SERIES: How to Get the Most Out of Your Weed Management Program in Christmas Tree Production?

TOPIC: Fall Herbicides for Christmas Tree Production



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Introduction:

Weeds can lead to heavy intense competition with Christmas trees in the field at any stage of their life (Fig. 1). They can interfere with production practices such as shearing, pruning and spraying in larger trees and can also harbor pests, pathogens, and diseases. Generally, herbicide program in Christmas tree production includes applying preemergence herbicides (mixed with broad spectrum postemergence herbicides) during springtime before budbreak. Followed by postemergence applications (spot treatments) during growing season in summer for controlling those weeds that escapes spring preemergence herbicide effectiveness. A fall herbicide application can lead to better weed management and an improved herbicide program in Christmas tree production. This article will discuss the benefits & drawbacks and timings of fall herbicide applications in Christmas tree production.



Figure 1. *A highly weed infested Christmas tree farm. Photo credits: Debalina Saha, MSU Horticulture.*

Need to identify weeds properly:

Identifying the dominant weeds species in the Christmas tree field is a very important step for planning a successful herbicide program. Understanding which weed species are the problematic ones is the first step in control. For identifying the weed species, scouting is recommended where growers can simply walk around the field and note down the important weeds growing in the field and their locations, or they can utilize the latest technologies such as Geographic Information System (GIS) which can significantly enhance weed identification and mapping of their locations throughout the field. For easy weed identification, "The IPM Pocket Guide for Weed Identification in Christmas Trees" by Michigan State University (MSU) Extension can be a good handy resource. MSU Pant & Pest diagnostics is also available to help identify weed species. Once the main problematic weed species have been identified, growers can target specific weeds' life cycles/stages and adjust herbicide products for the best effectiveness.

Was the initial weed control ineffective?

It is important to understand why weeds were problematic this year can be helpful in preventing the weed problems in the future. The initial preemergence herbicides applied during the springtime may be ineffective if the products have been applied too late, after weeds have already emerged or the weed species may not be on the product label, or even the spray equipment was not properly calibrated (Lindberg and Saha, 2022). In these cases, weeds can escape the effect of preemergence herbicides and will persists during the growing seasons and later during the fall as well.

Fall herbicide application timing:

Preemergence herbicides. MSU Extension recommends using soil temperatures to determine the timing of fall preemergence herbicides. Sol microbial activity is responsible for herbicide decomposition, degradation, and longevity. However, soil temperature of 50 degrees Fahrenheit or below is not suitable for biological activity. So, when the soil cools in the fall, microbial activity slows and then ultimately ceases. Hence, soil temperature needs to be noted before fall preemergence herbicide applications (Lindberg and Saha, 2022). MSU Enviroweather can be a good resource for growers to find weather stations near their locations and view soil temperature readings.

Postemergence herbicides. For postemergence herbicide applications, growers need to make sure trees have hardened off in the fall to ensure crop safety. When the trees harden, the cuticle of the needles get thickened, and the herbicides cannot get in contact. A general thumb rule is at or around Labor Day new growth should be sufficiently hardened off (Lindberg and Saha, 2022). During fall time, perennial weed species such as maple seedlings and poison ivy, translocate resources from shoots to roots and hence systemic postemergence herbicides will also move more effectively to the roots, and can improve its effectiveness.

Benefits and drawbacks of fall herbicide applications:

During springtime there can be weather related issues such as dry weather can prevent preemergence herbicides from getting activated properly, or too wet conditions can make the field impassable, or too cold weather can delay getting equipment preparation and ready to use (Lindberg and Saha, 2022). Some perennials weed species

TABLE 1: *List of preemergence herbicides with their water solubility that are labeled for use in Christmas tree weed control.*

Herbicide	Mechanism of action	WSSA and HRAC group	Water solubility (mg/L) at 20-25°C	Water solubility strengths
Gallery (isoxaben)	Cellulose synthesis inhibitor	21(L)	0.93	Low
Goaltender (oxyfluorfen)	PPO inhibitor	14(E)	0.1	Very low
Marengo (indaziflam)	Cellulose synthesis inhibitor	29(L)	2.8	Low
Pendulum Aqua Cap (pendimethalin)	Mitosis inhibitor	3(K1)	0.3	Very low
Pennant Magnum (s-metolachlor)	VLCFA synthesis inhibitor	15(K3)	529.3	High
Princep (simazine)	Photosystem II inhibitor	5(C1)	5.0	Relatively low
Sureguard (flumioxazin)	PPO inhibitor	14(E)	0.8	Low
Surflan (oryzalin)	Mitosis inhibitor	3(K1)	2.5	Low
Tower (dimethenamid-P)	VLCFA synthesis inhibitor	15(K3)	1450± 20	Very high
Velpar (hexazinone)	Photosystem II inhibitor	5(C1)	33000	Very high

translocates resources from shoots to roots during fall time and the systemic postemergence herbicides (such as glyphosate and triclopyr) are more effective during this time than summer. In addition, certain weed species such as marestail can germinate during fall and early spring. Hence, fall herbicide application can improve weed control in Christmas tree production (Lindberg and Saha, 2022).

However, there are few drawbacks of fall herbicide applications. During fall time, the herbicides applied will need to remain in the soil for a longer time interval than spring applied products. Growers need to choose products that have low solubility in water (Lindberg and Saha, 2022) to avoid leaching and run off and for longer persistence in the soil. Table 1 lists some important preemergence herbicides with their water solubility that are labeled for use in Christmas tree weed control.

In conclusion, growers need to rotate herbicides with different modes of action to avoid herbicide resistance development among weed species. In Michigan a population of common ragweed has already been reported to become resistant to clopyralid herbicide, and some pigweeds have become resistant to glyphosate. It is recommended to integrate non-chemical methods along with the chemical method to achieve successful weed control in Christmas tree production.

References:

Lindberg, B. and D. Saha. 2022. Fall weed control options for Christmas tree farms. Michigan State University Extension. https://www.canr.msu.edu/news/fall-weed-control-options-for-christmas-tree-farms

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