

RAGWEED PARTHENIUM RESPONSE TO PREEMERGENCE AND POSTEMERGENCE HERBICIDES



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INTRODUCTION

Ragweed parthenium (*Parthenium hysterophorus* L.) is a summer annual distributed throughout the southern US, Mexico, the Caribbean, Brazil, Taiwan, China, Ethiopia, India, and Australia. It interferes with crop production, animal husbandry, human health, and biodiversity. In the US, ragweed parthenium occurs from south (Florida) to north (Michigan) and from east (Massachusetts) to west (Texas). It is more common in the southern US than in northern US and is common in certain counties in Florida and Texas. In Mississippi, ragweed parthenium is found in row crops, around barns, near farm equipment and storage areas, poorly maintained lawns, and along roadsides and railroads. In the southern US, the frequency of detection of ragweed parthenium is on the rise in recent years. Because it is not a ubiquitous weed in the US, it was not received routine herbicide evaluation trials as other weeds. Thus, information on the efficacy of herbicides on ragweed parthenium is sparse or limited to a few older herbicides. Efficacy of newer herbicides on ragweed parthenium is not known.

OBJECTIVE

To determine the efficacy of several preemergence (PRE) and postemergence (POST) herbicides used in corn, cotton, peanut, rice, and soybean on ragweed parthenium.

MATERIALS AND METHODS

PREEMERGENCE STUDY:

Greenhouse studies conducted: April-May 2006; September-October 2006.
 Greenhouse conditions: 24/20 (± 3) C for 13/11 h day/night with natural light.
 Plastic trays: 0.5 m long, 0.24 m wide, 0.04 m depth without holes were filled with soil.
 Seeds: 0.25 g (about 500) seeds were planted in 5 rows and thinly covered with soil.
 Herbicides: As listed in Table 3 were sprayed using an indoor spray chamber.
 Herbicide rates: as suggested by manufacturers.
 Watering: Mist / gentle shower as needed.
 Statistical design: RCBD with 4 replications.
 Ragweed parthenium seedlings were counted weekly for 6 weeks.

POSTEMERGENCE STUDY - ROSETTE STAGE:

Field study: Stoneville, MS.
 Site: Edge of the farm, non-cropped area with a natural infestation.
 Year: May-June 2005 and 2006.
 Rosette growth stage: 10 to 30 cm dia; 8 to 10 leaves; 2 to 7 cm tall.
 Herbicides: As listed in Table 1 were sprayed using a backpack spray.
 Herbicide rates: As suggested by manufacturers.
 Plot size: 2 m wide and 12.2 m long.
 Statistical design: RCBD with 3 replications.
 Ragweed parthenium control was visually estimated at 1 and 3 weeks after treatment.

POSTEMERGENCE STUDY - BOLTED STAGE:

Field study: Stoneville, MS.
 Site: Edge of the farm, non-cropped area with a natural infestation.
 Year: May-June 2005 and 2006.
 Rosette growth stage: 30 to 40 cm dia; 20 to 26 leaves; 70 to 80 cm tall.
 Herbicides: As listed in Table 2 were sprayed using a backpack spray.
 Herbicide rates: As suggested by manufacturers.
 Plot size: 2 m wide and 12.2 m long.
 Statistical design: RCBD with 3 replications.
 Ragweed parthenium control was visually estimated at 1 and 3 weeks after treatment.

RESULTS

Table 1. Rosette stage ragweed parthenium control 3 weeks after postemergence application of herbicides in 2005 and 2006 at Stoneville, MS.

Herbicide	Rate	Control, 3 WAT	
		2005	2006
	g/ha	%	
Glyphosate	840	93	100
Glufosinate	410	93	95
Paraquat	1120	24	0
Bentazon	1120	31	30
Acifluorfen	560	26	3
Chlorimuron	13	95	95
Halosulfuron	70	82	90
MSMA	1120	90	63
Bromoxynil	560	58	90
Atrazine	2240	25	74
2,4-D	806	89	90
Flumioxazin	90	-	85
Trifloxysulfuron	8	-	95
Clomazone	1400	-	38
Non-treated	-	0	0
LSD (0.05)	-	4	9

Table 2. Bolted stage ragweed parthenium control at 1 and 3 weeks after postemergence application of herbicides in 2005 and 2006 at Stoneville, MS.

