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Herbicides for Pre-emergence Weed Control in Christmas Trees.

Spring is almost here and it is time to plan for pre-emergence herbicide application in Christmas trees to control summer annual grassy and broadleaf weeds. For a pre-emergence herbicide to be effective, it must be applied well ahead of weed seed germination. However, before deciding on an herbicide, you must know your major weed species. Therefore, regular scouting and correct weed identification are vital to help select the most suitable pre-emergence herbicide for next growing season and get a bigger bang for your buck.

To increase the duration of weed control, consider a product with longer soil residual activity and use higher application rates, within label limits, depending on tree age, species, and soil type. The higher the application rate, the longer it takes for an herbicide to dissipate below the minimum threshold level. Always keep in mind that a pre-emergence herbicide will require 1/2 to 1 inch of water from rainfall or irrigation for activation. Therefore, either time your application within a few days before rainfall or apply a light irrigation. Do not apply pre-emergence herbicides on snow or frozen soil and also make sure the ground is free of thatch or other debris which may intercept the herbicide from reaching the soil.

What Weed Species Interfere with Christmas Trees Growth?

Many grassy and broadleaf weeds compete with Christmas trees for water, nutrients, light, and space. Most commonly encountered grassy weeds include: annual bluegrass, barnyardgrass, broomsedge, crabgrass, goosegrass, fall panicum, foxtails, junglerice, quackgrass, and witchgrass etc. The most common broadleaf weeds are: annual sow thistle, Asiatic dayflower, chickweeds, common purslane, common ragweed, dandelion, field bindweed, field pennycress, goldenrod, hairy vetch, horseweed, horsenettle, lambsquarters, pigweeds, prickly lettuce, prostrate spurge, shepherd's-purse, smooth bedstraw, smooth cat's-ear, spotted spurge, wild carrot, and willow weed.

What Pre-emergence Herbicides are Available for Controlling Weeds in Christmas Trees?

A fairly good number of pre-emergence herbicides are available for broadleaf and grassy weed control in Christmas trees. However, factors such as Christmas tree species and age, weed species to be controlled, environmental safety, and economics must be considered to select an herbicide most suitable to your situation.

Herbicides commonly used for weed control in Christmas trees belong to one of the following groups:

- 1. Photosynthesis Inhibitors:** This group consists of triazine herbicides such as Atrazine, Simazine, Prometryn, and Hexazinone etc. Atrazine is mainly effective on broadleaf weeds. Simazine has both grass and broadleaf activity. They are absorbed both by roots and foliage. They bind to a protein involved in electron transfer in Photosystem II, thereby inhibit photosynthesis which results in chlorosis of plant leaves followed by necrosis of leaf tissue and eventually death of the whole plant. Triazines have excellent soil activity. Their soil persistence varies from a few weeks to many months depending on product, use rate and soil pH. Triazine-resistant weeds have been confirmed in several states in the US following repeated use of these herbicides.

Weeds Controlled

Atrazine controls annual morningglory, cocklebur, groundcherry, kochia, Jimsonweed, lambsquarters, nightshade, pigweed, ragweed, purslane, velvetleaf, wild oats, and witchgrass.

Simazine will control alyssum, annual bluegrass, annual ryegrass, barnyardgrass, crabgrass, downy brome, fall panicum, foxtails, goosegrass, junglerice, signalgrass, silver hairgrass, wild oats, rattail fescue, witchgrass, annual morningglory, carpetweed, common chickweed, fiddleneck, filaree, fireweed, Florida pusley, groundsel, henbit, knawel, lambsquarters, nightshade, pepperweed, pigweed, pineappleweed, prickly lettuce, common purslane, ragweed, redmaids, Russian thistle, shepherd's-purse, smartweed, Spanish needles, speedwell, tansy mustard, and wild mustard.

- 2. Root Inhibitors:** This group consists of Dinitroaniline herbicides such as Pendimethalin, Oryzalin, and Trifluralin etc. Dinitroanilines are largely absorbed by young seedling shoot organs such as the hypocotyl or coleoptile and to some extent by plant root systems. They are very effective on grassy weeds as well as some dicot weeds such as pigweeds and lambsquarters. Other dicots such as ragweeds and smartweeds are not adequately controlled. Dinitroaniline herbicides act by inhibiting cell division (mitosis) and kill susceptible plants by inhibiting cell division in root cells which arrests normal root growth.

