COTTON WEED MANAGEMENT IN NO-TILL MAIZE AND SORGHUM STUBBLE

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Abstract

The amount of cotton produced using conservation tillage production techniques is increasing rapidly in south Texas and northeastern Mexico. Conservation tillage is being adopted due to benefits from decreases in wind and water erosion, sandblasting of seedling cotton, time, equipment, labor, fuel, and increased net returns when compared to a conventional moldboard plow tillage system. Objectives of this study were to identify weed management techniques which are effective for cotton production in no-tillage maize or grain sorghum residue. Sixteen weed management treatments were evaluated for crop injury, control of *Amaranthus Palmeri* and *Panicum Texanum* and effects on no-tillage cotton lint yields. Single herbicide treatments did not provide acceptable control of *Amaranthus Palmeri* and *Panicum Texanum* Tank mix combinations of several herbicides provided superior season long weed control and cotton lint yields in subtropical no-till cropping conditions. These herbicide combinations included pendimethalin plus fluometuron, clomazone plus pyrithiobac, pendimethalin plus pyrithiobac, fluometuron plus pyrithiobac, and pendimethalin plus fluometuron plus pyrithiobac.

Introduction

A barrier to the adoption of cotton production under conservation tillage is the lack of knowledge and benefits of weed management using no-tillage techniques. One of the major inputs costs of cotton production is soil tillage and land preparation prior to planting. Conservation tillage can decrease production costs from $50 to $120/ha by eliminating many equipment and tillage passes over the field and replacing tillage with chemical weed management during the pre-planting season and early growth of cotton. Conservation tillage will not be adopted for cotton production unless weeds can be effectively managed without mechanical cultivation. Objectives of this study were to identify weed management techniques which are effective for cotton production in no-tillage maize or grain sorghum residue. Sixteen weed management treatments (Table 1) were evaluated for crop injury, control of *Amaranthus Palmeri* and *Panicum Texanum* and effects on no-tillage cotton lint yields. These herbicide combinations included pendimethalin plus fluometuron, clomazone plus pyrithiobac, pendimethalin plus pyrithiobac, fluometuron plus pyrithiobac, and pendimethalin plus fluometuron plus pyrithiobac.

Materials and Methods

Experiments were conducted under irrigated conditions near Weslaco, Texas in 1996 on maize and grain stubble with no-tillage prior to planting. Maize residue exceeded 10,000 kg/ha and grain sorghum residue exceeded 4000 kg/ha at planting time. Cotton was planted using a John Deere 7200 Maxemerge planter equipped with "Dawn" residue fingers directly in from of each row of double disk openers on the planter and a 40 cm diameter ripple coulter in front of the residue fingers. The coulter was used to slice through crop residue and the two residue fingers on each row ran opposed to one another at an angle moving crop residue away from the seed planting zone to provide a uniform seedbed for cotton. Cotton was planted in early March at a seeding rate of 127,000 seeds/ha. A randomized complete block design experiment with four replications was used for both maize and grain sorghum residue cotton plantings. Herbicide treatments were pendimethalin, fluometuron, clomazone, pyrithiobac, prometryn, and fluazifop alone and in combinations (Table 1.) applied as a broadcast application. Pyrithiobac and fluazifop were applied post-emergence to cotton 25 days after planting when the cotton was at 3-4 leaf stage of growth and grass and broadleaf weeds were 3-6 cm tall. Counts and visual percent control of *Amaranthus Palmeri* and *Panicum Texanum* were taken 21 days after treatments were applied and again 50 days after treatments were applied. Cotton was fertilized with 89 kg/ha nitrogen as liquid N32 as a side-dress application when cotton was 15-20 cm tall and furrow irrigated twice during the cropping season as needed. Seed cotton was hand harvested from the center two rows of 4 row plots, weighed, ginned, lint was weighed to determine actual lint values used to report yield.

Results and Discussion

Single herbicide treatments did not provide acceptable control of *Amaranthus Palmeri* and *Panicum Texanum* Tank mix combinations of several herbicides provided superior season long weed control and cotton lint yields in subtropical no-till cropping conditions Single herbicide treatments did not provide acceptable control of *Amaranthus Palmeri* (Table 2) and *Panicum Texanum* (Table 3). Tank mix combinations of several herbicides provided superior season long weed control and cotton lint yields (Table 4) in subtropical no-till cropping conditions . These herbicide combinations included pendimethalin plus fluometuron, clomazone plus pyrithiobac, pendimethalin plus pyrithiobac, fluometuron plus pyrithiobac, and pendimethalin plus fluometuron plus pyrithiobac.

