.5 lbs. ai/A + 7.5	.1 A	1.7 AB	.7 AB	1.7 A
Gran. Fert. + 0.92% Ando-B (Dry)		.1 A	3.4 A-C	12.5 A-D	40.0 C
Gran. Fert. + 0.69% Ando-A (Wet)		.4 A	5.0 A-D	16.7 A-D	41.7 CD
Gran. Fert. + 0.69% Ando-A (Dry)		.7 A	10.0 A-F	21.7 C-F	63.3 D-F
Gran. Fert. + 1.38% Ando-A (Wet)		1.0 A	8.3 A-E	18.3 A-E	33.3 C
Sprayable Balan 2.0 lbs. ai/A		1.1 A	6.7 A-E	15.0 A-D	41.7 CD
Gran. Fert. + 0.92% Ando-A (Dry)		1.4 AB	8.3 A-E	20.0 B-E	46.7 CD
Gran. Fert. + 1.38% Ando-B (Dry)		1.4 AB	8.3 A-E	13.3 A-D	30.0 BC
Gran. Fert. + 0.92% Ando-A (Wet)		1.7 AB	5.0 A-D	11.7 A-D	41.7 CD
Gran. Fert. + 0.92% Ando-B (Wet)		1.7 AB	8.3 A-E	16.78 A-E	50.0 C-E
Gran. Fert. + 1.38% Ando-A (Dry)		1.7 AB	6.7 A-E	18.3 A-E	40.0 C
Gran. Fert. + Balan 2.0 lbs. ai/A		2.0 A-C	8.3 A-E	15.0 A-D	36.7 C
Gran. Fert. + Balan 1.6 lbs. ai/A		2.0 A-C	6.7 A-E	11.7 A-D	31.7 BC
Gran. Fert. + 1.38% Ando-B (wet)		3.0 A-C	13.3 B-G	21.7 C-F	40.0 C
Gran. Fert. + 0.46% Ando-A (Dry)		4.4 A-D	13.3 B-G	26.7 D-G	68.3 EF
Gran. Fert. + Bensul 10.0 lbs. ai/A		4.7 A-D	18.3 E-H	25.0 D-G	41.7 CD
Sprayable Ando-A 3.0 lbs. ai/A		5.0 A-D	16.7 D-H	40.0 F-I	75.0 F
Gran. Fert. + 0.46% Ando-A (Wet)		5.3 A-D	10.0 A-F	25.0 D-G	38.3 C
Check		6.7 A-E	15.0 C-G	41.7 G-I	73.3 F
Sprayable Ando-A 2.0 lbs. ai/A		6.7 A-E	16.87 D-H	35.0 E-H	78.3 F
Sprayable Ando-B 3.0 lbs. ai/A		8.7 B-E	21.7 F-H	48.3 HI	73.3 F
Sprayable Ando-A 1.0 lbs. ai/A		9.3 C-E	28.3 H	56.7 I	83.3 F
Sprayable Ando-B 2.0 lbs. ai/A		11.7 DE	23.3 GH	41.7 G-I	80.0 F
Sprayable Ando-A 1.5 lbs. ai/A		13.3 E	25.0 GH	51.7 HI	76.7 F

* Treatments having the same letter are not significantly different at the 5% level. Mean separation by Duncan's Multiple Range Test.

Broadleaf Weed Control Study

This study was established to examine a new herbicide that will soon be available for use in turf. The herbicide triclopyr was tested in combination with other commonly used turf herbicides (Table 2). Excellent control was seen with a three-way combination of triclopyr, 2,4-D, and MCPP at 1.0, 1.0 and 0.5 lbs/A, respectively. Trimec and Trimec plus triclopyr also gave excellent results. A mixture of triclopyr and 2,4-D at 0.38 and 0.75 lbs. respectively gave nearly as good control of the target weeds as the above mentioned treatments. Triclopyr was applied as an ester formation; the potential for volatilization and subsequent damage to desireable trees and ornamentals is not knwon. More research is needed concerning the volatilization potential for this particular formulation. When triclopyr is formulated as an ester and mixed with 2,4-D amine a chemical reaction occurs which renders both herbicides ineffective. Triclopyr has been formulated as an amine. However, the herbicidal activity of the amine formulation has not been as good as the ester formulation. The formulation problems with triclopyr need to be resolved before it reaches the marketplace.

Table 2. 1983 MSU Broadleaf Weed Control Trial.

