HERBICIDE COMBINATIONS FOR WEED CONTROL IN SKYLINE HONEYLOCUST[1]

by Steven C. Prochaska and Thomas A. Fretz[2]

Abstract. Pre-emergent fall applications of alachlor (Lasso) and oxadiazon (Ronstar) singly or in combination with linuron (Lorox) or simazine (Princep) exhibited in some cases excellent weed control in excess of 9 months in a Skyline honeylocust planting. Alachlor when applied at the 6.0 lb AIA (active ingredient per acre) rate controlled annual grass weeds 10 months after application. Oxadiazon exhibited excellent control of both annual grasses and broadleaf weeds at all rates except when used singly at 3.0 lb AIA. In addition, some control of bigroot morning glory (*Ipomea pandurata*) was observed with oxadiazon. Sequential applications of glysophate (Roundup) controlled weeds in the nursery situation with no phytotoxicity to the skyline honeylocust trees.

Control of weed populations is an essential management practice in the commercial production of shade trees. Increased demand for quality plants, reduced production schedules, and rising costs, make the use of herbicides imperative. The control of weeds in the shade tree nursery is complicated by several problems. First, adverse weather together with heavy spring and fall workloads can leave little opportunity for weed control practices. Secondly, shade trees are generally grown in the same location for 3-8 years, which makes it difficult to cultivate and impossible to fumigate. In addition, no single herbicide has yet been developed that will control all troublesome weeds without injury to some nursery crops.

For the above reasons a research project was initiated to develop an herbicide program which would more efficiently control annual grass and broadleaf weeds, including perennials. Time of application of the herbicide treatments was designed so that fall treatments could extend the weed control period beyond the heavy spring work period. This resulting herbicide program should reduce labor and operating costs, increase production of quality plant material in a shorter period of time and negate the effects of wet weather and seasonal workloads on both the application of herbicides and on the control of weed growth.

Materials and Methods

These experiments were conducted at the Cole Nursery Co., Inc., of Circleville, Ohio. Each individual experiment consisted of 6 treatments and a control with 3 replications. Plot design was completely randomized and each plot was 9' x 10' with 6-4 year old *Gleditsia triacanthos inermis* 'Skyline' trees per plot. All herbicides were applied with a CO_2 constant pressure sprayer calibrated to deliver the herbicides in the equivalent of 36 gallons of water per acre.

Both alachlor 4 EC and oxadiazon 2 EC were applied September 13, 1974 on clean cultivated soil in order to evaluate the control of winter and spring weed growth. The glysophate studies were initiated on May 20, 1975 and repeat applications were subsequently applied at 3 and 5 week intervals.

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Weed control was evaluated using a standard 1-10 visual rating system in which 1.0 represented no weed control and 10.0 complete weed control. Data on weed control, weed species present and observation of any injury to the nursery stock were evaluated monthly during the growing season. Treatment means when significant were separated using Duncan's multiple range test.

All herbicides were applied either alone or in combination with another herbicide to lengthen and increase overall weed control. Some of the prominent weed species present included Pennsylvania smartweed (*Polygonum pennsylvanicum*), common ragweed (*Ambrosia artemisiifolia*), common lambsquarter (*Chenopodium album*), galinsoga (*Galinsoga parviflora*), rough pigweed (*Amaranthus retroflexus*), henbit (*Lamium amplexicaule*), yellow rocket (*Barbarea vulgaris*), wild morning glory (*Convolvulus arvensis*), chickweed (*Stellaria media*), bigroot morning glory (*Ipomoea pandurata*), shepard's purse (*Capsella bursa-pastoris*), daisy fleabane (*Erigeron strigosus*), mare's tail (*Erigeron canadensis*), large crabgrass (*Digitaria sanguinalis*), yellow foxtail (*Setaria lutescens*), and barnyard grass (*Echinochloa crusgalli*).

Results

Alachlor (Lasso) — Alachlor is a preemergent herbicide that controls annual grasses (3) and when applied singly it has given safe, effective weed control in a wide range of ornamentals. Previous studies have indicated that alachlor may be combined with linuron or simazine to increase its weed spectrum (1,2).

