STOP #5

EFFECT OF PRE AND POSTEMERGENCE HERBICIDES ON CRABGRASS CONTROL AND KENTUCKY BLUEGRASS PHYTOTOXICITY

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Studies were conducted to evaluate the efficacy of preemergence and postemergence herbicides applied alone and in combinations to crabgrass at various growth stages, and the phytotoxicity of these herbicides to Fylking Kentucky bluegrass.

The crabgrass study was conducted on a weedy area with a previous history of crabgrass infestation. The area contained no turfgrasses or automatic irrigation system; consequently, a portable sprinkler was used to irrigate the crabgrass. The severe drought experienced in the Midwest coupled with sporadic irrigation during the spring and summer made it difficult to keep the crabgrass area sufficiently moist. These conditions must therefore be taken into account in the interpretation of the data.

The best short and long-term control of crabgrass at the 2 to 3 leaf growth stage was obtained with the 0.25 lb/A rate of Acclaim, a postemergence herbicide, in combination with pendimethalin, Trimec and urea (Table 4). Surprisingly, the 0.12 lb/A rate of Acclaim applied in the same combination provided better long-term crabgrass control than did the 0.18 lb/A rate. Very good crabgrass control was also observed with Acclaim combined with preemergence herbicides pendimethalin or Ronstar compared to Acclaim alone. Another herbicide which provided good control of crabgrass at the 2 to 3 leaf growth stage was MON 15100 (2.0 lb/A), which gave slow initial control but maximum control at 5 to 6 weeks after treatment. MON 15100 has both pre and postemergence activity.

At the 3 leaf to 2 tiller growth stage, excellent crabgrass control was provided by an Acclaim (0.18 lb/A) and BAS 514 (1.0 lb/A) combination. BAS 514 has both pre and postemergence activity. Acclaim applied alone and in combination with various other postemergence herbicides also provided good crabgrass control.

At the 2 to 4 tiller growth stage, herbicide efficacy differences were found with respect to the type of surfactant used. Greater crabgrass control was achieved when X-77 was applied with MON 15100 than compared to Frigate. Acclaim and BAS 514 did not provide excellent crabgrass control at the 2 to 4 tiller growth stage as was found at the 3 leaf to 2 tiller growth stage. The difference in efficacy of these herbicides was probably not related so much to the crabgrass growth stage as it was to the lack of sufficient precipitation required for herbicide activity.

BAS 514 represented another herbicide where efficacy was increased by the addition of a surfactant. At the 2 to 7 tiller growth stage, BAS 514 (1.0 lb/A) and the surfactant BAS 090 provided better crabgrass control than BAS 514 alone or in combination with Acclaim. Once again, lack of adequate precipitation may have been responsible for the anomalous activity of these herbicides as well as MON 15100.

The Kentucky bluegrass study received frequent irrigation from an automatic system. Therefore, moisture was not as much a limiting factor as it was in the crabgrass study. The most phytotoxic herbicides and herbicide

combinations were Acclaim (0.25 lb/A) + pendimethalin + Trimec + urea, MON 15100 (2.0 lb/A), Ronstar, and Ronstar + Acclaim (Table 5). Unfortunately, these herbicides were often found to provide the best control of crabgrass. Furthermore, Kentucky bluegrass phytotoxicity was increased by the addition of surfactants.

Overall, Acclaim applied alone and in combination with various pre and postemergence herbicides provided the best control of crabgrass and in most cases, minimal injury to Fylking Kentucky bluegrass. Two experimental herbicides, BAS 514 and MON 15100, showed promising results for pre and postemergence control of crabgrass. The activity of these herbicides appeared to be dependent upon soil moisture and type of surfactant used. Under drought or drying conditions, the efficacy of BAS 514 and MON 15100 most likely would be increased by the addition of BAS 090 and X-77.

TABLE 4. Effect of preemergence and postemergence herbicides on crabgrass control.

