

# Chemical Weed Management in Northern Hardwood Nurseries

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**Facing Page:** *Clean, healthy seedbed. (Photo by Jeanie Redicker.)*

## Precautionary Note on Herbicide Use

The following information is a record of herbicides that have been found useful in the past. It is not a recipe for a particular use in a specific nursery. There are many herbicides and many different labels for those herbicides. The information provided herein is a place to start because pesticide labels may change over time. Before using any pesticide product, check with the appropriate State pesticide regulatory authorities to determine if that product is registered in that State, Tribe, or other jurisdiction for the intended application site. The cardinal rule for any pesticide use is to **READ AND FOLLOW CAREFULLY ALL LABEL INSTRUCTIONS**. The pesticide label is a legal document providing instructions on the proper use of the product, including application rate and labeled species. The label also provides much useful information on safe handling procedures, weeds controlled, and conditions that may adversely affect the activity of the herbicide on weeds or the crop. If the herbicide has a label for ornamental nurseries, it can be used in hardwood nurseries, provided other aspects of the label are followed.

## The Timing and Use of Herbicides in Northern Hardwood Nurseries

Use of herbicides is most effective when combined with other cultural practices such as weed sanitation and soil fumigation. The timing of herbicide application depends on many factors. One of the most fundamental considerations is whether the herbicide compound has “preemergent” or “postemergent” herbicidal activity. Preemergent products are applied to the soil where they are taken up by germinating weeds and then slow or terminate essential plant biochemistry so weeds never emerge from the soil, or expire soon after emergence. These compounds remain active in the soil for a period of time depending on soil texture, soil organic matter, rate of application, as well as soil temperature and amount of precipitation. Preemergent herbicides may be used for weed control in hardwood seedling beds because tree seedlings are not seriously damaged due to several factors, such as a large seed size compared with weed seed, tree seed planted below the zone of herbicide activity, tolerance of some species even when exposed to the herbicide, and timing the application to after tree seedling germination is complete. In addition, tree seed is frequently planted in the fall. Typically, preemergent herbicides are applied in the spring, before hardwood seedling emergence, during seedling emergence, or 4 to 6 weeks

after seedling emergence, depending on the herbicide. If a preemergent herbicide is applied after hardwood sowing in the fall, the herbicide probably would not effectively control weeds in the spring due to leaching or degradation. Also, fall application would inhibit the establishment of living mulch cover crops used in many nurseries.

A postemergent herbicide, on the other hand, is applied to the weed after it has emerged from the soil and is actively developing. These compounds are typically absorbed into the plant through the leaves. Some postemergent compounds can be sprayed over the top of growing hardwood seedlings. These are primarily herbicides that only control annual and perennial grasses. Other postemergent compounds should not be applied to emerged and growing hardwood seedlings, however, as they are broad-spectrum herbicides that kill both grasses and broadleaves. The nursery manager must be aware of these distinctions.

## Preemergent Herbicides Used in Seedbeds

The herbicides discussed below have been used by nursery managers in the Northeastern United States. There may be other formulations of the same chemical that could be advantageous in some situations. An internet search on the chemical name will provide pesticide labels and material data safety sheets (for example, the Crop Data Management Service database <http://www.cdms.net/label-database>). It is essential to understand the correct timing of application as it relates to both the seedling crop and the weed to be controlled.

### Cavalcade 65WDG

Cavalcade 65WDG (proflumicafone) is a soil-active preemergent compound labeled for a wide range of hardwood species. This herbicide disrupts cell division and, therefore, interferes with germination. It controls most grasses and broadleaf weeds, but weeds that have emerged prior to application will not be effectively controlled. The label states that the foliage of seedlings may be temporarily injured if this herbicide is applied when the plants are “flushing.” The label also states that unless it is certain the foliage of the species to be treated will not be damaged, wait to apply until the foliage has “hardened off” (not actively growing) and wash the herbicide off the foliage with irrigation immediately after application. Some nurseries wait 4 to 6 weeks after seedling germination to apply this herbicide. Unless one has experience with this