All rates and combinations of alachlor gave satisfactory broadleaf weed control through June 4, 1975, 9 months after the initial application when compared to the nontreated control plots. Alachlor at 6.0 lb AIA (AIA = active ingredient per acre) alone or in combination gave better annual grass weed control than alachlor at 3.0 lb AIA alone or in combination with simazine at 1.0 lb AIA (Table 1). The combination of alachlor at 6.0 lb AIA + simazine at 1.0 lb AIA gave significantly better broadleaf weed control at the June 4, 1975 evaluation period and continued to be the better treatment in later evaluation periods. The broadleaf weeds controlled by alachlor included chickweed, yellow rocket, daisy fleabane, mare's tail, henbit and shepard's purse, however by the late July evaluation period weed control was becoming ineffective with increasing populations of ragweed, lambsquarter, yellow foxtail, galinsoga, and annual morning glory.

Table 1. Fall-applied alachlor and various combinations employed for winter and spring weed control in Skyline honeylocust.

Herbicide treatment[1]	Rate lb AIA	weed control: Broadleaf weeds (6-4-75)	weed control: Annual grasses (7-23-75)
Alachlor	3.0	7.3c	5.0a
Alachlor	6.0	8.3bc	8.0a
Alachlor + Linuron	3.0 + 1.0	8.0bc	8.7a
Alachlor + Linuron	6.0 + 1.0	8.7b	9.3a
Alachlor + Simazine	3.0 + 1.0	7.0c	5.7a
Alachlor + Simazine	6.0 + 1.0	10.0a	7.3a
Control	—	5.0d	5.0a

[1]Treatments applied September 13, 1974.

Oxadiazon (Ronstar) — Oxadiazon is a preemergent herbicide that exhibits some broadleaf postemergent activity at the seedling stage. In previous studies, oxadiazon has exhibited good weed control on a variety of field and container grown ornamentals with no phytotoxicity (2,5).

Excellent annual grass control was exhibited by all oxadiazon treatments through July 23, 1975, 9½ months after initial application on September 13, 1974. Broadleaf weed control was excellent through June 1975, however by July 23 increased weed infestations were beginning to appear in the 3.0 lb AIA rate singly or in combination with either linuron or simazine (Table 2).

In addition, oxadiazon did seem to offer some control of both annual and bigroot morning glory during the July evaluation period (Table 2).

Glyphosate (Roundup) — Glyphosate is a postemergent non-selective herbicide that controls a broad spectrum of annual and perennial weeds (3). This herbicide controls perennial vines, by absorption through vegetative tissues and translocation through the plant to underground rhizomes and roots (2,4).

Table 2. Fall-applied oxadiazon and various combinations employed for winter and spring weed control in Skyline honeylocust.

Herbicide Treatment[1]	Rate	Weed control				
		Annual grasses	Broadleaf weeds	Broadleaf weeds	Morning glory	Bigroot Morning glory
	lb AIA	7-23-75	7-4-75	7-23-75	7-23-75	7-23-75
Oxadiazon	3.0	10.0a	8.3ab	5.7b	8.7a	7.7a
Oxadiazon	6.0	10.0a	9.7a	7.7ab	9.3a	10.0a
Oxidiazon+Linuron	3.0 + 1.0	10.0a	8.0b	7.0ab	8.0b	10.0a
Oxadiazon+Linuron	6.0 + 1.0	10.0a	9.3ab	8.7a	8.7ab	10.0a
Oxadiazon+Simazine	3.0 + 1.0	10.0a	9.3ab	7.3ab	9.3a	10.0a
Oxadiazon+Simazine	6.0 + 1.0	10.0a	9.7a	8.3ab	9.3a	10.0a
Control	—	5.0b	1.0c	1.0c	5.0c	5.0b

[1]Treatments were applied September 13, 1974.

Table 3. Spring-applied glyphosate treatments for annual and perennial weed control in Skyline honeylocust.

Herbicide treatment	Rate	Weed control			
		Annual broadleaves	Bigroot morning glory	Bigroot morning glory	Morning glory
	lb AIA	(8-27-75)	(7-23-75)	(8-27-75)	(8-27-75)
Glyphosate (single application)	2.0	8.0b	9.0a	9.7a	9.7ab
Glyphosate (single application)	4.0	8.7ab	10.0a	10.0a	10.0a
Glyphosate (applied every 3 weeks)	2.0	10.0a	10.0a	10.0a	10.0a
Glyphosate (applied every 3 weeks)	4.0	10.0a	10.0a	10.0a	9.3b
Glyphosate (applied every 5 weeks)	2.0	10.0a	10.0a	10.0a	10.0a
Glyphosate (applied every 5 weeks)	4.0	10.0a	10.0a	10.0a	9.7ab
Control	—	3.0c	2.0b	2.0b	3.0c

Annuals controlled by single applications of glysophate included giant ragweed, lambsquarter, rough pigweed, yellow foxtail, large crabgrass, Pennsylvania smartweed and galinsoga. In addition perennial weeds including bigroot morning glory, Canada thistle, common milkweed and yellow nutsedge were controlled following repeated applications at either a 3 or 5 week interval.