TREATMENTS	RATE (lb/A)	PERCENT CRABGRASS CONTROL								
		1 WAT	2 WAT	3 WAT	4 WAT	5 WAT	6 WAT	7 WAT	8 WAT	10 WAT
Application Date = 6-4-88										
Growth Stage = 2 to 3 leaf										
Pendimethalin 60 WDG + Urea	1.5 + 1.0 lb/1000 ft^2		11		28	14	25	22	11	17
Acclaim 1 EC + Pendimethalin + Urea	0.08 + 1.5 + 1.0		87		80	40	40	29	33	33
Acclaim + Pendimethalin + Urea	0.12 + 1.5 + 1.0		94		94	81	64	50	31	22
Acclaim + Pendimethalin + Trimec + Urea	0.12 + 1.5 + 4.0 Pints/A + 1.0		94		94	79	74	69	47	39
Acclaim + Pendimethalin + Trimec + Urea	0.18 + 1.5 + 4.0 + 1.0		89		89	61	61	39	22	6
Acclaim + Pendimethalin + Trimec + Urea	0.25 + 1.5 + 4.0 + 1.0		100		100	92	92	77	68	44
Acclaim + Pendimethalin + Breakthru + Dicamba + Garlon 4 + Urea	0.18 + 1.5 + 0.125 + 0.125 + 0.125 + 1.0		100		95	82	82	61	39	5
Acclaim + Urea	0.12 + 1.0		67		46	28	16	5	5	5
Above treatments applied using high volume nozzles = 165 GPM, 30 PSI										
Remaining treatments = 49 GPM, 30 PSI										
Pendimethalin	1.5		19		6	6	6	6	0	11
Pendimethalin	3.0		39		53	25	25	19	19	6
Benefin 2.5 G	2.0		6		6	0	0	0	0	0
Benefin	3.0		5		10	5	5	5	5	0
Ronstar 50WP	1.0		14		6	0	6	6	0	0
Ronstar	2.0		7		0	7	0	0	7	7
Bensulide	12.5		36		31	8	14	6	0	6
DCPA 75 WP	10.5		0		0	0	0	0	0	0
Prodiamine 65 WDG	0.5		0		0	0	0	0	0	0
Prodiamine	0.75		0		8	0	0	0	0	0
MON 15100	0.5		13		78	56	38	31	27	27
MON 15100	1.0		36		75	53	56	36	39	33
MON 15100	2.0		45		80	89	89	75	82	55
Ronstar + Acclaim	0.5 + 0.18		92		68	36	36	30	17	11
Ronstar + Acclaim	1.0 + 0.18		100		94	67	58	50	22	0
Ronstar + MSMA	0.5 + 2.0		23		29	5	5	5	5	38
Ronstar + MSMA	1.0 + 2.0		50		17	6	0	0	0	0
Ronstar/Ronstar + Acclaim *	0.75/0.75 + 0.187		24		12	12	48	88	84	61

*Ronstar + Acclaim applied on 7/3/88

TABLE 4 cont. Effect of preemergence and postemergence herbicides on crabgrass control.

TREATMENTS	RATE (lb/A)	PERCENT CRABGRASS CONTROL 1 WAT	2 WAT	3 WAT	4 WAT	5 WAT	6 WAT	7 WAT	8 WAT	10 WAT
Application Date = 6-21-88 Growth Stage = 3 leaf to 2 tillers										
Acclaim	0.18	11	64	83	66	54				30
Acclaim	0.25	0	45	93	69	46				19
Acclaim + Breakthru + Garlon + Dicamba	0.25 + 0.125 + 0.125 + 0.10	30	59	37	24	30				0
Acclaim + Breakthru + Garlon	0.25 + 0.125 + 0.125	24	71	71	53	31				18
Acclaim + Turflon II Amine	0.18 + 3.0 Pints/A	41	19	19	10	5				10
Acclaim + Turflon II Amine	0.25 + 3.0	26	31	37	26	6				6
Acclaim + Breakthru + Garlon + Dicamba + Urea	0.25 + 0.125 + 0.125 + 0.10 + 1.0	36	89	89	64	36				28
Acclaim + BAS 514 50 WP	0.18 + 1.0	100	100	100	100	67				33
Acclaim + Clopyralid + Triclopyr	0.25 + 2.5 Pints/A	18	74	82	66	44				35
Acclaim + Dicamba	0.25 + 0.25	6	75	67	42	36				0
Acclaim EW	0.18	27	72	81	61	53				13
Hoe 43360	0.09	12	48	58	47	47				29
Pendimethalin	1.5	10	5	5	0	0				0
Pendimethalin	2.0	0	0	0	0	0				0
Benefin	2.0	0	0	0	0	0				5
Benefin	3.0	0	0	0	0	0				27
Ronstar	1.0	56	33	11	11	0				11
Ronstar	2.0	0	0	0	0	0				0
Bensulide	12.5	0	0	5	5	0				0
DCPA	10.5	0	0	0	0	0				0
Prodiamine	0.5	10	5	5	5	5				5
Prodiamine	0.75	12	0	0	0	0				0
MON 15100 + Frigate	0.17	0	7	7	0	7				0
MON 15100 + Frigate	0.33	6	0	6	6	0				11
MON 15100 + Frigate	0.67	0	0	0	0	0				0

TABLE 4 cont. Effect of preemergence and postemergence herbicides on crabgrass control.

