

This research will be expanded in 1992 to include more pesticide products, although several important points can be learned from the research conducted in 1991. Any grass clippings used as a mulch that have been treated with a herbicide or plant growth regulator could cause serious injury or death to ornamental plants. At least two, and perhaps three mowings should be returned to the turf before using herbicide or plant growth regulator treated clippings as a mulch. Clippings treated with a fungicide or insecticide should not cause injury to ornamental plants.

PREEMERGENCE HERBICIDE EVALUATIONS

The 1991 grass preemergence trial was conducted at the Hancock Turfgrass Research Center (Table 5). We examined the efficacy of Dimension granular herbicide when different percentages of active ingredient on the granule were used. As the percentage of active ingredient on the granule was decreased, better crabgrass control was obtained. Potentially lower herbicide rates may be possible by using these lower AI granules. The savings in herbicide must be balanced by the increased cost of shipping and handling the extra inert material. Another interesting observation from this trial was the activity of Gallery as a preemergence grass herbicide. Gallery is a new class of herbicide for use on turf that controls a wide spectrum of broadleaf weeds preemergence. However, as the rate of Gallery 75 DF was increased from 0.75 to 1.5 lbs AI/A, fairly good crabgrass control was achieved with only 6% crabgrass in the plots receiving the 1.5 lb rate. This level of control compared quite favorably with the 3.0 lb AI/A rate of pendimethalin (PreM) which had 7% crabgrass.

POSTEMERGENCE HERBICIDE EVALUATIONS

Considerable effort was focused on postemergence crabgrass control during 1991. Testing in 1991 focused on combinations of pre and postemergence herbicides and on Dimension plus adjuvants. Early season postemergence treatments were applied on May 31 to crabgrass in the 2-3 leaf stage (Table 6). Combinations of BAS 514 (proposed trade name Drive from BASF) with PreM gave complete crabgrass control at 4 weeks after treatment (WAT) and excellent control through 9 WAT. Combinations of prodiamine (proposed trade name Barricade from Sandoz) with Acclaim also provided excellent control through 9 WAT. Dimension, listed in Table 6 as MON-15104, performance was variable and dependent upon the adjuvant that was applied with it. The MON-15104 is a vegetable oil formulation that will not be the commercial product, rather the commercial product will be an emulsifiable concentrate. When MON-15104 was applied alone, a maximum of 81% control was observed at 4 WAT, but this control fell off to 44% at 9 WAT. Other adjuvants such as Dow Corning 6955-145, when added to MON-15104, resulted in excellent crabgrass control throughout the 9 week evaluation period (Table 6).

The mid-season postemergence crabgrass trial was initiated on July 3rd when crabgrass was at the 2-3 tiller growth stage. As the plants become more mature, the crabgrass is more difficult to control and this is apparent when comparing percent control in Tables 6 and 7. This trial was compromised by the fact that a brief but intense rain shower occurred 4 hours after applications were completed. Some of the difference in performance may be due to the fact that some treatments were washed off the leaf before complete herbicide absorption had occurred.

At this growth stage, only the single isomer of Acclaim (experimental designation HOE 46360-18H) provided 100% control at 4 WAT. The BAS 514 plus PreM treatments performed well, but not as consistently as the earlier treatments. The Dimension treatments were again quite variable, depending upon which adjuvants were added to the spray solution. The treatments designated MON-15151 represent the emulsifiable formulation of Dimension, which will be the commercial product. As some of these adjuvants are experimental and therefore not available to the end-user, the adjuvant X-77 seemed to perform well with both Dimension formulations and is commercially available. This would be a good choice for turf managers to use when using Dimension in a postemergence situation.

Why does Dimension perform so much better with an adjuvant? This question was examined in detail by Steve Keeley during his MS research, which was reported upon in the proceedings from the 1991 and 1990 conferences. We concluded that Dimension is not very mobile in plants, and that

the herbicide must be placed near the site of activity for herbicidal action to occur. The site of activity is the meristematic tissue, i.e., the crown. Adjuvants reduce the surface tension of water and permit a more complete coating of the crabgrass plant with the spray solution. This increases the likelihood of the herbicide being near the meristematic tissue so that when absorbed, it is essentially at the site of action. In order to investigate the importance of this mechanism on the activity of Dimension, a field study was designed to examine the effects of spray volume and adjuvant on the activity of Dimension. Dimension was applied as an EC formulation in spray volumes of 33, 61, and 163 GPA with or without an adjuvant. The adjuvant chosen was a Dow Corning product DC X2-5309. This product has recently been commercialized as SylGard 309. Results were quite interesting (Table 8) and showed that without an adjuvant, maximum control was seen from the 61 GPA spray volume with higher or lower spray volumes resulting in less control. However, when the adjuvant was added, control increased as spray volume increased although control from the 61 GPA spray volume was not appreciably different from the 163 GPA treatment. These data show the importance of using an adjuvant and getting thorough coverage of the plants by using higher spray gallonages. Flat fan nozzles were used to apply all treatments. Results from using a Chem Lawn nozzle would probably be quite different, since even though the GPA is high, the leaf coverage is low due to the very large droplet sizes generated by this spray system.