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Table 1. Herbicide treatments and dosages applied to no-till cotton in corn and grain sorghum stubble.

	Application Timing	dosage kg a.i./ha
1. Command (clomazone)	PRE-E	1.12
2. Prowl (pendimethalin)	PRE-E	1.12
3. Cotoran (fluometuron)	PRE-E	1.34
4. Caporal (prometryn)	PRE-E	1.57
5. Staple (pyrithiobac)	POST-25 DAP	0.07
6. Command + Staple (clomazone + pyrithiobac)	PRE-E + POST-25 DAP	1.12 + 0.07
7. Command + Cotoran (clomazone+fluometuron)	PRE-E	1.12 + 1.34
8. Prowl + Cotoran (pendimethalin + fluometuron)	PRE-E	1.12 + 1.34
9. Command + Fusilade (clomazone + fluazifop)	PRE-E + POST-25 DAP	1.12 + 0.10
10. Prowl + Fusilade (pendimethalin + fluazifop)	PRE-E + POST-25 DAP	1.12 + 0.10
11. Staple + Fusilade (pyrithiobac +fluazifop)	POST-25 DAP + POST-25 DAP	0.07 + 0.10
12. Command + Staple (clomazone + pyrithiobac)	PRE-E + POST-25 DAP	1.12 + 0.07
13. Prowl + Staple (pendimethalin + pyrithiobac)	PRE-E + POST-25 DAP	1.12 + 0.07
14. Cotoran + Staple (fluometuron + pyrithiobac)	PRE-E + POST-25 DAP	1.34 + 0.07
15. Prowl + Cotoran+Staple (pendimethalin + fluometuron + pyrithiobac)	PRE-E + PRE-E + POST-25 DAP	1.12 + 1.34 + 0.07
16. Untreated (cultivation only)	25 & 50 DAP	

[a] PRE-E is applied pre-emergence to cotton.
[B] POST-25 DAP is applied post-emergence to the crop 25 days after planting

Table 2. Cotton Lint yield in response to weed management by 5 best herbicide combinations.

	---- cotton lint yield (kg/ha) ------- maize residue	sorghum residue
Prowl + Cotoran (pendimethalin + fluometuron)	585 abc	411 ab
Command + Staple (clomazone + pyrithiobac)	659 ab	336 ab
Prowl + Staple (pendimethalin + pyrithiobac)	697 a	493 a
Cotoran + Staple (fluometuron + pyrithiobac)	594 abc	466 a
Prowl + Cotoran+Staple (pendimethalin + fluometuron + pyrithiobac)	659 ab	563 a
untreated (cultivated) weedy control	109	152

Table 3. *Amaranthus Palmeri* percent control in response to weed management by 5 best herbicide combinations.

	---- percent weed control ------ maize residue	sorghum residue
Prowl + Cotoran (pendimethalin + fluometuron)	97 a	95 b
Command + Staple (clomazone + pyrithiobac)	99 a	99 a
Prowl + Staple (pendimethalin + pyrithiobac)	99 a	99 a
Cotoran + Staple (fluometuron + pyrithiobac)	99 a	99 a
Prowl + Cotoran + Staple (pendimethalin + fluometuron + pyrithiobac)	99 a	99 a
mechanical cultivation only	45	50

Table 4. *Panicum Texanum* percent control in response to weed management by 5 best herbicide combinations.

	---- percent weed control ----- maize residue	sorghum residue
Prowl + Cotoran (pendimethalin + fluometuron)	93 b	87 b
Command + Staple (clomazone + pyrithiobac)	94 b	93 ab
Prowl + Staple (pendimethalin + pyrithiobac)	96 ab	92 ab
Cotoran + Staple (fluometuron + pyrithiobac)	97 a	90 ab
Prowl + Cotoran+ Staple (pendimethalin + fluometuron + pyrithiobac)	97 a	98 a
mechanical cultivation only	55	60