MINIMUM TILLAGE WEED CONTROL ON CLAY SOILS

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Abstract

'DES 119' cotton was planted no-till on a Sharkey clay May 21, 1993; April 20, 1994; and April 10 and 28 (replant), 1995. The site had previously been planted to grain sorghum for 10 consecutive years and a large johnsongrass and redvine infestation was predominate. A split plot design with four replications was used. Main-plot treatments were nine sequential combinations of preplant (fall/winter and/or March application) and preemergence herbicides designed to control winter and summer annual weeds. Individual treatments were: 1) Hip in the fall followed by (fb) Treflan [fall/winter = F/W, 1.25 lb ai/A (ai, active ingredient for all materials)] fb Treflan (March = M, 1.25 lb) fb Cotoran (Preemergence = PRE, 2.0 lb), 2) Treflan [F/W, 1.25 lb (Bladex 1.5 lb in 1995)] fb Bladex + Zorial (PRE, 1.2 lb + 1.6 lb), 3) Bladex [FW, 2.5 lb (1.5 lb in 1995)] fb Cotoran + Command (PRE. 2.0 lb + 1.0 lb), 4) Goal [F/W, 0.4 lb (0.3 lb in 1995)] fb Bladex [M, 1.5 lb (2.0 lb + Roundup D-Pak 1.0 lb in 1993)] fb Cotoran + Dual (PRE, 2.0 lb + 1.0 lb), 5) Goal [F/W, 0.4 lb (0.3 lb in 1995)] fb Weedar 64 (M, 1.0 lb in 1993, 1995) fb Cotoran + Dual (PRE, 2.0 lb + 1.0 lb), 6) Hip in the fall fb Roundup D-Pak (M, 1.0 lb) fb Cotoran (PRE, 2.0 lb), 7) Hip in the fall fb Weedar 64 (M, 1.0 lb) fb Cotoran + Command (PRE, 2.0 lb + 1.0 lb), 8) Zorial (F/W, 1.2 lb) fb Gramoxone Extra (M, 0.94 lb) fb Cotoran + Dual (PRE, 2.0 lb + 1.0 lb), and 9) Goal [F/W, 0.4 lb (0.3 lb in 1995)] fb Bladex [M, 1.5 lb (2.0 lb + Roundup D-Pak 1.0 lb in 1993)] fb Cotoran + Command (PRE, 2.0 lb + 1.0 lb). Sub-plot treatments were three sequentially-applied postemergence herbicides for controlling johnsongrass and/or redvine. Sub-plot treatments selected for johnsongrass control were (A) Select 0.094 lb/A applied broadcast three times in 1993 and two times each in 1994 and 1995, (B) Select 0.094 lb (broadcast rate) and (C) Assure 0.063 lb (broadcast rate) each applied to a 20-inch band centered on the row at the same time as the broadcast treatment. Sub-plot treatments selected for redvine control were (A) one flame cultivation (1993) and Roundup D-Pak applied between crop rows with a hooded sprayer at 1.5 lb ai/A two times in 1994 and one time in 1995, (B) two mechanical cultivations between rows in 1993 and one in 1994 fb Roundup D-Pak/hooded sprayer one time at 1.5 lb and Roundup D-Pak/hooded sprayer two times at 0.75 lb in 1995 and (C) two mechanical cultivations in 1993, three in 1994, and none in 1995. Crop injury and weed control were determined by visual estimation (0 = no control or injury, 100 = complete control or injury) and plant counts. Crop yield was measured by mechanically harvesting and weighing the seed cotton from the two center rows of each four-row sub-plot. Plot weights were converted to pounds per acre.

