WEED CONTROL IN NO-TILLAGE TROPICAL CORN

Walter T. Scudder and Raymond N. Gallaher
Professor, Central Florida Research and Education Center, Sanford, FL 32771; and Professor of Agronomy, respectively, IFAS, University of Florida, Gainesville, FL 32611

Tropical field corn (Zea mays), because of its heat tolerance and disease resistance, is adapted to summer planting in Central and South Florida. It can be grown as a second crop following a spring planting of vegetables or field corn and brought to maturity during the fall for either forage or grain. Other early and full season types can only be grown in the spring to give a satisfactory crop.

In order to evaluate weed control programs for no-tillage tropical corn, the cultivar Pioneer 304C was planted on the Research Center farm on July 21, 1983. The soil, Imokalee fine sand, is a Arenic Haplaquod, with a shallow hardpan at approximately 24 inches. The experiment was designed as a factorial, with four contact post-emergent herbicide treatments to kill existing growth, four pre-emergent herbicide treatments to inhibit further weed development, and four replications. This comprised a total of 64 plots, each with six rows 35 feet in length. Of the four replications, two were on land with a heavy growth of annual weeds, primarily large crabgrass (Digitaria sanguinalis), narrowleaf signalgrass (Brachiaria piligera), and goosegrass (Elusine indica). The field had been used for vegetables during the winter of 1982-83 followed by spring fallow. The other two replications were planted on an adjacent field which had produced soybeans in 1981 followed by fallow in 1982 and the spring of 1983. By the summer of 1983, it was uniformly covered with a bermudagrass (Cynodon dactylon) sod with a few large weeds such as dogfennel (Eupatorium capillifolium).

The experiment was planted with a Buffalo Model 4570-H, 2-row All-Flex Till-Planter, supplied by Dr. R. N. Gallaher of the Agronomy Department, courtesy of the Fleischer Manufacturing Co., Inc. of Columbus, Nebraska. This planter has a front coulter, a slot-shoe opener, covering wheels, and a rear tine incorporator. Using 30 inch row spacing, a 24-cell plate, and sprockets to give a spacing in the row of 8.4 inches, 24,900 seed per acre were planted. Although herbicide spray and granule application equipment were attached, the weed control chemicals were applied with a separate small plot sprayer to permit uniform planting. The herbicides for each treatment were tank-mixed and applied in water at 60 gallons per acre, with full broadcast coverage.

To kill existing broadleaved weeds and grasses, the treatments were paraquat at two rates, 3/8 and 3/4 pound ai/acre, and glyphosate at two rates, 1 1/2 and 3 pounds. Ortho X-77 was added at 1/82 of the final volume to all paraquat treatments. The preemergence herbicides were alachlor and metolachlor, each used at both 2 pound and 3 pound rates, providing a total

of 16 treatments. Additional broadleaf weed control was obtained with atrazine at 1 pound ai/acre, tank-mixed with the other treatment chemicals for all plots.

The crop was grown without any preparatory tillage or cultivation. One insecticide application was made for budworm control and the crop was irrigated twice, applying 1 inch of water each time by overhead sprinklers.

Weed control data were recorded on August 9. There was adequate control in all plots of broadleaf weeds. Grass control was rated on a scale of 0 to 10, with 10 indicating complete grass elimination. Individual grass species were not rated separately since there appeared to be little difference in the composition of the species in the various plots, except in those replications where bermudagrass predominated.

The ears were harvested on November 9. Yields are expressed as shelled grain at 15.5% moisture.

Summary data on weed control and corn grain yields are given in Tables 1 through 4. Although paraquat gave a rapid burn-down of the weeds, regrowth was evident within two weeks. Glyphosate was much more effective throughout the whole crop growing season. This was also reflected in corn yields. There was no significant effect of chemical rate with any of the herbicides. Alachlor and metolachlor, in combination with atrazine, were equally effective in controlling annual weed regrowth. A significant difference in weed control and crop yield was evident between the two field areas. Regrowth of the bermudagrass depressed corn yield to a lower level than was obtained where annual weeds were present at planting time.

Table 1. Effect of paraquat and glyphosate applied at planting on control of established grasses in no-till tropical corn.

Post-emergence herbicide	Chemical rate ai/acre	Weed control rating	Mean
	-----lb-----	---0-10---	
Paraquat	3/8	6.6	6.9
	3/4	7.1	
Glyphosate	1 1/2	8.7	9.0
	3	9.3	
LSD *(0.05)*		---	1.0
(0.01)		---	1.4

Table 2. Effect of alachlor and metolachlor applied at planting on subsequent growth of weeds in no-till tropical corn.

Pre-emergence herbicide	Herbicide mean	Rate effect		Interaction with post-E herbicides	
		2 lb.	3 lb.	Paraquat	Glyphosate
	----------0-10 rating----------				
Alachlor	7.8	7.9	7.8	6.7	9.0
Metolachlor	8.0	7.9	8.0	7.0	9.0
Significance		N.S.	N.S.	N.S.	N.S.

Table 3. Comparison of weed control in annual weed field with that observed in bermudagrass sod planted to no-till tropical corn.

Post-emergence herbicide	Field		Mean
	Annual weeds	Bermudagrass sod	
	----------0-10 rating----------		
Paraquat	6.5	7.2	6.9
Glyphosate	9.4	8.6	9.0
Mean	7.9	7.9	
LSD (0.05)	1.0		
(0.01)	1.4		

Table 4. Mean yields of tropical corn observed in no-till trial, comparing several experimental factors.

Comparison	kg/ha	bu/acre
Paraquat	5750	91.7
Glyphosate	6202	98.9
LSD (0.05)	N.S.	N.S.
(0.01)	455	7.3
Alachlor	5987	95.5
Metolachlor	5965	95.2
LSD (0.05)	N.S.	N.S.
Annual weed field	6278	100.1
Bermudagrass field	5674	90.5
LSD (0.05)	455	7.3
(0.01)	N.S.	N.S.