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WEED CONTROL TRIALS IN COTTONWOOD PLANTATIONS

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Weed control in the first year is essential for establishing a cottonwood plantation, for the young trees can neither survive nor grow well if they must compete with other plants. Once the light and moisture conditions are established in its favor, cottonwood becomes the fastest growing tree in the South.

Disking, the recommended method of weed control, is expensive. Unless the site has been carefully prepared, the equipment is likely to be damaged. The amount of cultivation depends on the kinds and vigor of vegetative competition, but usually the ground must be worked several times, for the weeds should never be allowed to overtop the cuttings.

This article reports a 1962 study that compared five mechanical and six chemical weed-control treatments in cottonwood plantations on slack-water sites. Plots were on Crown Zellerbach Corporation lands near Fitler, Miss. Cultivation proved to be still the best method.

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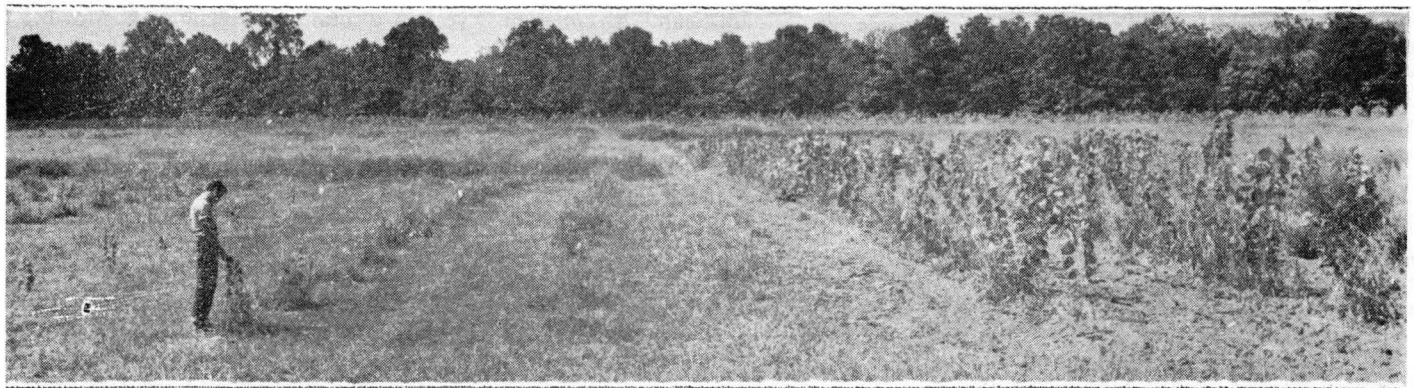
The Study

The four study areas included two abandoned fields—one having mixed Sharkey and Tunica soils and the other mixed Tunica and Bowdre soils; a pasture mainly on mixed Tunica but with some Bowdre; and an area of Sharkey soil recently cleared of a hardwood stand (new ground). The soils are differentiated by depth of clay. In Sharkey soil, clay extends without a change in texture to a depth of greater than 3 feet, in Tunica to 2-3 feet, and in Bowdre to 1-2 feet.

Site preparation on the two old fields consisted of disking in the fall and subsoiling in February prior to planting. The pasture was subsoiled only. Subsoiling was done in one direction at 10-foot intervals, the purpose being to help mark planting spots and, by loosening soil, aid in planting. This practice proved to be undesirable as the soil tended to crack along the subsoiled trenches in dry weather. The new ground was disked in the fall and again in March before planting.

Weed-control treatments were: (1) check-cross-disk and hand-hoe to keep weeds at a minimum; (2) cross-disk only; (3) plant soybeans as a first-year crop with cottonwood; (4) cross-mow; (5) plant cottonwood on berm of 18-inch-deep ditches; (6) pre-emergence surface application of simazine, 8 lbs. per acre; (7) or of monuron, 4 lbs. per acre; (8) pre-emergence subsurface applications of casoron, 0.5 lb. per acre; (9) or of monuron, 2 lbs. per acre; (10) post-emergence applications of amizine, 8 lbs. per acre; (11) or of diuron, 0.5 lb. per acre, plus surfactant at 2 lbs. per acre. Each treatment was replicated 4 times in the 4 areas on 1/3-acre plots.