Treatment Name	Lowest Rating Indicates Least Amount of Broadleaves		
	7-7-83	7-21-83	8-11-83
Triclopyr + 2,4-D + MCPP 1.0 + 1.0 + .5 lbs/A	1.5 A*	1.0 A	1.2 A
Trimec 0.6 gal/A	1.7 AB	1.0 A	1.3 AB
EH 533 (Trimec + Triclopyr) 4 pts/A	1.5 A	1.0 A	1.2 A
Triclopyr + 2,4-D 0.38 lbs/A + .75 lbs/A	2.0 AB	1.7 A	1.7 AB
Triclopyr + 2,4-D .25 lbs/A + 1.0 lbs/A	2.5 AB	2.0 A	2.2 AB
Triclopyr + 2,4-D + MCPP .5 + .5 + .125 lbs/A	2.7 AB	2.0 A	1.8 AB
KIH 843-06-83 1.43 lbs/A	1.7 AB	2.3 A	1.7 AB
KIH 844-06-83 1.43 lbs/A	3.3 A	2.8 AB	3.3 BC
Triclopyr + 2,4-0D .125 lbs/A + 1.0 lbs/A	2.3 AB	3.0 AB	2.3 AB
2,4-D + McPP 1 lbs/A 0.5 lbs/A	2.3 AB	3.0 AB	1.7 AB
Triclopyr + 2,4-D 0.25 lbs/A + 0.5 lbs/A	2.8 AB	3.2 AB	2.5 AB
Demise 1.43 lbs/A	2.3 AB	3.3 AB	1.7 AB
2,4-D 1 lbs/A	3.2 AB	3.3 AB	2.5 AB
Check	6.0 C	6.2 CD	4.7 CD
Check	6.5 C	6.5 CD	5.8 DE
Check	7.0 C	7.0 CD	5.8 DE

* Treatments having the same letter are not significantly different. Mean separation by Duncan's MRT (5%).

Reduction in Annual Bluegrass (Poa Annua) Populations using Plant Growth Regulators

A study was initiated in 1983 to determine if certain plant growth regulators have any herbicidal action towards annual bluegrass. Many herbicides and cultural practices have been used to attempt to eliminate annual bluegrass from other more desirable cool season turfgrasses. To date there is no acceptable means of eliminating annual bluegrass from other desirable turfgrasses. This study used three plant growth regulators, Embark, MON-4620, and EL-500, applied on May 21. Several of the EL-500 and MON 4620 treatments used a reduced rate of the growth regulator with three sequential applications at four week-intervals. Embark was applied at a reduced rate with one sequential application six weeks after the initial treatment.

The results seen in Table 3 are somewhat surprising. EL-500 does seem to reduce annual bluegrass populations. The fact that the mowed check plot and the unmowed check plot were the third and sixth best treatments, respectively, illustrates that these results must be interpreted with caution. However, since seven of the top eight chemical treatments were EL-500 treatments, research with EL-500 in this area should be continued.

Table 3. PGR Effect on Annual Bluegrass Populations. Treated: 5/27/83. Rated: 11/4/83.

Treatment	Rating*
EL500 1.5 lbs/A	58.7 A
EL500 0.5 lbs/A 3 apps.	56.3 A
Mowed Check	54.7 AB
EL500 0.75 lbs/A	52.8 A-C
EL500 0.375 lbs/A 3 apps.	46.0 A-C
Unmowed Check	41.7 A-D
EL500 0.125 lbs/A 3 apps.	39.3 A-E
Embark 0.25 lbs/A 2 apps.	36.7 A-F
EL500 2.5 lbs/A	35.3 A-F
EL500 0.25 lbs/A 3 apps.	21.0 BC-F
Embark 0.25 lbs/A	18.4 C-F
MON 4621 1.5 lbs/A	11.1 D-F
MON 4621 1.0 lbs/A 3 apps.	5.1 EF
MON 4621 2.5 lbs/A	4.7 EF
Embark 0.5 lbs/A	3.1 F

* Percent reduction of annual bluegrass populations

Postemergence Control of Crabgrass

A study was initiated to examine a new class of postemergence grass herbicides that have shown promise as selective crabgrass herbicides. The herbicdes that were tested in this study were Hoelon, Poast, Fusilade, DOWCO 4532, CGA 82725, and a commercial formulation of methanearsonate. The two numbered compounds are experimental materials under development by Dow Chemical and CIBA-GEIGY.

The results of this study are shown in Table 4. The materials which looked the best were DOWCO 453 at 0.2 lbs/A and Poast at 0.2 lbs/A. Another treatment which looked good was Hoelon at 3.0 lbs/A with a second application of 1.5 lbs/A at 10 days after the first application. The experimental herbicide CGA 82725 performed fairly well at a rate of 0.5 lbs/A but that rate seemed too low to give as good control as the above mentioned treatments.

Table 4. 1983 Post Emergence Crabgrass Control. Hancock Turfgrass Research Center. Rate: 9/8/83. Treated: 8/2/83.

