WEED CONTROL IN ELDARICA PINE PLANTINGS

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Young plantation-grown eldarica pines (Pinus eldarica) can suffer reduced survival and growth when competing weeds deprive them of moisture, nutrients and growing space. Weeds are particularly damaging in arid regions because moisture deficits accentuate competition effects. In New Mexico, perennial grasses and annuals quickly overtop eldarica pine seedlings during periods of seasonal rains and high soil temperatures.

Total eradication of the weeds is often impractical or impossible, but plantation managers can control weeds to a level that optimizes crop productivity and value. Three primary methods of weed control (mechanical, chemical and cultural) will be discussed in relation to plantation-grown eldarica pines.

MECHANICAL

Mechanical weed control includes hand weeding, mowing, machine tillage, mulching and irrigation management.

Hand pulling and hoeing of weeds can be very effective, though quite expensive and time consuming. In situations where trees are tightly spaced, however, hand weeding may be the only practical means of controlling weeds, or at least a useful complement to other methods. Pulling and hoeing usually only remove the above-ground part of the plant, and seeds and living plant parts remain in the soil to regenerate weeds. Hand weeding may be required several times throughout a growing season.

Mowing is generally much less labor intensive than hand weeding, but still only removes part of the above-ground portion of the plants. In general, mowing has marginal weed control value.

Machine tillage, or cultivation, is a primary method of weed control and can be used effectively in eldarica pine plantings. Tree rows need to be spaced widely (usually 6 feet or more apart) to allow cultivating equipment to pass between the rows for the first two years or so of tree growth. Trees within rows can be more closely spaced unless the site will be cultivated across the rows as well. Cultivation is much faster and less expensive than hand weeding, especially over large areas. Unfortunately, cultivating machines usually cannot get close enough to the trees for safe and complete weed control. Other methods of control are often required to finish the job.

Machine tillage provides another major benefit in addition to weed control: the breakup of soil-surface crusts common to the Southwest. Low soil moisture and a lack of organic matter contribute to the crusting, and cultivation improves soil aeration and moisture infiltration. However, cultivation also improves conditions for weed seed germination, requiring additional tillage as weed populations become reestablished. Tillage need only be to a depth of 2 to 3 inches. Deep plowing is unnecessary and may damage tree roots near the soil surface.

Hay, straw or pecan shell mulches may effectively shade out emerging weeds, but are often expensive and vulnerable to wind scattering.

Irrigation management can help control weeds by making conditions less favorable for weed growth. Generally, unwatered areas between trees in drip-irrigated plantations will not support as many weeds as corresponding

areas in flood-irrigated plantations. Even under drip irrigation, however, weed control will probably be required.

Flooding can be used to kill weeds by cutting of the air supply to their roots, but P. eldarica does not tolerate anaerobic soil conditions. Long-duration flooding for weed control is not recommended.

CHEMICAL

Chemical weed control is often the method which requires the least physical effort to reach an acceptable level of control. Herbicides, as chemical plant killers are called, are available in many forms under hundreds of trade names. To understand appllication rates and safe modes of use, the grower must know the active ingredient in the commercial product being used. Container or bag labels provide explicit directions on application methods and alert the user to chemical hazards. New Mexico users should contact the New Mexico Department of Agriculture for information regarding the acquisition of applicator's licenses and safety training.

Herbicides possess varying degrees of specificity, determining the ability of a given chemical to control target plants without seriously harming crops. Crops will suffer some herbicide damage if the chemical's specificity is not well-defined or if applied at an improper rate.

Two major classifications of herbicides are defined according to their time of application in relation to the emergence of the weed species. Preemergence herbicides are applied before the weeds arise from the soil; postemergence herbicides are applied after weed emergence.

In southern New Mexico, one postemergence and five preemergence herbicides have been tested for their ability to control weeds without serious adverse effects on young eldarica pine seedlings. The herbicides tested and their rates of application are listed in Table 1.

Table 1. Herbicides tested with Pinus eldarica in southern New Mexico.

