HERBICIDE CONTROL OF MINTWEED (*SALVIA REFLEXA*) IN COTTON PRODUCTION SYSTEMS

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Abstract

The control of mintweed with herbicides in cotton was evaluated over two sites and seasons. Where mintweed plant numbers exceeded 5 plants/m^2, metolachlor mixed with cotton broadleaf herbicides proved the most effective pre-emergent form of control.? Post-emergent applications of glyphosate, bromoxynil and glufosinate-ammonium provided excellent control and may be valuable options if transgenic cotton varieties tolerant to the herbicides are released. Rotating cotton fields to sorghum and using atrazine would also be highly desirable in fields heavily infested with mintweed.

Keywords : Salvia reflexa, cotton, competition, herbicide

Mintweed (*Salvia reflexa*) is not currently considered a serious problem in the cotton industry, ranked 13 in a 1989 cotton industry survey (1), however, growers who are not vigilant in its control can experience infestations that severely limit yield. The selection of herbicides available for control in cotton is limited, and as such a wider evaluation of herbicide options was warranted. In addition, the potential release of transgenic herbicide tolerant cotton has allowed the efficacy of other herbicides (glyphosate, bromoxynil and glufosinate-ammonium) to be evaluated against mintweed.

Materials and methods

Initial experiments to examine registered cotton pre-plant herbicides for efficacy against mintweed were conducted near Warren, NSW in 1989. Seven herbicide treatments, an untreated control and a weed-free control (Table 1) were tested in a randomised complete block design on irrigated cotton. Herbicides were applied with a hand boom, post-planting pre-emergence of cotton.? Incorporation occurred via irrigation the day after planting. Plot size was 20 m x 4 m rows with four replicates.? The number of mintweed and cotton yields were measured using 2 m^2 quadrats in two sampling positions per plot.

A second experiment to evaluate wider herbicide options was conducted near Gunnedah, NSW in 1996.? Nine pre-emergent herbicides, five post-emergent herbicides and an unsprayed control were set up in a randomised complete block design to assess efficacy against irrigated mintweed. Incorporation of pre-emergent herbicides was conducted with rolling lilliston harrows. Post emergent herbicides were applied when mint- weed had reached the 3-4 node stage. Plot size was 10 m x 4 rows. Mintweed control was estimated over the entire plot via a five point linear rating method (Table 2).

Results and Discussion

Mintweed can be a highly competitive plant against cotton if the population is allowed to increase above 5 plants/m^2. Fig. 1 shows the rapid decline in yield of cotton once numbers increase above this approximate value. This competitiveness is reflected in Table 1 where the best pre-emergent herbicide combination of diuron + metolachlor did not reduce mintweed plant numbers below a level that affected yield. It is, however, possible that the herbicides themselves have a direct effect on cotton yield and separate experimentation is required to examine those possible interactions.

The experiment at Gunnedah in 1996 had an average of 9.5 plants/m^2 in the control plots. Again, the addition of metolachlor to the broadleaf herbicide mix of fluometuron + prometryn enhanced control (Table 2.).? Doubling the metolachlor rate by itself only marginally improved control. Atrazine or an atrazine + metolachlor mix is highly effective at controlling mintweed. All post emergent herbicides shown

in Table 2, except MSMA, controlled mintweed effectively. Regrowth of existing plants and new germination's after irrigation and rain would require further applications of these herbicides.

Table 1. Comparison of pre-emergent herbicides on mintweed number and seed cotton at Warren 1989

Herbicide	a.i. (kg/ha)	Mintweed No./m^2	Seed Cotton (g/m)	% Yield of weed-free cotton
Control		75	28	3.9 %
Diuron	2.33	70	189	26.3 %
Diuron + Pendimethalin	1.75 + 0.99	13	325	45.1 %
Diuron + Metolachlor	1.75 + 1.44	10	487	67.5 %
Diuron + Fluometuron + Prometryn	1.75 + 0.875 + 0.875	14	311	43.1 %
Fluometuron + Prometryn	0.875 + 0.875	84	122	16.9 %
Fluometuron + Prometryn + Pendimethalin	0.875 + 0.875 + 0.99	40	259	36.0 %
Fluometuron + Prometryn + Metolachlor	0.875 + 0.875 + 1.44	24	259	63.8 %
Weed-free Control		0.7	721	100 %
		sed = 29	sed = 112	

Table 2. Comparison of pre and post emergent herbicides for efficacy against mintweed at Gunnedah 1996.

Herbicides	a.i. (kg/ha)	Rating[a]
Pre emergent		
Atrazine[b]	2.7	5
Fluometuron	3	1
Prometryn	3	1.75
Diuron	2.33	0.25
Metolachlor	2.88	2.75
Metolachlor	1.44	2.37
Norflurazon	3.2	2
Metolachlor + Atrazine[b]	1.1 + 0.89	4.5
Flumeturon + Prometryn + Metolachlor	1 + 1 + 1.44	2.5
		sed = 0.48
Post-emergent		
Glyphosate[b]	0.9	5
Bromoxynil[b]	0.6	5
MSMA	2.4	3
Paraquat + Diquat[b]	0.54 + 0.46	5
Glufosinate - ammonium[b]	1	4.4
		sed = 0.32

[a] linear rating scale 0 = no control, 5 = complete control

[b] Note these herbicides can not currently be applied to cotton

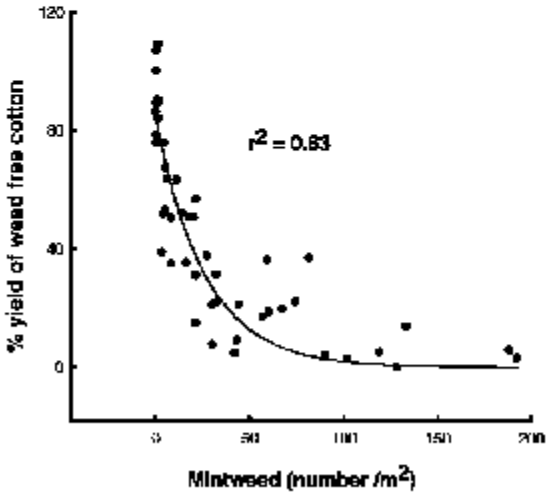

Figure 1. Relationship between mintweed density and weed-free cotton.

Conclusions

Mintweed can be a highly competitive plant against cotton when greater than 5 plants/m^2 are present. No cotton safe pre-emergent herbicide options exist that provide adequate mintweed control on there own. The addition of metolachlor to either diuron or fluometuron + prometryn mixes improves control. The post-emergent use of MSMA may eventually be replaced by the more efficacious herbicides, glyphosate, bromoxynil and glufosinate ammonium, if cotton varieties tolerant to these herbicides are released. The use of atrazine either alone or with metolachlor in sorghum crops would provide an additional management tool in cotton rotations designed to reduce mintweed populations. Combining the above strategies with inter row cultivation, shielded sprays of either paraquat + diquat or glyphosate and hand chipping escapes, would form an integrated approach to managing? this weed throughout the rotation.

References

1. Charles, G.W. 1991. *Aust. J. Exp. Agric.*, **31**, 387-392.