Weeds Controlled

Dinitroanilines control annual bluegrass, barnyardgrass, crabgrass, crowfootgrass, foxtails (yellow, green, and giant), goosegrass, itchgrass, Johnsongrass (from seed), junglerice, lovegrass, panicums (browntop, fall, and Texas), sandbur, signalgrass, sprangletops (Mexican and red), witchgrass, woolly cupgrass, carpetweed, common chickweed, mouse-ear chickweed, cudweed, evening primrose, filaree, Florida pusley, henbit, horseweed, kochia, lambsquarters, lawn burweed, London rocket, Pennsylvania smartweed, pigweed, puncturevine, purslane, shepherdspurse, spurges (annual and prostrate), speedwell, velvetleaf, and yellow woodsorrel.

Oryzalin is weak on annual morningglory, climbing milkweed, ladythumb, london rocket, mustards (black and wild), nightshade (black), prickly lettuce, prickly sida, prostrate spurge, spotted spurge, ragweeds (common and giant), smartweed, sowthistle, and velvetleaf.

- 3. Shoot Inhibitors:** This group comprises of chloroacetamides herbicides such as Pennant

Magnum etc. Shoot inhibitor herbicides are absorbed by germinating seedling shoots prior to or at the time of emergence. They block the formation of long chain fatty acids. Pennant Magnum effectively controls many annual grasses, Asiatic dayflower, yellow nutsedge and black nightshade. Typical persistence in the soil is 10 to 15 weeks.

Weeds Controlled

Pennant magnum controls annual bluegrass, barnyardgrass, crabgrass, crowfootgrass, foxtails (yellow, green, and giant), goosegrass, Johnsongrass (from seed), junglerice, fall panicum (browntop, fall, and Texas), sandbur, witchgrass, carpetweed, common purslane, common groundsel, hairy galinsoga, nightshade (black and hairy), and Florida pusley. Pennant magnum also controls annual sedge and yellow nutsedge.

- 4. Shoot and Root Inhibitors:** This group comprises of herbicides such as Devrinol 50W or 5G (Napropamide). Devrinol is a long residual herbicide labeled for use in conifer seedbeds and transplant beds. It controls most annual grasses and many broadleaf weeds. It is weak on common ragweed, yellow woodsorrel, spurge, nightshade, and horseweed.

Weeds Controlled

Devrinol controls annual bluegrass, barnyardgrass, barleys, bromes, canarygrass, crabgrass, foxtails, goosegrass, seedling Johnsongrass, panicums, Italian ryegrass, sandbur, sprangletops, stinkgrass, annual sowthistle, carpetweed, common chickweed, common groundsel, common lambsquarters, common purslane, horse purslane, little mallow, prickly lettuce, prostrate knotweed, pineappleweed, purple cudweed, redstem filaree, and redroot pigweed.

- 5. Cellulose Biosynthesis Inhibitors:** This group comprises of herbicides such as

Gallery 75 DF, Marengo, and Specticle.

These herbicides affect cell wall biosynthesis in susceptible weeds and prevent cell division in developing root tips. Seeds of treated plants germinate but they either fail to emerge or emerge as severely stunted seedlings. Gallery is mainly a broadleaf herbicide and does not have activity on grassy weeds. It may be applied over-the-top in established field grown conifer species listed on the Gallery 75 DF label (consult product label). **Marengo and Specticle are newly registered products for use as fully directed sprays in field established Christmas trees. However, there is very little experience with these herbicides in the Northeast.** Over-the-top application of Marengo/Specticle may seriously injure Christmas trees.

Marengo/Specticle control annual grassy as well as broadleaf weeds. These products do not control plants emerging from tubers, rhizomes, bulbs, corms, existing rootstocks, and woody vegetation.