TREATMENTS	RATE (lb/A)	PERCENT CRABGRASS CONTROL 1 WAT	2 WAT	3 WAT	4 WAT	5 WAT	6 WAT	7 WAT	8 WAT	10 WAT
Application Date = 7-1-88 Growth Stage = 2 to 4 tillers										
MON 15100 + Frigate	0.5 + 0.5% v/v	0	0	8	8		0			
MON 15100 + Frigate	1.0 + 0.5%	0	0	28	28		8			
MON 15100 + Frigate	2.0 + 0.5%	0	22	83	83		67			
MON 15100 + X-77	0.5 + 0.5%	0	28	28	50	52				
MON 15100 + X-77	1.0 + 0.5%	15	49	49	62	62				
MON 15100 + X-77	2.0 + 0.5%	15	60	60	92	85				
BAS 514	0.5	0	0	0	0	0				
BAS 514	1.0	27	27	27	27	20				
Acclaim + BAS 514	0.18 + 0.5	22	0	0	14	0				
Acclaim + BAS 514	0.18 + 1.0	28	28	28	28	28				
Application Date = 7-22-88 Growth Stage = 2 to 7 tillers										
MON 15100 + X-77	0.5 + 0.5%	0	0							
MON 15100 + X-77	1.0 + 0.5%	0	0							
MON 15100 + X-77	2.0 + 0.5%	0	0							
BAS 514	0.5	17	0							
BAS 514	1.0	43	24							
Acclaim + BAS 514	0.18 + 0.5	65	28							
Acclaim + BAS 514	0.18 + 1.0	64	19							
BAS 514 + BAS 090	1.0 + 0.5%	92	64							
Pendimethalin	1.5	5		5						
Pendimethalin	3.0	0		33						
Benefin	2.0	0		0						
Benefin	3.0	5		14						
Ronstar	1.0	0		0						
Ronstar	2.0	0		0						
Bensulide	12.5	0		0						
DCPA	10.5	0		0						
Prodiamine	0.5	0		5						
Prodiamine	0.75	0		6						
MON 15100 + Frigate	0.5 + 0.5%	0		0						
MON 15100 + Frigate	1.0 + 0.5%	0		0						
MON 15100 + Frigate	2.0 + 0.5%	0		0						

TABLE 5. Effect of preemergence and postemergence herbicides on Fylking Kentucky bluegrass phytotoxicity.

