

The possible Use of Herbicides Bifonex and Oxyfluorfen on *Pinus caribaea* var. *hondurensis*.

Charles Parkin*

ABSTRACT

Herbicides bifonex and oxyfluorfen were applied to newly sown *Pinus caribaea* var. *hondurensis* at rates of 3 pounds and 0.75 pound active ingredient per acre respectively (3.36 kg and 0.84 kg per hectare). Neither chemical affected germination of the seed, indicating a potential for their use on tropical bare-root pine nurseries.

INTRODUCTION

Weed control in bare-root nurseries is of vital importance. Besides being unsightly, weeds use water and nutrients which would otherwise be available to the seedlings. Left to grow tall enough, they shade the seedlings. Weeds may also serve as a refuge for insects and disease which could damage seedlings (Armson and Sadreida, 1974; Wakely, 1954; Wilde, 1958).

Many methods of weed control are used. In bare-root nurseries these include mechanical cultivation, chemical control, and hand weeding. Although each of these methods has a time and place, due to rising labor costs an effective chemical control would be the most economical (McDonald, 1973; Stoeckeler and Jones, 1957). A successful chemical control meets three prerequisites:

1. It should not have a long-term residual effect so as to damage future crops.

* 2208 Osage. Bartlesville OK, U.S.A. 74003.

2. It should not harm the seedlings.
3. The weeds should be reduced. (McDonald, 1973).

Chemicals which have been used with mixed success in bare-root conifer nurseries include mineral spirits, dacthal, simazine, methyl bromide, sulfuric acid, and dymid (Armson and Sadreika, 1974; Holt et al, 1976; McDonald, 1973; Stoedkeler and Jones, 1957; Wakeley, 1954; Walstad, 1974; Wilde, 1965).

Two newer diphenyl ester chemicals which have shown promise are bifonex (Modown) and oxyfluorfen (Goal). These have been used as a post-seeding, preemergence herbicide on various species of conifers, in many cases with notable success (Ryker, 1979, 1980). Although the physiological effects of the diphenyl esters on weeds are not clearly understood, they are thought to form a chemical barrier on the soil surface, killing the weeds as they emerge. Conifers, which emerge with the seed cap covering the plant apex, are protected from this chemical barrier (Anderson, 1977).

Currently in Honduras, where *Pinus caribaea* var. *hondurensis* Barr. & Golf. is grown, weeding is done almost entirely by hand (Winter, 1978). Although some successes have been recorded in Africa using chlorthal and propazine on *Pinus caribaea* (Bacon, 1979), many more failures have been found in Honduras using gesa prim, primextra, and karmex, which killed the seedlings as well as the weeds (Winter, 1978).

Because of the success with bifonex and oxyfluorfen in the northwestern United States on conifer beds, and because of the mechanism by which the two chemicals work, it was decided to try these chemicals on *Pinus caribaea* var. *hondurensis*. Although from Idaho, U.S.A., there is no way to gauge the success of these chemicals on weeds occurring in Central America, the toxicity on germination of *Pinus caribaea* could be observed. This was the purpose of the study reported here.

METHODS AND MATERIALS

A three-replicate random-block design was planned with a control block (no treatment), a block with bifonex to

be applied at a rate of 3 pounds active ingredient per acre (3.36 kg per hectare) immediately after planting, and a block with oxyfluorfen to be applied at a rate of 0.75 pound active ingredient per acre (0.84 kg per hectare) immediately after planting. The rates and timing of application were based on work done by Ryker (1979, 1980).

Originally each treatment was applied to two-foot-square plots in the silt loam soil at the University of Idaho forest nursery, located in Moscow, Idaho. This method was chosen because at least two of the larger nurseries in Honduras have silt loam soils. However, the early summer of 1981 was an unusually cold one, with night temperatures during June and July ranging from the 40s down to the high 30s (Fahrenheit). This caused extremely poor germination. After it became clear that even the control plots were going to fail, 6-inch pots were filled with the nursery soil. These were then planted with 50 seeds each, covered with 1/2 inch of sand, separated into three blocks, and placed in the greenhouse, with one pot per treatment per block. Each block contained two herbicide treatments and a control as originally described. The pots were then watered as needed for one month, at which time germinated seedlings in each pot were counted and tabulated. The variance in germination was then analyzed to determine if there were differences.