In addition, supplementary chemical applications were made with two exper-



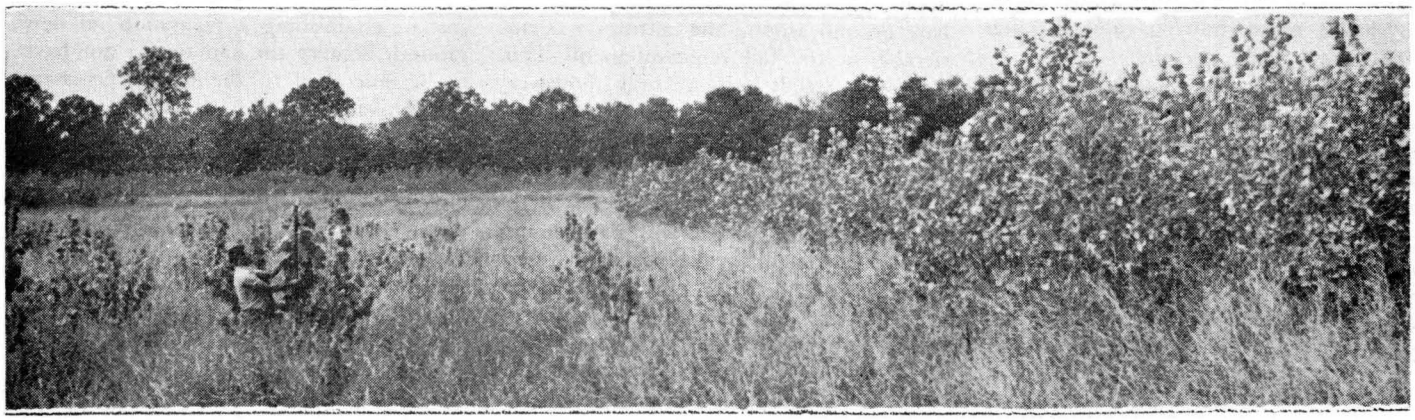


Figure 1. These photos, taken 1 and 2 growing seasons after planting, compare growth of cottonwood receiving two different cultural treatments during the first year. Weed control was by mowing, on the left, and disking, on the right.

imental herbicides (Hercules 7175 and 7531), each at 4 lbs. per acre, and casoron at 3 lbs. per acre on a total of about 1200 cuttings adjacent to the new-ground plots.

When lack of grass control by simazine and monuron became obvious by the first of May, dalapon at 5 lbs. per acre was sprayed on the third and fifth rows of these plots in the pasture and one fallow field. On May 21 an additional 5 lbs. per acre of dalapon with 1 percent surfactant was applied to these rows and also the first and seventh rows of the same plots.

Twenty-inch-long cottonwood cuttings treated with phorate were planted during the last week of February on all plots except those on new ground and in subsurface treatments, which were planted the last week of March. Trees on the ditch berms were 6 feet apart (the ditches themselves were 10 feet apart); on all other plots spacing was 10 by 10 feet.

Subsurface chemicals were applied the third week of March, surface pre-emergence chemicals the first week of April, and post-emergence chemicals the first week of May. A repeat spray with diuron was put out the third week of May. Chemicals were applied with a tractor rig that straddled the rows and sprayed a band 32 inches wide at a broadcast application rate of 32 gallons per acre. Subsurface applications on all but the new ground were made by spraying the ground, turning with a moldboard plow, and disking. This technique was unsatisfactory, as the sticky nature of the soil and the rough terrain made it impossible to get a desired, uniform depth of 1 to 2 inches of soil turned over the chemical. The new ground was sprayed and disked only.

The pasture and two fallow fields were disked 7 to 8 times and mowed 5 to 6 times, starting the last of April and ending the first of September. On the new ground, weed control was stopped after 3 diskings because seedling survival was poor (the cuttings had dried out prior to planting). There was much less Johnson-grass than on the pasture and old fields, but if a better tree stand had developed at least 2 more mowings and diskings would have been useful.

Trees planted along ditches received no weed control other than that provided by the drastic site preparation. Ditching proved inadequate where Johnson-grass was established.

Soybean plots were disked until May, when two rows of soybeans were planted between the cottonwood except on the new ground, where the beans were broadcast. The May planting failed and the beans were replanted in June.