Main-plot treatments giving winter weed control above 90% in April each year were Zorial 1.2 lb fb Gramoxone 0.94 lb M fb Cotoran 2.0 lb + Dual 1.0 lb PRE (Treatment 8) and with Goal 0.4 lb (0.3 lb in 1995) lb F/W fb Bladex 1.5 lb (2.0 lb + Roundup D-Pak 1.0 lb in 1993) lb ai/A M fb Cotoran 2.0 lb + Command 1.0 lb PRE (Treatment 9). Treatment with the same F/W rates of Goal fb Bladex M but fb Cotoran 2.0 lb + Dual 1.0 lb PRE (Treatment 4) gave >90% winter weed control in 1993 and 1994 and 88% in 1995.

Summer annual weeds were controlled > 90% each year by Goal F/W fb Bladex M fb Cotoran 2.0 lb + Command 1.0 lb PRE (Treatment 9). Main-plot treatments with Bladex 2.5 lb (1.5 lb in 1995) F/W fb Cotoran 2.0 lb + Command 1.0 lb PRE (Treatment 3) and Weedar 64 1.0 lb ai/A M fb Cotoran 2.0 lb + Command 1.0 lb PRE (Treatment 7) gave > 90% summer annual weed control in 1993 and 1994 but only gave 79 and 73%, respectively, in 1995.

The only main-plot treatment giving > 90% johnsongrass control each year was Goal 0.4 lb (0.3 lb in 1995) F/W fb Bladex 1.5 lb (2.0 lb + Roundup D-Pak 1.0 lb in 1993) M fb Cotoran 2.0 lb + Dual 1.0 lb PRE (Treatment 4). Several main-plot treatments controlled johnsongrass > 90% in 1994 and all treatments gave this level of control by September, 1995. This increased johnsongrass control was the result of sub-plot treatment applications of Assure and Select.

In mid-September 1994 and late-July 1995, redvine control was not different among main-plot treatments. In mid-May 1995, the main-plot treatment of Bladex 2.5 lb (1.5 lb in 1995) F/W fb Cotoran 2.0 lb + Command 1.0 lb PRE (Treatment 3) gave the greatest delay in redvine plant development. Visually estimated, this was a reduction of 68% when compared to the most developed plants. This treatment also resulted in least (14%) estimated ground cover in mid-June, 1995. The johnsongrass population in August, 1993, was an average 204, 3013, and 95 plants/acre for sub-plot treatments A, B, and C, respectively. On August 16, 1995, the population was further reduced to 82, 564, and 33 plants/acre; a population that should be effectively controlled by spot-application in the future. Seed cotton yield was not different among main-plot treatments in 1994 (1218 to 1468 lb/A). Yield was greatest in 1994 and 1995 with main-plot treatments of Bladex 2.5 (1.5 in 1995) lb ai/A F/W fb Cotoran 2.0 lb + Command 1.0 lb PRE (Treatment 3) and Goal 0.4 (0.3 in 1995) lb ai/A F/W fb Bladex 1.5 (2.0 + D-Pak 1.0 in 1993) lb ai/A M fb Cotoran 2.0 lb + Command 1.0 lb PRE (Treatment 9).

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Bladex 1.0 lb + Goal 0.25 lb was used to "burn" vegetation between rows of sub-plot treatment C in mid-July 1995. In September 1994, redvine plant injury averaged 85% with sub-plot treatment A, 75% with B, and 13% with C; values for these treatments in late-July, 1995, were 78, 84, and 54%, respectively. The increased control from 1994 to 1995 for sub-plot treatment C was probably due to the accumulated control benefits from main-plot treatments.

Sub-plot treatment averages for redvine plant development (% "leaf-out" = relative appearance of foliage quantity) in mid-May 1995, were 17%, 26%, and 97% for A, B, and C, respectively; while the estimated plot area covered with redvine in mid-June was 16, 20, and 61%, respectively. Average seed cotton yields for sub-plot treatments A, B, and C in 1993 were 1252, 1400, and 1378 lb/acre; for 1994 they were 1967, 1987, and 2154 lb/acre; and for 1995 they were 1461, 1400, and 1255 lb/acre, respectively. The 1993 sub-plot treatment A yield was lower, the 1994 C yield was greater and the 1995 C yield was lower when compared with the average yield from other sub-plot treatments each year.