Herbicide	Rate	Control	
		WAT1	WAT3
	g/ha	%	
Glyphosate	840	69	95
Glufosinate	410	84	89
Paraquat	1120	21	8
Bentazon	1120	23	19
Acifluorfen	560	49	28
Chlorimuron	13	31	68
Halosulfuron	70	35	61
MSMA	1120	18	45
Bromoxynil	560	51	33
Atrazine	2240	43	36
2,4-D	806	28	70
Flumioxazin	90	53	13
Trifloxysulfuron	8	56	86
Clomazone	1400	64	39
Non-treated	-	0	0
LSD (0.05)	-	5	5

Note: Control data represents an average of 2005 and 2006.

Table 3. Ragweed parthenium control with herbicides applied preemergence under greenhouse conditions in 2006 at Stoneville, MS.

Herbicide	Rate	Control		
		2 WAT	4 WAT	6 WAT
	kg/ha	%		
Norflurazon	2.24	100	100	100
Pendimethalin	1.12	38	29	22
Clomazone	1.12	94	100	100
Diuron	1.79	85	80	87
Fluometuron	2.24	87	91	96
Pyriathiobac	0.08	52	34	35
Dimethenamid	1.10	65	52	54
Flumetsulam	0.06	45	33	34
Imazaquin	0.14	66	51	58
S-Metolachlor	2.13	74	56	58
Metribuzin	0.70	72	84	90
Chlorimuron	0.01	79	55	77
Atrazine	1.79	54	35	38
Simazine	3.36	73	59	53
Flumioxazin	0.11	97	89	84
Quinclorac	0.56	58	40	67
Non-treated	-	0	0	0
LSD (0.05)	-	18	18	15

CONCLUSIONS

PREEMERGENCE STUDY:

- Ragweed parthenium control was highest with norflurazon (100%) and clomazone (100%) followed by fluometuron (96%), metribuzin (90%), diuron (87%), flumioxazin (84%), chlorimuron (77%), and quinclorac (67%) at 6 WAT.
- Ragweed parthenium control was ≤58% with all other PRE herbicides and control was lowest with pendimethalin (22%) at 6 WAT.
- Among the herbicides studied, ragweed parthenium appears to be highly sensitive to pigment and photosynthesis inhibitors compared to herbicides with other modes of action.

POSTEMERGENCE STUDY:

- Glyphosate, glufosinate, chlorimuron, and trifloxysulfuron applied to rosette stage controlled ≥93% ragweed parthenium at 3 WAT.
- Halosulfuron, MSMA, bromoxynil, 2,4-D, and flumioxazin controlled 58 to 90% rosette ragweed parthenium at 3 WAT.
- Ragweed parthenium control with all other POST herbicides was ≤38%.
- At bolted stage, glyphosate, glufosinate, and trifloxysulfuron controlled 86 to 95% ragweed parthenium and control was 61 to 70% with chlorimuron, halosulfuron, and 2,4-D.
- Overall, efficacy of POST herbicides was better on rosette plants than on bolted plants.
- Interestingly, paraquat had negligible activity (≤8%) on ragweed parthenium, regardless of growth stage.
- Among the herbicides studied, amino acid synthesis and glutamine synthase inhibitors were more active than herbicides with other modes of action.
- These results indicate that several herbicides registered for PRE and POST control of weeds in corn, cotton, peanut, rice, and soybean could provide effective control of ragweed parthenium.
- Furthermore, a few of the herbicides studied were more active than herbicides previously reported in the literature.

Non-treated cotton



Chlorimuron, 3 WAT



Paraquat, 3 WAT



Glufosinate, 3 WAT