Weeds Controlled

Gallery 75 DF controls asters, bittercress, carpetweed, chamber-bitter, chickweeds, common groundsel, common ragweed, curly dock, dandelion, dogfennel, eclipta, fleabanes, honeyvine milkweed, horseweed, henbit, Jimsonweed, lambsquarters, London rocket, mustards, nightshade (black), pepperweed, pigweeds, plantains, prickly lettuce, red sorrel, shepherd's-purse, spiny sow thistle, spurges, swinecress, tansy mustard, white clover, wild carrot, wild mustard, wild radish, willoweed, and wood sorrels.

Marengo/Specticle labels indicate control of annual bluegrass, crabgrass, foxtails, and ryegrass and broadleaf weeds such as bittercress, chickweeds, clover, cudweed,

curly dock, dandelion, eclipta, filaree, Florida pusley, common groundsel, hairy fleabane, lambsquarters, mare's tail, mustard, oxalis, pigweeds, spotted spurge, annual sow thistle, shepherd's purse, and willowherb.

6. **Cell Membrane Disruptors:** This group comprises herbicides such as Oxyfluorfen (Goal XL, Galigan 2E, and Goal Tender) and Flumioxazin (Sureguard). These herbicides inhibit the protoporphyrinogen oxidase (PPO) enzyme in the chloroplast to prevent biosynthesis of protoporphyrin IX which is a precursor for the synthesis of both chlorophyll and heme. The inhibition of PPO leads to production of highly reactive molecules that destroy lipids and protein membranes.

Weeds Controlled

Goal 2 XL, Galigan 2E, or Goal Tender control annual bluegrass, barnyardgrass, broadleaf signalgrass, canarygrass, crabgrass, foxtails, witchgrass, bedstraw, common cocklebur, common lambsquarters, common groundsel, common ragweed, cutleaf evening primrose, horseweed, pepperweed, pigweeds, prostrate spurge, red clover, spotted spurge, white clover, tropic croton, morningglories, mustard species, nightshades, tangy mustard, **thistles (bull and Russian)**, and yellow wood sorrel.

Sureguard controls annual bluegrass, barnyardgrass, chickweeds, chamberbitter, hairy bittercress, dog fennel, eclipta, redstem filaree, hairy galinsoga, groundsel, henbit, horseweed, ground ivy, lambsquarters, liverwort, morningglories, mulberry weed, moss, mustards, nightshades, pearlwort, pigweeds, pennycress, phyllanthus, plantains, ragweeds, tropical spiderwort, **thistles (Canada and Russian)**, velvetleaf, yellow rocket, and yellow woodsorrel.

7. **Others/Prepackaged Mixtures**

Westar DG (Hexazinone + sulfometuron methyl) is a prepackaged mixture of a photosynthesis Inhibitor (Hexazinone 68.6%) and an ALS-Inhibitor (Sulfometuron methyl 6.5%). Westar may be applied over-the-top of field planted Douglas fir, Fraser fir, blue spruce, Scotch pine, and white pine prior to budbreak. Westar also provides early postemergence control of small weed seedlings (< 2 inches). Add a non-ionic surfactant (0.25% v/v) to improve control of emerged weed seedlings. Do not add surfactant when tank-mixed with Roundup original (for directed application only in field established trees) else severe tree injury may occur. The active ingredient 'hexazinone' in Westar may leach through soil under some conditions and contaminate the ground water.

Weeds Controlled

Westar controls grassy weeds such as crabgrass, creeping bentgrass, downy brome, fescue, Italian ryegrass, rattail fescue, and some sedges as well. Broadleaf weeds controlled include: asters, common chickweed, common groundsel, common lambsquarters, common ragweed, fleabane, goldenrod, Pennsylvania smartweed, pigweeds, smooth cat's-ear, spotted cat's-ear, sunflower, wild carrot, and yarrow.

Table 1: Herbicides for pre-emergence control of grassy and broadleaf weeds in Christmas trees.