TABLE 6 - EARLY SEASON POSTEMERGENT CRABGRASS CONTROL STUDY

HERBICIDE <u>TREATMENT</u> ¹	RATE (lb ai/A)	<u>Percent Control</u>		
		<u>2 WAT</u>	<u>4 WAT</u>	<u>9 WAT</u>
CONTROL		0	0	0
BAS 514 + PREM + BAS 090	0.5 + 1.0 + 1 QT	100	100	95
BAS 514 + PREM + BAS 090	0.5 + 1.5 + 1 QT	100	100	99
BAS 514 + PREM + BAS 090	0.5 + 2.0 + 1 QT	100	100	98
BAS 514 + PREM + BAS 090	0.75 + 1.0 + 1 QT	100	100	94
BAS 514 + PREM + BAS 090	0.75 + 2.0 + 1 QT	100	100	100
PRODIAMINE + ACCLAIM	0.5 + 0.12	95	100	95
BAS 514 + PREM + BAS 090	0.75 + 1.5 + 1 QT	98	99	96
BAS 514 + BAS 090	0.5 + 1 QT/A	96	99	46
MON-15104 + DOW CORNING 6955-145	0.38 + 0.5% v/v	87	99	97
BAS 514 + BAS 090	0.75 + 1 QT/A	100	98	79
PRODIAMINE + ACCLAIM	0.38 + 0.12	96	98	96
MON-15104 + X-77	0.38 + 0.5% v/v	76	97	89
MON-15104 + PFIZER M	0.38 + 0.5% v/v	40	97	87
MON-15104 + ACTIVATOR 90	0.38 + 0.5% v/v	69	96	91
MON-15104 + DOW CORNING X2-5309	0.38 + 0.5% v/v	42	96	85
ACCLAIM	0.25	95	94	56
MON-15104 + PFIZER 14636-181-7	0.38 + 0.5% v/v	62	94	81
MON-15104 + AGSCO SUNIT	0.38 + 0.5% v/v	47	93	85
MON-15104 + HERBIMAX	0.38 + 0.5% v/v	8	93	79
PRODIAMINE + MSMA	0.5 + 2.0	74	92	87
MON-15104 + CSY-77715512	0.38 + 0.5% v/v	85	91	86
ACCLAIM	0.12	94	89	53
DIMENSION 1EC	0.38	38	87	67
MSMA + MSMA 2WAIT	2.0 + 2.0	82	86	17
MON-15104 + ACTIVATOR 90	0.25 + 0.5% v/v	56	86	51
MON-15104 + ACTIVATOR 90	0.12 + 0.5% v/v	31	82	64
MSMA	2.0	77	81	21
MON-15104	0.38	65	81	44
MON-15104 + DASH	0.38 + 0.5% v/v	32	81	50
<u>PREM</u>	<u>1.5</u>	<u>33</u>	<u>68</u>	<u>33</u>
LSD (P=0.05)		39	13	29