Table 1. Survival and growth of cottonwood during first season

Treatment	Fallow field No. 1			Fallow field No. 2			Pasture			New ground		
	Survival		Av. ht. in	Survival		Av. ht. in	Survival		Av. ht. in	Survival		Av. ht. in
	June	Oct.	Oct.	June	Oct.	Oct.	June	Oct.	Oct.	June	Oct.	Oct.
	Percent		Feet	Percent		Feet	Percent		Feet	Percent		Feet
Disk and hoe	75	71	5.9	82	80	5.0	76	75	4.5	21	18	6.6
Disk	82	78	5.4	88	80	4.1	58	53	3.9	22	20	7.2
Soybeans	79	71	4.4	90	85	4.7	80	71	5.5	22	15	4.5
Mow	70	59	2.0	86	74	1.9	75	58	1.8	20	20	3.8
Ditch	83	37	2.3	76	36	2.0	73	14	1.9	53	13	4.0
Amizine	58	17	2.1	72	47	1.9	56	19	2.0	16	8	4.0
Diuron	33	15	2.4	53	27	2.2	25	3	2.0	12	6	3.5
Simazine	21	3	2.3	35	12	2.0	34	18	2.3	18	12	4.5
Monuron	19	2	2.1	13	5	2.2	40	8	1.7	18	12	3.9
Casoron (subsurface)	29	10	2.2	32	6	1.7	22	8	2.0	17	15	3.8
Monuron (subsurface)	26	6	2.1	27	6	1.6	35	5	2.0	17	12	4.5

Results

Survival was determined in June, and a height and survival measurement was made in October at the end of the growing season (table 1). Survival of 65 percent in October was taken as the minimum acceptable. In the new ground no treatment met this minimum. For the other areas, mechanical treatments where a disk was used proved satisfactory except on pasture plots that were disked only. Here, for unknown reasons, survival was below the minimum by June. In the two fallow fields and the pasture, trees on plots disked as part or all of the treatment grew twice as tall as those on mowed and chemically treated plots.

Height growth indicated that the new ground was the best site, but low survival made analysis difficult. An attempt was made at the final remeasurement to evaluate the effect of the chemicals in this site, where Johnson-grass occurred only in patches. Simazine received the best rating, but it controlled the weeds on slightly less than 50 percent of the area where it was sprayed. The experimental herbicides were also ineffective.

Chemicals were not rated on the other areas, as at best they controlled weeds only until May. Also, practically all of the competing vegetation on the two old fields was Johnson-grass, as was one-half to two-thirds that on the pasture. Dalapon killed the Johnson-grass, and the bare ground around the cuttings was noticeable at the fall remeasurement. This and other weeds grow so rank, however, that a spray band of 32 inches is not sufficient. Whether the dalapon damaged the cottonwoods could not be evaluated from this study.

The growing season was dry—at no time did the ditches hold any water. Lack of soil moisture probably lessened the survival and growth of the cottonwood, and possibly reduced the effectiveness of the chemicals. Moisture was a limiting factor with the soybeans, too. Even with replanting, stands did not develop.

On all treatments where a disk was used, the survival and growth of the trees gave evidence of superior weed control. On the subsoiled plots, disking filled the larger cracks created by the subsoiler and dry weather and thereby conserved moisture. Mowing controlled the height of the weeds but not competition for moisture. It helped survival by allowing cottonwoods of low vigor to hang on, but height growth was no better than for chemical treatments, where trees had to fight their own way with the weeds.

Conclusions

Cultivation still remains the best method for controlling weeds during the first year of a cottonwood plantation. Mowing can be recommended only where the ground is so rough that disking is impossible. Even there, the best course may be to prepare the site sufficiently so that cultivation is feasible (figure 1). Ditching was not beneficial during a dry summer on old fields where Johnson-grass was abundant, but in other trials it has been better than no cultivation on new ground.

While no suitable chemicals were found in this study, the idea still has merit. A formulation that could be applied at or shortly after planting and would remain effective for a year would be particularly useful. It would, for example, reduce the cost of establishing a plantation on new ground, because the site would not have to be smoothed to the extent necessary for cultivation.

Reforestation of marginal crop and pasture land might also be speeded if landowners did not have to take their cultivators away from field crops. Where the soil has been compacted, though, cultivation may benefit tree growth by improving moisture relationships, even apart from weed-control effects.