There was no significant difference in the control of annual or perennial weeds between the 3 and 5 week interval applications. Treatments containing 2.0 lb AIA glyphosate were as effective as those at the 4.0 lb AIA rate (Table 3).

It should be noted that glyphosate activity was increased when applied to actively growing vegetation. Typically the injury to the weed species was manifested by a marked loss in green color, followed by a tip-dieback, and later wilting, stunting and eventual death. In the treatments applied directly to the trunks of Skyline honeylocust, no phytotoxicity was observed, however it must be cautioned that the trees in this study were beyond the green bark growth stage. Previous study by Smith *et al* (6) has documented that glyphosate caused trunk injury when applied to young trees with green bark.

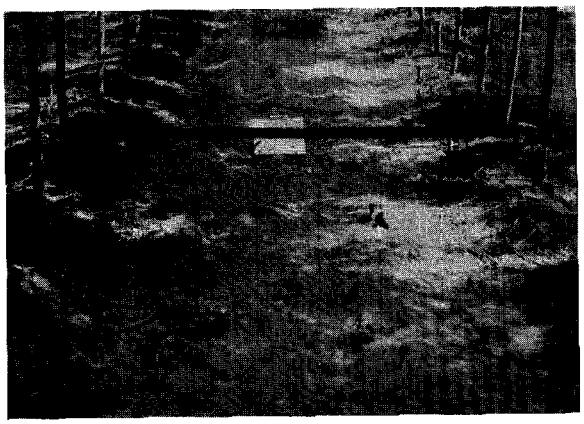

Figure 1. Oxadiazon (Ronstar) + Simazine (Princep) in foreground (extended to black line) at 6.0 + 1.0 lb AIA applied 9-13-74. Picture taken 6-30-75.

As a result of this study it appears that preemergent treatments of oxadiazon applied singly or in combination with 1.0 lb AIA of simazine or alachlor at 6.0 lb AIA offers a means of achieving extended weed control with no phytotoxicity to field grown Skyline honeylocust. In addition, repeated applications of glyphosate also offer an outstanding means of achieving postemergent control of annuals and perennials when applied at the proper time.

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INSECTICIDE INVENTORY AND RECOMMENDATIONS[1]

by Dr. Donald L. Schuder

Like mother Hubbard's cupboard our pesticide arsenal may soon be bare too! There are numerous reasons for this present condition.

Some of the blame goes back to Rachael Carson and her best selling book *Silent Spring.* Her philosophy inflamed the American public and the impressionable rebellious youth to wage an anti-pesticide battle. It soon became a political advantage to be anti-pesticide. As a result, congress amended F.I.F.R.A. and established the Environmental Protection Agency.

Since the establishment of this governmental agency many of the chemical weapons vital to the profession of arboriculture have been banned and/or their use severely restricted. You all know what they are: DDT, dieldrin, aldrin, chlordane and heptachlor.

As a result of the restrictions, the Gypsy Moth has spread clear to the Gulf of Mexico and the Pacific Ocean. There are now no effective chemicals for controlling the smaller european elm bark beetle, the vector of Dutch elm disease. The quarantine for the Japanese beetle has become a farce as there are no longer effective long residual soil insecticide treatments to control the larvae for more than a few weeks. The quarantine will have to be discarded unless some changes are made soon. We may have to use Milky Spores to inoculate our soils and it is only effective against high populations.

All of the insecticides which have long residual periods are being investigated with the avowed intent to remove them from our chemical arsenal. These include lindane, Thiodan, and even Vapona in the "no pest strips" is under indictment.

We must now use presently available pesticides only according to the label. As I'm sure you are well aware, many of the former uses no

1. Presented at the 52nd Annual Convention of the International Society of Arboriculture in St. Louis, Missouri in August of 1976.