RESULTS AND DISCUSSION

Germination in each of the pots and the analysis of variance are shown in Tables 1 and 2. Midway through the experiment, *Botrytis* (a form of damping-off fungus) attacked an adjacent experiment and spread to blocks 1 and 2. All blocks were treated with benomyl and the experiment was continued. Low seed viability plus the disease account for the small numbers of test seedlings.

There was no significant difference in germination between either the blocks or the different treatments, indicating that both bifonex and oxyfluorfen have the potential for use on *Pinus caribaea*.

Further testing is needed. Although both bifonex and oxyfluorfen are effective on weeds in the northwestern United

Table 1. Germinating seedlings according to treatment and block.

Treatment	Block			Total	Average
	1	2	3		
Bifonex	31	16	31	78	26
Oxyfluorfen	13	16	27	56	18.67
Control	16	20	27	63	21
Totals	60	52	85	197	

Table 2. Analysis of variance of germination.

Source	SS	df	F (calculated)	F (tab. 95o/o C.I.)	
Treatments	84.22	2	42.11	1.37	6.94*
Blocks	197.56	2	98.78	3.21	6.94
Error	123.11	4	30.78		
Totals	404.89	8			

*No differences occur between treatments or blocks.

States, the transfer of information from one nursery to another is risky (Steward, 1977). Both chemicals should be tested at various nurseries on various soils throughout the tropics to determine their effects on local weed species and on the growth of *Pinus caribaea* after germination. However, since neither chemical appears to affect the germination of *Pinus caribaea*, both have potential as useful herbicides in bare-root nurseries in the tropics.

LITERATURE CITED

- ANDERSON, W. P. 1977. Weed Science: Principles. West Publishing Co., New York. 598 p.

- ARMSON, K. A. and V. Sadreida. 1974. Forest Tree Nursery Soil Management and Related Practices. Ministry of Natural Resources, Division of Forests, Forest Management Branch, Ontario. 177 p.
- BACON, G. J. 1979. An Effective Preemergence weedicide for use in *Pinus* nurseries. South African For. Jour. 109:3-6.
- HOLT, H. A., S. H. Sickhom, S. L. Sherrick, T. R. Witttrout, and J. R. Wichman, 1976. Weed Control in Indiana State Nurseries. Proceedings, North Central Weed Control Conference 31:106.
- McDONALD, S. D. 1973. Isolation of a Herbicide for General Application at the Coeur d'Alene Nursery, 1968-1971. M.S. Thesis, University of Idaho, Moscow. 50 p.
- RYKER, R. A. 1979. Western Herbicide Study—1979 Update. Proceedings of the Intermountain Nurseryman's Association Meeting. pp. 16-23.
- RYKER, R. A. 1980. Western Forest Tree Nursery Herbicide Study, Rocky Mountain-Great Basin Nurseries. Progress Report for 1979. Intermountain Forest and Range Experiment Station, USDA, Forest Service, Boise, Idaho. 63 p.
- STEWART, R. E. 1977. Herbicides for Weed Control in Western Forestry Nurseries. Proceedings, West. Soc. Weed Sci. 30:78-89.
- STOECKELER, J. H. and G. W. Jones. 1957. Forest Nursery Practice in the Lake States. Agriculture Handbook No. 110, USDA, Forest Service. 124 p.
- WAKELEY, P. C. 1954. Planting the Southern Pines. Agriculture Monograph No. 18, USDA, Forest Service. 233 p.
- WALSTAD, J. D. 1974. Pine Nursery Production Technology. Southern Forestry Research Center, Weyerhaeuser Co., Hot Springs, Arkansas. 18 p.
- WILDE, S. A. 1958. Forest Soils. Ronald Press Co., New York. 537 p.
- WINTER, K. 1978. Informe anual del Vivero Rapaco. COHDE—FOR, Tegucigalpa, Honduras. p. 19-20.