Treatment		Rating
Chemical	Rate	0 = 9; 0.1 = no crabgrass
Dowco 453 + OC	0.2 lb ai/A	0.1 A*
Dowco 453 + OC	0.2 + 0.1 lbs ai/A	0.1 A
Poast + OC	0.2 lb/A	0.1 A
Poast + OC	0.2 + 0.1 lbs	0.1 A
Hoelon	3.0 + 1.5 lb ai/A	0.3 AB
CGA 82725 + OC	0.5 + 0.25 lb ai/A	0.5 AB
AMA 2 apps.	Recommended Rate	0.7 A-C
CGA 82725 + OC	0.156 lbs ai/A	0.8 A-D
CGA 82725 + OC	0.5 lbs ai/A	0.9 A-D
CGA 82725 + OC	0.25 lbs ai/A	1.0 A-D
Dowco 453 + OC	0.05 lbs ai/A	1.2 A-D
Dowco 453 + OC	0.1 lbs ai/A	1.2 A-D
Poast + OC	0.1 lbs ai/A	1.5 A-E
Poast + OC	0.15 lbs ai/A	1.5 A-E
Fusilade + OC	0.15 lbs ai/A	1.7 A-E
Fusilade + OC	0.2 + 0.? lbs ai/A	2.0 B-E
Hoelon	2.0 lbs ai/A	2.3 C-F
Heolon	3.0 lbs ai/A	2.5 D-F
Hoelon	1.0 lbs ai/A	3.2 E-G
Fusilade + OC	0.1 lbs ai/A	3.8 F-H
Am 1 app.	Recommended Rate	4.3 G-I
Check		5.2 HI
Check		5.5 I

* Treatments having the same letter are not significantly different. Mean separation by Duncan's MRT (5%).

Interestingly, there was little phytotoxicity with any of the herbicides, although DOWCO 453 and CGA 89725 did seem to show some potential for phytotoxicity. This study was conducted on a turfgrass consisting predominately of annual bluegrass and fine fescue. Another field study was initiated to look at the phytotoxicity potential of these herbicides on Kentucky bluegrass. This study was put out on August 28 at the Hancock Turfgrass Research Center.

The three herbicides which showed the most promise, Poast, CGA 82725, and DOWCO 453, were tested on Kentucky bluegrass along with HOE 35609, an experimental herbicide for quackgrass control. The three herbicides from the original postemergence study all showed unacceptable levels of injury. The data in Table 5 shows ratings of the treatments 47 days after application. At this time the Paost treatments had recovered from the herbicide injury but DBA 82725 and DOWCO 453 treatments still had not recovered. The injury from these herbicides develops slowly taking 3-5 weeks for the grass to go off color. The injury symptoms were exhibited for a period of about six weeks. The length of time the injury symptoms are expressed is totally unacceptable on Kentucky bluegrass. The fact that these herbicides seem to be much less phytotoxic to annual bluegrass and fine fescue merits further research.

Table 5. Phytoxicity to Kentucky Bluegrass with New Herbicides. Hancock Turfgrass Research Center. Treated: 8/28/83. Rated: 10/14/83.

Treatment		Rating
Chemical	Rate	Lowest Rating Indicates Least Phytoxicity
Poast + OC	.2 lb/A	1.0 A
Poast + OC	.15 lb/A	.13 A
Hoe 35609	.5 lb/A	1.5 A
Check		1.7 AB
Hoe 35609	1.0 lb/A	2.3 AB
CGA 82725 + OC	.25 lb/A	3.0 B
CGA 82725 + OC	.5 lb/A	4.8 C
Dowco 453 + OC	.2 lb/A	5.7 C
Dowco 453 + OC	.15 lb/A	7.7 D

* Treatments having the same letter are not significantly different. Mean separation by Duncan's MRT (5%) Standard error = .4; F = 30.59.

Environmental Fate of Agricultural Chemicals Using Model Ecosystems

To complement the field studies on pesticide efficacy, a model ecosystem has been developed to examine the total fate of an agricultural chemical applied to turf. These model ecosystems will go far beyond field studies in providing clues as to how pesticides are affected by soil and thatch and how to improve pesticide effectiveness.

The model ecosytem consists of a 31.5 x 30.5 x 5.0 cm (LxWxH) stainless steel base on top of which rests a 23.5 x 31.4 x 16 cm (LxWxH) glass chamber. The glass chamber was constructed from 0.625 cm plate glass. On one face of the glass chamber twenty 0.625 cm air intake holes have been drilled. On the opposite face six 0.625 cm air outake holes have been drilled. The air intake holes are concentrated to one opening by placing a 2 x 20 x 4 cm (LxWxH) glass cover over the holes with 1.27 cm hole opposite the six holes in the main chamber. A cross flow of air over the tops of the plants is achieved.

The stainless steel base was constructed from 0.625 cm plate for the base and 0.32 cm plate for the sides. Strips of stainless steel 1.27 x 0.32 (WxH) were soldered along the inside edge of the base to form a ledge upon which rests a 1.27 cm thick porous ceramic plate. The porous ceramic plate allows simulation of field drainage conditions removing the artificial nature of soil water relations in most container grown plants.

The unique quality of the model ecosystems is that the turf samples are in a totally enclosed environment allowing the monitoring of all forms of loss of an agricultural chemical from the soil surface. The volatile losses of nitrogenous fertilizers can be easily studied using model ecosystems. The fate of fungicides, pesticides, and plant growth regulators in the soils can be conveniently studied using model ecosystems. The model ecosystems are an excellent method to study a large variety of problems concerning agricultural chemicals and to profile information to improve their use and efficiency.

A prototype of the model ecosystem has been constructed and is currently undergoing testing. Assuming the prototype proves of sufficient quality, an additional seven model system will be constructed.