¹ Treatments applied May 31, 1991

TABLE 7 - MID-SEASON POSTEMERGENCE CRABGRASS CONTROL STUDY

<u>HERBICIDE TREATMENT¹</u>	<u>RATE (lb AI/A)</u>	<u>PERCENT CONTROL</u>			
		<u>2 WAT</u>	<u>4 WAT</u>	<u>6 WAT</u>	<u>AVERAGE</u>
ACCLAIM	0.25	100	100	100	100
HOE 46360-18H	0.090	99	98	95	97
HOE 46360-5H	0.090	99	98	90	96
BAS 514 + BAS 090	0.75 + 1 QT/A	100	95	91	95
BAS 514 + PREM + BAS 090	0.75 + 2.0 + 1 QT	98	95	89	94
HOE 46360-5H	0.045	93	93	94	93
BAS 514 + PREM + BAS 090	0.75 + 1.5 + 1 QT	98	92	86	92
HOE 46360-5H	0.060	98	93	84	92
BAS 514 + PREM + BAS 090	0.38 + 1.5 + 1 QT	98	90	82	90
BAS 514 + PREM + BAS 090	0.5 + 2.0 + 1 QT	96	84	90	90
MON-15151 + ACTIVATOR 90	0.38 + 0.5% v/v	76	90	99	88
BAS 514 + PREM + BAS 090	0.38 + 2.0 + 1 QT	93	86	84	88
MON-15151 + DOW CORNING X2-5309	0.38 + 0.5% v/v	73	88	97	86
ACCLAIM	0.18	99	96	62	86
MON-15151 + PFIZER 14636-181-7	0.38 + 0.5% v/v	72	89	96	86
MON-15151 + X-77	0.38 + 0.5% v/v	74	83	96	84
BAS 514 + PREM + BAS 090	0.5 + 1.0 + 1 QT	95	81	75	84
MON-15104 + DOW CORNING 6955-145	0.38 + 0.5% v/v	66	91	91	83
HOE 46360-18H	0.060	98	83	65	82
MON-15104 + PFIZER M	0.38 + 0.5% v/v	75	82	88	82
MON-15151 + PFIZER M	0.38 + 0.5% v/v	60	88	96	81
BAS 514 + PREM + BAS 090	0.5 + 1.5 + 1 QT	89	75	77	80
MON-15104 + PFIZER 14636-181-7	0.38 + 0.5% v/v	66	81	90	79
BAS 514 + PREM + BAS 090	0.75 + 1.0 + 1 QT	70	80	86	79
MON-15104 + DASH	0.38 + 0.5% v/v	58	86	91	78
MON-15151 + CSY-77715512	0.38 + 0.5% v/v	56	85	94	78
MON-15104 + X-77	0.38 + 0.5% v/v	56	89	89	78
MON-15104 + AGSCO SUNIT	0.38 + 0.5% v/v	58	80	88	75
MSMA 6EC	2 + 2 (AT 2WAT)	52	87	80	73
MON-15151 + ACTIVATOR 90	0.25 + 0.5% v/v	73	67	72	71
MON-15104 + ACTIVATOR 90	0.25 + 0.5% v/v	45	82	79	69
LSD (P=0.05)		40	35	38	31

TABLE 7(CONTINUED) - MID-SEASON POSTEMERGENCE CRABGRASS CONTROL STUDY

<u>HERBICIDE TREATMENT¹</u>	<u>RATE (lb AI/A)</u>	<u>PERCENT CONTROL</u>			<u>AVERAGE</u>
		<u>2 WAT</u>	<u>4 WAT</u>	<u>6 WAT</u>	
MON-15104 + ACTIVATOR 90	0.38 + 0.5% v/v	44	72	85	67
MON-15104 + DOW CORNING X2-5309	0.38 + 0.5% v/v	32	76	86	65
BAS 514 + BAS 090	0.5 + 1 QT/A	74	42	68	61
HOE 46360-18H	0.045	72	51	60	61
BAS 514 + PREM + BAS 090	0.38 + 1.0 + 1 QT	72	60	50	61
MON-15151 + DOW CORNING 6955-145	0.38 + 0.5% v/v	51	62	66	60
BAS 514 + BAS 090	0.38 + 1 QT/A	83	61	30	58
MON-15151 + ACTIVATOR 90	0.12 + 0.5% v/v	63	48	49	53
MON-15151 + AGSCO SUNIT	0.38 + 0.5% v/v	44	44	68	52
MON-15104 + CSY-77715512	0.38 + 0.5% v/v	43	39	73	52
MON-15151	0.38	32	56	61	50
MON-15104	0.38	15	43	78	45
MON-15151 + HERBIMAX	0.38 + 0.5% v/v	22	55	56	44
MON-15151 + DASH	0.38 + 0.5% v/v	19	41	48	36
PREM	1.5	24	29	35	29
MON-15104 + HERBIMAX	0.38 + 0.5% v/v	22	13	41	25
MON-15104 + ACTIVATOR 90	0.12 + 0.5% v/v	37	5	22	21
CONTROL		0	0	0	0
LSD (P=0.05)		40	35	38	31

¹ Treatments applied July 3

TABLE 8 - MID-SEASON POSTEMERGENT CRABGRASS CONTROL WITH DIMENSION

Effect of different spray volumes and Sylgard 309

<u>TREATMENTS</u> ¹	<u>GPA</u>	<u>RATE</u>				
		<u>(lb ai/A)</u>	<u>2 WAT</u>	<u>4 WAT</u>	<u>6 WAT</u>	<u>8 WAT</u>
CONTROL			0	0	0	0
DIMENSION ²	33	0.38	61	78	59	51
DIMENSION	61	0.38	64	87	75	77
DIMENSION	163	0.38	53	75	52	47
DIMENSION + SYLGARD 309	33	0.38+0.5%	71	81	77	67
DIMENSION + SYLGARD 309	61	0.38+0.5%	87	97	96	96
DIMENSION + SYLGARD 309	163	0.38+0.5%	81	99	99	99
LSD (P=0.05)			23	22	25	34

¹ Treatments were applied July 5, 1991² All Dimension treatments were applied as the 1EC