

**Oregon Department of Agriculture and Oregon Association of Nurseries
Nursery Research Pre-proposal**

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Project Title: Screening Postemergence herbicides for Field Grown Ornamental

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Project background:

A cost-effective weed control program is essential for sustainable nursery production to remain a reality. Herbicides, including pre and postemergence herbicides are in common use in field-grown ornamentals. Glyphosate and paraquat are two postemergence products that offer broad-spectrum weed control and lower costs. However, herbicide resistance and regulatory hurdles undermine the usefulness of these products. The Willamette Valley hosts a population of Italian ryegrass that is resistant to glyphosate and paraquat. Recent regulatory changes require additional training and label-restriction for these products, making their use cumbersome. Nurseries require alternatives to paraquat and glyphosate for effect. Shade tree production is an important subsector of Oregon's nursery industry, with leads for value in the state (ODA, 2020).

Three new herbicidal active ingredients, tiafenacil, tolpyralate, and florpyrauxifen-benzyl have been identified as having the potential to replace or complement postemergent control in nurseries. Tiafenacil is a protoporphyrinogen IX oxidase (PPO) and a WSSA Group 14 herbicide. It is a postemergence (POST) herbicide that controls grasses and broadleaves and has reduced toxicity to humans. In South Korea, for example, where paraquat is banned, Tiafenacil has replaced paraquat (Park et al. 2018). Although group 14 herbicides are registered for nurseries (e.g., Aim (carfentrazone)), tiafenacil is active in grasses as POST, thus contributing to control of such tenacious weeds as Italian ryegrass. Tolpyralate is a 4-hydroxyphenylpyruvate dioxygenase (HPPD) inhibitor herbicide in WSSA Group 27. It has low volatility and predominantly foliar activity on grasses and broadleaves. It is mode-of-action previously not used in field-grown nursery production. Florpyrauxifen-benzyl is a synthetic auxin with low volatility and low toxicity to humans. It is active against sedges, grasses, and broadleaves, including Canada thistle. Florpyrauxifen-benzyl has a short half-life and supports greater flexibility in crop rotation. There is no information on the tolerance of field-grown plants to these compounds. This project will initiate the evaluation of crop tolerance to the sequential application of these compounds to newly established field-grown woody ornamentals over a three year period.

Project objectives:

- 1) Evaluate efficacy and crop safety of tiafenacil, tolpyralate, and florpyrauxifen-benzyl

Methods & Timeline:

A field study will be conducted at OSU's Lewis Brown Farm in Corvallis, OR. In the spring of 2021, the field will be tilled and prepared to receive young plants. Plots will be 12 by 90 ft with 30 plants per plot. Ten tree species will be selected for the study: *Acer rubrum*, *Quercus rubra*,

Prunus laurocerasus, *Gleditsia triacanthos*, *Tilia americana*, *Fraxinus* spp., *Pyrus* sp., *Malus* sp., *Picea* spp., *Thuja occidentalis*. Three plants of each species will be planted for a total of 30 tree per plot. The experiment will be organized as a randomized complete block design with four replicates. Treatments will include tiafenacil, tolpyralate, and florpyrauxifen-benzyl at two rates: the label field rate, and double the field rate. Tank mixes of tiafenacil plus tolpyralate, and tiafenacil plus florpyrauxifen-benzyl at the field rate and an untreated control will result in 9 treatments. Three herbicide treatments will be applied approximately 6 weeks apart in spring, early summer, and mid-summer. The first application will occur 2 months after planting (June). Assessments will include crop height, shoot length, trunk caliper, visual estimate of injury, and chlorophyll contents every four weeks. The experiment will run for two consecutive seasons, and plant health will be evaluated until the spring of the third season.

The benefit to Nursery Industry:

This project's findings will initiate the evaluation of new compounds for nurseries that may ultimately result in new labels. The intent of this project is to provide nursery growers with alternatives to glyphosate and paraquat by providing new tools to manage herbicide resistance and hard to control weeds.

Budget summary:

	Description	Requested
Personnel		
Salary	0.14 FTE	\$ 6,500
Employee benefits (OPE)	77%	\$ 5,005
Supplies and Expenses		
Miscellaneous	Plants, irrigation material, fertilizer	\$ 3,200
Plot fee	\$1,200/A	\$ 1,200
TOTAL REQUEST		\$ 15,905

References

Park J, Ahn YO, Nam J-W, Hong M-K, Song N, Kim T, Yu G-H, Sung S-K (2018) Biochemical and physiological mode of action of tiafenacil, a new protoporphyrinogen IX oxidase-inhibiting herbicide. *Pesticide biochemistry and physiology* 152:38-44

Oregon Department of Agriculture. September 2020. Oregon Agricultural Statistics. <https://www.oregon.gov/oda/shared/Documents/Publications/Administration/ORAgFactsFigures.pdf>