

 UI Extension Forestry Information Series

Forest Herbicides and Their Mode of Action

Randy Brooks

Herbicides are currently one of the most widely used forms of weed control in tree plantings. Most forest weeds are not controlled as well by non-chemical methods (scalping, burning, etc.) as by herbicides. Herbicides have several advantages over other weed control methods due to selective and rapid control, retention of surface nutrients and organic matter, and the residual dead mulch that conserves soil moisture and inhibits re-invasion of weeds. They are especially effective on tough perennial weed species such as quackgrass, brome grass, and Canada thistle. Selecting a herbicide will vary with species and growth habits of both the weed and the tree. Problem weeds should be controlled during site preparation. They can be more difficult to control once trees are planted.

Many herbicides are labeled for use in tree plantings, and for site preparation and general use in forested situations. Some herbicides can be applied directly over some trees. Direct applications can be harmless to some trees at any stage of growth, harmless to others only when they are dormant, and lethal to some species at any time. Herbicides are very specific and nonlabel applications are not only illegal, but may be lethal to crop trees and/or ineffective on weeds. Some herbicides must be applied as a directed spray to minimize or avoid spray contact with the trees. Herbicides are used in various stages of tree growth. Know the existing weeds and use herbicides that control weeds while being safe for desired trees and shrubs. Be sure to read and follow the directions on the label.

Surfactants. Surfactants (or adjuvants) are used to enhance herbicide performance and are sometimes necessary for control of specific weeds. A surfactant enhances the coverage of a sprayed-on herbicide by reducing the surface tension of spray droplets and allowing greater pesticide contact and penetration,

enhancing the toxicity of the material. Consult the label for forestry applications, as some conifers may be affected by the addition of a surfactant.

The new silicon surfactants (e.g. SYLGARD 309) have been developed to specifically enhance the performance of pesticides. These surfactants have their greatest effect when combined with water-soluble, postemergent herbicides. Silicone surfactants have the ability to penetrate leaf surfaces in less than one minute. Herbicide applications made prior to sudden rainstorms are no longer rendered useless. Some herbicides now come with SYLGARD already pre-mixed.

Major Herbicides Labeled for Forestry in the Inland Northwest. The following herbicides are labeled for forestry applications in the Inland Northwest. Their registered names are in italics and trade names are in parentheses. Mention of specific chemicals and trade names does not imply endorsement.

- *Hexazinone* (Velpar or Pronone) – Hexazinone is a contact herbicide in its liquid form (Velpar) and a residual herbicide in liquid and granular form (Pronone) which can be foliar and/or soil applied. It affects the plant by inhibiting photosynthesis. It controls broadleaf weed, woody species, and grasses, and is used for selective weed control in conifers, and for conifer release. It can be applied when target plants are actively growing. Dormant season application of Pronone granular over sensitive conifers will provide residual, soil active control for the next 1-2 growing seasons.
- *Imazapyr* (Arsenal, Chopper, or Contain) – This is a nonselective, broad spectrum systemic herbi-

cide with residual soil activity. It's action is to inhibit enzymes used in synthesis of some amino acids. Imazapyr is readily absorbed through foliage or roots. It is used to control most annual and perennial grasses, broadleaf weeds, and woody species. It can be applied pre- or postemergence for long-term total vegetation control on non-crop lands.

- *Clopyralid* (Stinger, Transline) – This is a highly translocated, selective herbicide. Control is achieved by causing the plant to overexpend energy by producing excess hormones. These chemicals are absorbed through a plant's foliage. It is used postemergence on broadleaf herbaceous weeds, mostly on *Asteraceae*, *Fabaceae*, and *Polygonaceae* families, and does not harm conifers. It provides excellent control of Canada thistle, but does not control grasses or sedges.
- *Metsulfuron* (Escort, Ally) – This is a selective, postemergence herbicide used at low rates to control broadleaf weed and brush in non-cropland areas. It works within a plant by interfering with an enzyme which results in rapid cessation of cell division in both roots and shoots. Escort is used for selective broadleaf weed and brush control in pastures, rangeland, and noncropland. It can be used for site preparation or conifer release.
- *Triclopyr* (Garlon 3a) – This is a systemic, growth-regulating herbicide used to control woody and broadleaf perennial weeds in noncropland, forestland, range, permanent grass pasture, and right-of-ways. It also mimics natural plant hormones.
- *2,4-D* – Probably the most commonly used of all herbicides, 2,4-D is a selective herbicide used to control annual and perennial broadleaf weeds. It mimics natural plant hormones. It is absorbed through the foliage and translocated within the plant. Applications are made postemergence. Plants are most susceptible to 2,4-D when they are young and rapidly growing. Actively growing conifers are very susceptible to 2,4-D.
- *Picloram* (Tordon) – Picloram is a restricted use herbicide. It is a highly translocated, selective herbicide for broadleaf weeds and woody plants. It is active through foliage and roots and has a long persistence in the soil, requiring precautions to avoid damage to desirable plants.
- *Glyphosate* (Rodeo, Accord, Roundup) – Glyphosate is another one of the more common herbicides. It acts in a plant by inhibiting amino acid production and protein synthesis. It is nonselective and used to control grasses, broadleaf, and woody plants. It is absorbed through the foliage and translocates to the roots, but has no apparent soil activity. Because of this, it is applied postemergence only and requires substantial foliage contact for full effectiveness. Rodeo and Accord may require the addition of a surfactant.
- *Atrazine* (Aatrex) – Atrazine is another restricted use herbicide that inhibits photosynthesis in the targeted species. It is a selective herbicide in agriculture, but is used nonselectively in non-crop areas. It is primarily root absorbed, although some foliar absorption does take place. Due to its long residual activity in the soil it provides season-long control for weeds, but precautions must be taken to avoid damage to desirable plants.
- *Simazine* (Princep) – Simazine is also a restricted use herbicide that inhibits photosynthesis in the targeted species. Similar to Atrazine, it is used selectively in agriculture. It provides complete vegetation control (broadleaf and grasses) in non-crop areas when used at higher rates. It has long soil residual activity (>1 year), but requires lots of moisture in the soil to activate it.
- *Sulfometuron* (Oust) – Sulfometuron is a broad spectrum herbicide. It acts in the plant to interfere with an enzyme resulting in rapid cessation of cell division. It controls grasses and broadleaf weeds through foliar contact or root uptake, and can be applied pre- or postemergence. It kills plants at low rates. Oust can be applied over the tops of conifers if they are not lacking in vigor (stressed).

-
- *Pathway* (Picloram+2,4-D) – *Pathway* is sold as a combination of Picloram plus 2,4-D and has a forestry label. It can be applied on cut surfaces (stumps) or injected under the bark of woody species where it is translocated to the roots.

Timing and rates of herbicides applications are very important. Timing depends on the herbicide being used and its persistence, along with other characteristics discussed in the last issue. Remember, always read

and follow the directions on the label, and check to make sure the chemical you are buying is registered for your intended use and that you or other applicators are licensed where required.

This information first appeared in Woodland NOTES, Vol. 10, No. 1.

About the Author: *Dr. Randy Brooks* is an Area Extension Educator - Forestry and Professor at the University of Idaho.