herbicide, try a small-scale test before treating the entire crop and/or discuss this with a nursery manager who has used this herbicide. It can be applied more than once per season as long as the total does not exceed the amount specified by the label. Irrigate immediately after application to move the herbicide into the soil. Some nursery managers have been applying this before germination in the spring to larger seeded hardwood species. Black cherry (*Prunus serotina* Ehrh.), red osier (*Cornus sericea* L), silky (*Cornus oblique* Raf.) and grey (*Cornus racemosa* Lam.) dogwood, sassafras (*Sassafras albidum* Presl.) , persimmon (*Diospyros virginiana* L.), American plum (*Prunus Americana* Marsh.), and black locust (*Robinia pseudoacacia* L.) all readily germinate through the low application rate as listed on the label. Oaks and walnut also tolerate it.

### **Pendulum 2G or Pendulum AquaCap**

Pendulum 2G and Pendulum AquaCap (pendimethalin) are soil-active preemergent compounds that can be applied to a wide range of hardwood species. Pendimethalin disrupts cell division and therefore interferes with germination. It controls many grasses and broadleaf weeds, but weeds that have emerged prior to application will not be effectively controlled. The label states: “Do not apply during bud swell, bud break, or at time of first flush of new growth.” The label refers to use on established plants. It can be reapplied one additional time during the growing season. Irrigation is necessary to incorporate into the soil following application.

### **SureGuard**

SureGuard (flumioxazin) is a soil-active and mostly pre-emergent compound that can be applied to some hardwood species. It inhibits chlorophyll biosynthesis and controls many grasses and broadleaf weeds. The label states, “Do not apply to trees less than one year old,” and “Application to green foliage or green bark may cause unacceptable damage.”

This herbicide is most effective when applied pre-emergent to weeds but has some postemergent activity on small emerged weeds. If applied postemergent to the crop, apply before tree seedlings break bud. Irrigation is necessary following application to incorporate into the soil. This herbicide is not widely used in northern hardwood nurseries, therefore try it in small test plots or consult a nursery manager with experience in its use.

### **Lontrel**

Lontrel (clopyralid) is a soil-active preemergent compound that has been used in some nurseries when species of clover (*Trifolium* spp.) or medic (*Medicago* spp.) are a weed problem because of their resistance to soil fumigants. However, the label states that postemergent applications be directed to avoid the foliage of most hardwood species. Nursery managers who have used this product recommend the lower application rates. Clopyralid may carryover in the soil from one year to the next, possibly resulting in damage to a subsequent legume crop such as black locust, Kentucky coffee tree (*Gymnocladus dioica*, L., K. Koch), redbud (*Cercis canadensis* L.), or soybeans as a cover crop. This herbicide is not widely used in this region so small test plots should be installed as a precaution.

## **Postemergent Herbicides Used in Seedbeds**

### **Fusilade DX**

Fusilade DX (fluazifop-p-butyl) is a postemergent compound with little or no soil activity and can be applied over the top to most hardwood species to control annual and perennial grasses. While it acts on meristematic tissue in roots and stems of grasses, it does not control broadleaf weeds. Since Fusilade DX does not have soil activity, it only controls grass weeds that have emerged at the time of application. Use in hardwood nurseries can be inferred under the “Nonbearing Crop” section of the label. The label states the following: “Nonbearing crops not listed should be screened for phytotoxicity prior to widespread use.”

### **Envoy Plus**

Envoy Plus (clethodim) is a postemergent herbicide that controls annual and perennial grasses, much like Fusilade DX, and acts on meristematic tissues in roots and stems. The label lists many hardwood tree species. Like Fusilade DX, it does not have soil activity and only controls grasses to which it is applied. Grasses that emerge after application are not controlled.

## Herbicides Used To Control a Cover Crop Planted as a Living Mulch

Typically, the living mulch crop is planted with the tree seed in the fall. Wheat and rye are frequently used, as their seed germinates quickly in the fall to form a living mulch that reduces soil erosion, frost heave, seed predation, and damage from extreme winter cold. This mulch crop must be killed in late winter before the seedling crop begins to emerge. The herbicides discussed below are applied to the foliage of the cover crop and do not have soil activity. Some nurseries have used oats in the place of wheat or rye. Oats are killed by winter cold, not requiring the use of an herbicide. Oats may, however, be killed too soon by cold weather in the fall and not provide the crop protection desired.