COMMON NAME	TRADE NAME	RATE (lb. ai/A)	WEED EMERGENCE CLASS
Glyphosate	Roundup	0.5 1.0 1.5 2.0	post
Hexazinone	Velpar L	0.5[1] 1.0	pre
Oxyfluorfen	Goal 2E	0.5 1.0	pre
Sulfometuron methyl	Oust	0.25[1] 0.5	pre
Terbacil	Sinbar	2.0 4.0	pre
Trifluralin	Treflan	1.0 2.0	pre

[1]In addition to each of these chemicals being tested alone, two additional treatments were tested: 0.5 lb. ai/A Velpar combined with 0.25 lb. ai/A Oust, and 0.5 lb. ai/A Velpar combined with 0.13 lb. ai/A Oust.

All preemergence treatments were mechanically incorporated into the soil to a depth of 1 to 2 inches immediately after spraying in February. Roundup treatments were applied in a broadcast aqueous spray over the tops of the pine seedlings every 30 days from June through September.

Velpar at both rates and Treflan at the higher rate provided excellent early season control of broadleaf weeds, but failed to maintain effectiveness as the season progressed. Higher rates or multiple applications of either of these two chemicals have not been tested but may provide safe and effective, season-long weed control. Granular forms of both Velpar and Treflan are available and have been successfully used with conifers. These products should be evaluated with elarica pine because of their ease of application (no soil incorporation) and slow release quality.

Oust applied alone or in combination with Velpar provided adequate weed control through mid-season, but suppressed tree growth. Lower rates of Oust might provide effective weed control without reducing pine seedling growth.

The two highest rates of Roundup controlled weeds well, but caused browning and spindliness in the pine seedlings. However, Roundup applied as a directed spray to weeds only will effectively control weeds without damaging seedlings.

Goal reduced pine seedling growth and provided little weed control. Sinbar at both rates killed all eldarica pine seedlings by mid-season.

CULTURAL

Smother crops, or ground cover crops that are better competitors for the site than the native weeds, can be grown under the trees as an alternative to the weeds. Possible candidates for this role are low growing, lightly competitive grass species and clovers which can help stabilize the soil in cases where total weed eradication, especially by mechanical means, will lead

to serious topsoil erosion. Smother crops may become weeds themselves, however, if the wrong species are chosen and their growth is not controlled.

If trees are spaced properly and the smother crop has some market value, the smother crop may be harvested to add to the productivity of the plantation. Tree spacings which favor the pines as the primary crop will probably limit the number of harvested smother crops to those which can be harvested in the first one or two years. Harvesting the smother crop will be hindered as the trees enlarge and grow closer together.

It may be possible to introduce some grazing animals to the plantation as weed controlling agents, although this is not recommended. Many large mammals enjoy browsing the succulent growth of conifers, especially the young terminal leaders.

COSTS AND BENEFITS

Weed control costs vary widely depending on needs, methods and resources. Seasonal hand weeding costs may exceed $100 per acre, and machine tillage may cost $40 to $50 per acre. Herbicide costs for the rates discussed in this paper range from about $8 to $256 per acre per season, plus the costs of application.

Competing weeds do not have a significant effect on the height growth of eldarica pine, so it would be easy to assume that control is not necessary; however, trees grown in weedy plots are much more spindly and less full than their counterparts grown with the benefit of weed control. Tree quality and value are greatly reduced by severe weed competition, and with a crop as

valuable as P. eldarica, the costs of weed control are considered minimal and worthwhile.

Growers must carefully plan and evaluate their management schemes before planting any trees. Effective weed control is vital to proper site preparation, early tree care and, ultimately, the profitable production of Pinus eldarica.

MENTION OF TRADE NAMES IS SOLELY TO IDENTIFY MATERIAL OR EQUIPMENT USED AND DOES NOT IMPLY ENDORSEMENT BY THE COOPERATIVE EXTENSION SERVICE OR NEW MEXICO STATE UNIVERSITY.
