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## Killing Unwanted Trees With Tordon 101 Mixture

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Nearly half the 1.6 million acres of woodland in Kansas needs to be upgraded by removing low quality trees. An additional 200,000 acres of wooded pasture should have undesirable trees selectively killed. High quality trees thus grow more rapidly to salable size.

Tordon 101 Mixture, a relatively new commercially available herbicide, gave good results in the Lake States (Brinkman, 1970) and the South (Voeller and Holt, 1973, Lawson and Ferguson, 1974). Either basal tube or hatchet injectors may be used to apply it, and it has been highly effective in both the dormant and growing seasons. Tordon 101 Mixture seems to kill more species than other injector-applied herbicides.

As herbicide results vary considerably from one region to another because of different species and climates, we conducted a series of tests on typical Kansas hardwood species usually unwanted in native black walnut stands.

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## The Studies and Early Results

We conducted studies on three sites the past three years within 50 miles of Topeka. Two were black walnut sapling-pole stands on intermittent streams while one was a large pole-small sawtimber cottonwood stand on the Kansas River.

In the first study the herbicide gave a high rate of kill. It is too early to evaluate the last two, but good results are indicated now (Fall, 1975).

Detailed results are presented for the first study. It was in a typical eastern Kansas hardwood stand in Douglas County, about 10 miles south of Lawrence on a north facing slope overlooking an intermittent stream.

Eight species (375 trees) were injected with Tordon 101 Mixture<sup>2</sup> diluted with water 1:1 and injected through the bark at 3-inch intervals around the base of the tree with a Jim-Gem metering injector (Figure 1). Approximately one milliliter of herbicide was injected into each cut (Figure 2) after the trees had leafed out fully in mid-May.

Species tested were black walnut (*Juglans nigra* L.), mulberry spp., honey locust (*Gleditsia triacanthos* L.), American elm (*Ulmus americana* L.), osage orange (*Maclura pomifera* [Raf.] Schneid), hackberry (*Celtis occidentalis* L.), boxelder (*Acer negundo* L.), and Kentucky coffee (*Gymnocladus dioicus* [L.] K. Koch).

Crown kill evaluations were made in mid-August the same year and in June the next year.

More than 95% of the injected trees had 100% crown kill the first year, with more the second year (Table 1). The few remaining treated trees had at least 50% crown kills. Only eight trees (2%) produced stem sprouts the second year.

## Discussion

It appears that basal injected Tordon 101 Mixture will effectively control undesirable hardwood trees in eastern Kansas. Our results indicate that good crown kills without trunk sprouting can be expected during the first growing season.

Comparative trials of 2,4-D amine and Tordon 101 Mixture on a variety of hardwood species in the mountains of Arkansas have shown to be effective on a great number of species including some resistant to 2,4-D alone (Ferguson and Lawson, 1975, Voeller and Holt, 1973). Tree species that we and others have controlled with Tordon 101 are listed in Table 2. Most of them are found in Kansas. Species showing greatest resistance to Tordon 101 Mixture were black gum, sugar maple, and ashes.

Tordon 101 Mixture being water soluble improves its absorption into a tree's sap stream, that makes it difficult to use in winter. Tordon 101 R, a new formulation commercially available, overcomes that drawback.

Tree injection gradually releases desirable trees, while felling with a chainsaw immediately exposes "crop" trees to wind forces and would still require stump spraying to kill the unwanted competitor.

In either case, immediate or delayed felling many of the treated trees could be used as fire wood.

Table 1.—Effect of Tordon 101 Mixture on indicated hardwood species<sup>1</sup>

Species	Crown kill		No. of trees treated
	More 1/2, %	Complete, %	
American elm		100	90
Black walnut	2	98	94
Box elder		100	5
Hackberry		100	8
Honey locust	<1	99+	137
Ky. coffee tree		100	8
Mulberry	25	75	4
Osage orange	21	79	29
All species, avg.	3	97	375

1. Tordon 101 Mixture 1:1 with water basal injected at 3-inch intervals during the summer at 3 sites.

2. Tordon 101 Mixture is the trade name of a mixture of 0.54 pounds of picloram and 2 pounds acid equivalent of 2,4-D

**Table 2.—Tree species effectively controlled with injected Tordon 101 Mixture<sup>1</sup>**

Species	Treatment location <sup>*</sup>	Species	Treatment location <sup>*</sup>
American beech	3	Hackberry	2
American elm	2, 3	Hickory	1, 3
Bigtooth aspen	3	Honey locust	2
Black cherry	1, 3	Ky. coffee tree	2
Black locust	1	Mulberry spp.	1, 2
Blackgum	1	Osage orange	2
Black oak	1	Persimmon	1
Blackjack oak	1	Post oak	1
Black walnut	1, 2	Red maple	1, 3
Boxelder	1, 3	Serviceberry	1, 3
Eastern hophorn bean	3	Southern red oak	1
Eastern red cedar	1	Winged elm	1
Elm spp.	1	White oak	1, 3
Flowering dogwood	1		