### Roundup Pro

Roundup (glyphosate) is a systemic (moves within the plant) postemergent herbicide that is applied in late winter to the foliage of the cover crop. It will kill any weed that has germinated over winter, whether grass or broadleaf, including the cover crop. Activity is slow under the cool late winter conditions, therefore it is essential to apply several weeks before seedlings begin to emerge.

### Gramoxone SL 2.0

Gramoxone SL 2.0 (paraquat dichloride) can be applied in late winter as described above, but is not systemic and only kills the foliage that is contacted. Activity is very rapid, usually within a few days, killing both broadleaf and grass weeds. This herbicide must be applied before any crop seedlings have emerged or it will kill the foliage of emerged seedlings. If the growing point of the emerged seedlings is above ground, it may kill the seedlings.

### Fusilade DX or Envoy Plus

Fusilade DX (fluazifop-p-butyl) or Envoy Plus (clethodim) can be used to kill wheat or rye living mulch if the seedling crop emerges before glyphosate or paraquat can be applied.

## Herbicides Used in Cover Crops and Green Manure Crops

Weed control in cover crops as part of a weed sanitation program is another important way herbicides are used in

the nursery. In this situation, refer to the parts of the label applicable to the cover crop or to noncrop uses. However, if the cover crop is harvested and sold as an agricultural commodity, follow the part of the label applicable to that crop. One goal of weed sanitation is to minimize the quantity of weed seed that is carried over in the soil from the cover crop to the nursery crop.

### Roundup Pro

Roundup (glyphosate) is a broad-spectrum herbicide that controls most grasses and broadleaf weeds. A commonly used strategy is to use corn or soybean varieties that are Roundup Ready (genetically modified to tolerate glyphosate). In this case, glyphosate can be applied over the top of the cover crop and weeds to eliminate most grasses and broadleaf weeds without damaging the cover crop. Glyphosate is not soil active so it only controls the weeds present at the time of application. Often the cover crop is planted at densities significantly higher than normally used in field crop production, thereby quickly producing a canopy to inhibit the germination of weeds after the crop becomes too tall for additional glyphosate applications. For cover crops where Roundup Ready varieties are not available, such as wheat and sorghum, other herbicides can be used, depending on weed species and growth stage of weed or crop.

### Valor EZ

Valor EZ (flumioxazin) is the agriculture version of Sureguard and does a very good job of preemergent weed control when soybeans are used as a cover crop. Since nurseries have a low tolerance for weeds, a preemergent application at planting is well worth the investment, especially since Roundup has some resistance issues.

### Harmony Extra SG

Harmony Extra SG (thifensulfuron-methyl) is a selective spring-applied postemergent herbicide used in a wheat crop to control many weeds that have germinated since the crop was planted the previous fall.

### 2,4-D Amine 4

2,4-D amine 4 (dimethylamine salt of 2,4 dichlorophenoxyacetic acid) is a selective postemergence herbicide used to control broadleaf weeds in cover crops such as sorghum or corn. This herbicide selectively controls broadleaf weeds without significantly damaging the grass cover crop or grass weeds.

## **Basagran**

Basagran (sodium salt of bentazon) is a selective postemergence herbicide used to control broadleaf weeds and sedges in corn, sorghum, and soybean cover crops.

## **Other Products**

The application of herbicides that are labeled for use in an agricultural crop grown as a cover crop, or used in noncrop areas such as bed-ends, can help reduce weed seed production. This may be particularly important where weed seed may be washed, wind blown, or transported on equipment into seedling production areas. For example, Lontrel applied to bed-ends can help keep clover populations from establishing and subsequently being carried into production areas. One must be cautious, however, of herbicide carry-over if the area will later be used as a seed bed. The local farm supply business or the County Extension Agent may be able to suggest herbicides to meet specific needs.