TREATMENTS	RATE (lb/A)	Kentucky Bluegrass Phytotoxicity 1-9 (1 = Healthy Green Turf, 9 = Dead Turf) 3 DAT	8 DAT	12 DAT	19 DAT	28 DAT	42 DAT
Application Date = 6-26-88							
Pendimethalin 60 WDG + Urea	1.5 + 1.0 lb/1000 ft^2	1.0	2.0	3.0	2.7	1.7	2.3
Acclaim 1 EC + Pendimethalin + Urea	0.08 + 1.5 + 1.0	1.0	2.0	2.7	3.0	1.3	1.3
Acclaim + Pendimethalin + Urea	0.12 + 1.5 + 1.0	1.0	1.7	3.3	3.7	3.0	2.3
Acclaim + Pendimethalin + Trimec + Urea	0.12 + 1.5 + 4.0 Pints/A + 1.0	1.3	1.7	2.7	3.3	1.7	1.0
Acclaim + Pendimethalin + Trimec + Urea	0.18 + 1.5 + 4.0 + 1.0	1.3	1.7	2.7	3.0	2.3	2.0
Acclaim + Pendimethalin + Trimec + Urea	0.25 + 1.5 + 4.0 + 1.0	2.3	3.7	5.0	5.0	3.0	2.3
Acclaim + Pendimethalin + Breakthru + Dicamba + Garlon 4 + Urea	0.18 + 1.5 + 0.125 + 0.125 + 0.125 + 1.0	1.0	2.0	3.7	3.7	2.0	2.7
Acclaim + Urea	0.12 + 1.0	1.0	1.3	1.7	1.7	1.0	1.0
Above treatments applied using high volume nozzles = 165 GPM, 30 PSI Remaining treatments = 49 GPM, 30 PSI							
Ronstar 50 WP + Acclaim	0.5 + 0.18	1.0	1.0	3.0	3.3	1.0	1.0
Ronstar + Acclaim	1.0 + 0.18	1.0	1.3	2.7	4.3	2.0	1.3
Ronstar + MSMA	0.5 + 2.0	1.0	1.0	2.3	2.0	1.0	1.0
Ronstar + MSMA	1.0 + 2.0	1.0	1.0	3.0	3.0	1.3	1.0
Ronstar/Ronstar + Acclaim*	0.75/0.75 + 0.187	1.0	1.0	4.0	5.3	3.0	1.3
Acclaim	0.18	1.0	1.3	1.7	1.3	1.0	1.0
Acclaim	0.25	1.0	1.0	2.0	3.3	1.7	1.0
Acclaim + Breakthru + Garlon + Dicamba	0.25 + 0.125 + 0.125 + 0.1	1.0	1.0	2.0	1.7	1.0	1.0
Acclaim + Breakthru + Garlon	0.25 + 0.125 + 0.125	1.0	1.0	2.3	3.0	1.3	1.0
Acclaim + Turflon II Amine	0.18 + 3.0 Pints/A	1.0	1.0	2.0	1.7	1.0	1.0
Acclaim + Turflon II Amine	0.25 + 3.0	1.0	1.0	2.0	1.0	1.3	1.0
Acclaim + Breakthru + Garlon + Dicamba + Urea	0.25 + 0.125 + 0.125 + 0.1 + 0.5	1.0	2.0	2.3	2.3	1.3	1.7
Acclaim + BAS 514 50 WP	0.18 + 1.0	1.0	1.7	2.3	2.0	1.0	1.0
Acclaim + Clopyralid + Triclopyr	0.25 + 2.5	1.0	1.0	1.7	2.0	1.0	1.0
Acclaim + Dicamba	0.25 + 0.25	1.0	1.0	2.0	3.3	1.7	1.0

*Ronstar + Acclaim applied on 7/3/88

TABLE 5 cont. Effect of preemergence and postemergence herbicides on Fylking Kentucky bluegrass phytotoxicity.

TREATMENTS	RATE (lb/A)	Kentucky Bluegrass Phytotoxicity 1-9 (1 = Healthy Green Turf, 9 = Dead Turf) 3 DAT	8 DAT	12 DAT	19 DAT	28 DAT	42 DAT
Acclaim EW	0.18	1.0	1.7	2.7	3.0	1.7	1.0
Hoe 43360	0.09	1.0	1.0	2.3	2.7	1.3	1.3
Pendimethalin	1.5	1.0	1.3	2.0	1.7	1.3	1.0
Pendimethalin	3.0	1.0	1.0	1.7	1.3	1.7	1.3
Benefin 2.5 G	2.0	1.0	1.7	3.0	2.0	2.3	1.0
Benefin	3.0	1.0	1.0	2.3	2.0	3.0	2.3
Ronstar	1.0	1.0	1.0	2.3	2.3	1.7	1.0
Ronstar	2.0	1.0	1.7	3.7	4.3	2.0	1.3
Bensulide	12.5	1.0	1.0	2.0	2.7	1.7	1.0
DCPA 75 WP	10.5	1.0	1.0	1.7	1.0	1.7	2.0
Prodiamine 65 WDG	0.5	1.0	1.0	1.3	1.0	1.0	1.0
Prodiamine	0.75	1.0	1.0	2.0	1.7	1.7	1.3
MON 15100	0.5	1.0	1.3	2.0	2.7	3.3	1.3
MON 15100	1.0	1.0	1.0	1.3	1.3	1.7	2.0
MON 15100	2.0	1.0	1.0	2.0	2.3	3.3	4.7
MON 15100 + Frigate	0.5 + 0.5% v/v	1.0	1.3	2.3	2.7	2.3	2.0
MON 15100 + Frigate	1.0 + 0.5%	1.0	1.0	1.7	2.3	2.7	3.7
MON 15100 + Frigate	2.0 + 0.5%	1.0	1.3	2.7	4.0	5.7	6.3
CONTROL		1.0	1.0	1.7	1.3	1.0	1.0