\* 1 = Arkansas, 2 = Kansas, 3 = Michigan

1. Based on our study and those reported by Brinkman, Voeller and Holt, and Ferguson and Lawson.

### LITERATURE CITED

- Brinkman, Kenneth A. 1970. Picloram in spaced stem injections to control Lake States Hardwoods. U.S. Forest Service. Res. Note NC-94. St. Paul, MN 4 p.
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- Voeller, J. E. and H. A. Holt. 1973. Continued evaluation of the hypohatchet for woody species control. Proceedings 26th Annual Meeting, Southern Weed Science Society, p. 354-360.

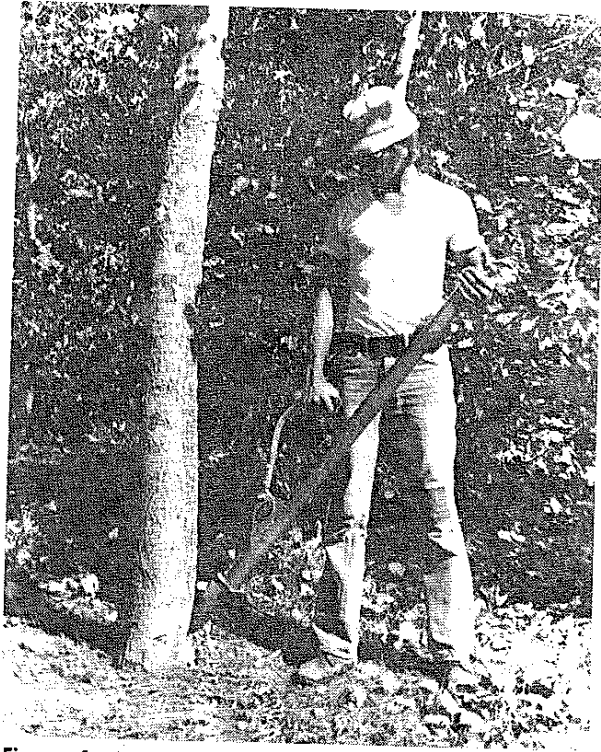


Figure 1.—Basal tube metering injector we used with Tordon 101 Mixture.

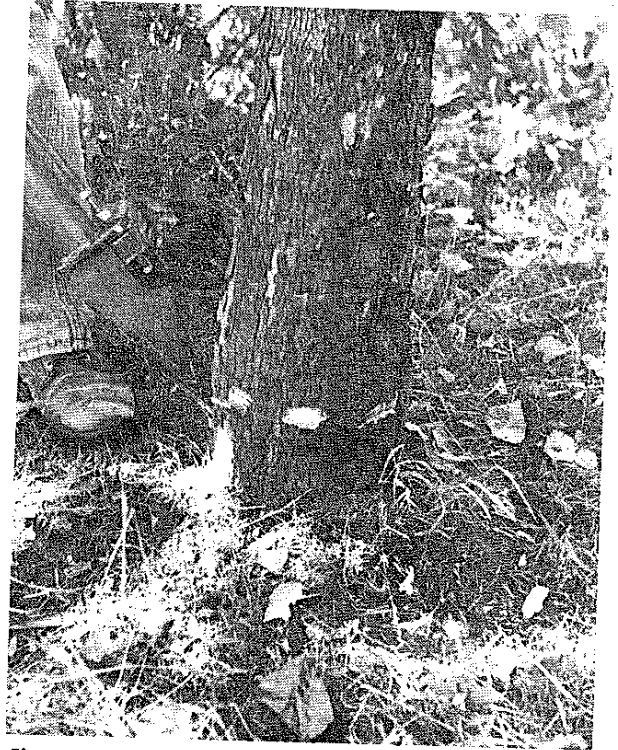


Figure 2.—We made cuts 3 inches apart close to the ground and metered 1 milliliter of herbicide into each cut.

Information in this report is for woodland owners, colleagues, industry cooperators, and other interested persons.

It is not a recommendation, but represents two years' research at one location.

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