Site of Use	Pre-emergence herbicide	Comments
Seed beds	Goal XL, or Galigan 2E @ 1 to 2 pints/ac or Goal Tender @ 0.5 to 1 pint/ac.	Apply higher rate after seeding "LABELED CONIFERS" and lower rate 5 to 6 weeks after conifer emergence.
Transplant beds (2-years or older seedlings)	Use one of the following herbicides: Treflan 5G @ 10-20 lbs/ac if incorporated or 30-50 lbs if surface applied. Ronstar G @ 150 lbs/ac. Goal XL/Galligan 2E @ 2 to 4 pints/ac. Goal Tender @ 1 to 2 pints/ac. Sureguard 51 WDG @ 8-12 oz/ac. Pennant Magnum @ 2 to 2.5 pints/ac.	Apply to dormant conifers before budbreak in summer. Princep 4L @ 2 pints/ac or Pennant Magnum @ 2 to 2.5 pints/ac may be combined with Galigan 2E @ 2 pints/ac or Ronstar G @ 100 lbs/ac. (Princep, Simtrol and Ronstar are safe on the early flush. However, avoid Goal XL, Galigan, or Goal Tender on early flush of spruces or true firs).
First year plantings	Use one of the following herbicides: Princep 4L @ 4 to 8 pints/ac. Gallery 75 DF @ 0.66 to 1 lb/ac. Goal 2XL @ 4.5 to 6 pints/ac. Sureguard 51 WDG @ 10 to 12 oz/ac. Westar @ 6 oz/ac.	Broadcast or band apply over-the-top of dormant conifers before budbreak. To improve control of annual grasses, tank-mix Surflan AS @ 6 to 8 pints/ac or Pennant Magnum @ 2 to 2.5 pints/ac or Pendulum @ 4.8 to 9.6 pints/ac or Barricade @ 2.3 lbs/ac with Princep 4L @ 4 pints/ac or Gallery 75 DF @ 0.66 to 1 lb/ac or Goal 2 XL @ 4.5 to 6 pints/ac.
Established Stands (Trees growing in field for one or more seasons)	Use one of the following herbicides: Princep 4L @ 4 to 8 pints/ac. Princep 4L + Aatrex 4L each @ 4 pints/ac. Gallery 75 DF @ 0.66 to 1 lb/ac Goal 2XL @ 4.5 to 6 pints/ac. Sureguard 51 WDG @ 10 to 12 oz/ac. Westar @ 6 to 10 oz/ac. *Specticle @ 3.5 to 5 oz/ac *Marengo @ 7.5 to 18.5 fl oz/ac	Broadcast or band apply over-the-top of dormant conifers before budbreak. To improve control of annual grasses, tank-mix Surflan AS @ 6 to 8 pints/ac or Pennant Magnum @ 2 to 2.5 pints/ac or Pendulum @ 4.8 to 9.6 pints/ac or Barricade @ 2.3 lbs/ac with Princep 4L @ 4 pints/ac or Gallery 75 DF @ 0.66 to 1 lb/ac or Goal 2 XL @ 4.5 to 6 pints/ac.

*Specticle or Marengo- There is very little experience with these herbicides in the Northeast. Contact Dr. Jatinder S Aulakh at the Windsor Valley Laboratory or the product manufacturer with any questions about these new products.

To control emerged seedling broadleaf and grassy weeds in field established Christmas trees (2 years or older plantations), roundup original can be tank-mixed @ 1 to 2 pints/ac with pre-emergence herbicides. Use at least 30 gallons spray solution per acre and apply prior to bud-break as fully directed spray only. True firs and spruces are more tolerant to glyphosate than Douglas fir and white pines. Therefore, use lower rate of roundup original (1 pint/ac) on Douglas fir and white pines and avoid contact with the foliage until plants are at least 2-ft tall.

The mentioning of trade names in this publication is solely for the purpose of providing specific information. The CAES does not guarantee or warranty the products named, and references to them in this publication do not signify our approval to the exclusion of other products of suitable composition.

INFORMATION SOURCES

- 1) 2011 New England Guide to Chemical Weed Control in Christmas Trees.
http://www.christmas-trees.org/2011_NE_Guide.pdf

For assistance with weed identification visit:
<http://weeds.cropsci.illinois.edu/extension/Other/NCR614.pdf>

<http://oak.ppws.vt.edu/~flessner/weedguide/>

<http://weedid.missouri.edu/>

Or email weeds pictures to:

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Or bring/send fresh intact weeds samples along with root system to Valley Laboratory, Windsor CT.