

# GROWING KNOWLEDGE

Series content is coordinated by Dr. Jay Pscheidt, professor of botany and plant pathology at Oregon State University in Corvallis, Oregon.



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Figure 1: Layout of a demonstration study in a commercial nursery near Corvallis, OR during the spring of 2021. PHOTO COURTESY OF OREGON STATE UNIVERSITY

## Testing tolerance with Marengo

Herbicide's label allows growers to experiment with various plants and levels

BY MARCELO L. MORETTI AND DAVID KING

**H**ERBICIDES ARE AN IMPORTANT weed control method in container-grown ornamental plants. Knowledge of crop tolerance to herbicides is essential for a safe and effective weed control program.

Tolerance to a specific herbicide application method depends on the crop species and the cultivar. Thus, developing labels for herbicide products for ornamental crops requires extensive testing. For example, the label of the herbicide Marengo® (indaziflam) lists the species and cultivars known to be tolerant to Marengo. Although many species are listed on the label, there are commercially grown plants whose tolerance status is not known.

For plant species not yet listed, the label suggests testing multiple plants at the highest rate (9 fl. oz./acre) followed by 1–2 months of evaluation.

### How to test for herbicide tolerance

In this article, I will layout my suggestions for how to do such testing.

Select rates to be tested. I suggest at least three rates – unsprayed check, highest label rate (9 fl oz), and twice the field rate (18 fl. oz./acre).

Test at least three individuals of each of each species at each herbicide rate. For the rates suggested, a minimum of nine plants for each species and cultivar would be required.

Include a tolerant species listed on the label as an additional check subject.

Apply the herbicide in early spring. Herbicide injury is easier to observe in fast-growing plants.

Irrigate within one hour after application.



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**Figure 2:** *Aronia melanocarpa* 'Autumn Magic' chokeberry response to Marengo at four (left picture 2a) and 12 weeks (right image 2b) after treatments. Within each picture, plants on the left are nontreated and on the right and treated with Marengo. PHOTOS COURTESY OF OREGON STATE UNIVERSITY

Watch for injury symptoms every two weeks for the first two months. Some injuries may be temporary and less visible as time after the application passes.

Compare plant growth. Herbicide injury may sometimes be mild and only detected through careful side-by-side comparison. Growth stunting reduces productivity and increases costs.

Following these steps, we conducted a crop tolerance study in a commercial nursery during the spring of 2021. Twelve species plus an indicator species (boxwood) were selected for the study. See Table 1.

In our study, Marengo was applied over the tops of the plants at three rates: 6, 9, and 18 fl. oz./acre. The nontreated



check was not sprayed (Figure 1). Crop damage was monitored every two weeks for the following two months.

Most of the tested species were not affected by Marengo application up to 18 fl. oz./acre during the two months of evaluation; these were classified as 'Tolerant.' The tolerant species include boxwood, plum yew, cotoneaster, honeysucker, and others (Table 1).

The susceptible species were 'Autumn

Magic' chokeberry, 'Munchkin' oak-leaf hydrangea, and 'Minnesota Snowflake' mock-orange (Table 1). Damage to 'Autumn Magic' chokeberry was most visible two weeks after the application. This was followed by a near-complete recovery over the course of the study. However, after two months, some plants were smaller than the unsprayed plants (Figure 2).

By contrast, 'Munchkin' oak-leaf hydrangea and 'Minnesota Snowflake' >>>

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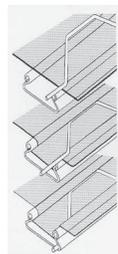
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## Testing tolerance with Marengo

**Table 1.** Tolerance to Marengo observed by plant species and cultivar.

	Species	Variety and common name	Tolerance group
1	<i>Cephalotaxus harringtonia</i>	'Duke Gardens', plum yew	Tolerant
2	<i>Buxus sempervirens</i> 'Suffruticosa' × <i>B. sinica</i> var. <i>insularis</i>	'Green Mountain', boxwood	Tolerant
3	<i>Cotoneaster apiculatus</i>	Cranberry cotoneaster	Tolerant
4	<i>Taxus baccata</i>	'Stricta', Irish yew	Tolerant
5	<i>Aronia melanocarpa</i>	'Autumn Magic', chokeberry	<i>Susceptible</i>
6	<i>Juniperus virginiana</i>	'Skyrocket', Eastern red cedar	Tolerant
7	<i>Taxus</i> × <i>media</i>	Dark green spreader yew (hybrid)	Tolerant
8	<i>Lonicera pileata</i>	'Privet', honeysuckle	Tolerant
9	<i>Ilex crenata</i>	'Sky Pencil', Japanese holly	Tolerant
10	<i>Hydrangea quercifolia</i>	'Munchkin', oak-leaf hydrangea	<i>Susceptible</i>
11	<i>Sarcococca hookeriana</i> var. <i>humilis</i>	Himalayan sweet box	Tolerant
12	<i>Philadelphus</i> × <i>virginalis</i>	'Minnesota Snowflake', mock-orange	<i>Susceptible</i>
13	<i>Distylium</i> sp.	'Vintage Jade', winter-hazel	Tolerant



**Figure 3.** *Hydrangea quercifolia* 'Munchkin' oak-leaf hydrangea is susceptible to Marengo, and showed extensive injury at two weeks after treatment (left 3a), a closer look at damage (center 3b), and even plant death at 12 weeks after treatment (right 3c). Within each picture, plants on the left are unsprayed and on the right were treated with Marengo. PHOTO COURTESY OF OREGON STATE UNIVERSITY

mock-orange presented severe injury for the entirety of the study. Two weeks after treatment, 'Munchkin' oak-leaf hydrangea showed extensive damage even at lower rates of Marengo. At higher rates, that damage progressed to plant death rates (Figure 3).

'Minnesota Snowflake' mock-orange was severely affected by Marengo but recovered somewhat, although the plants treated with Marengo were smaller (Figure 4). In summary, testing crop tolerance to Marengo can allow growers to expand its use in nurseries, with greater confidence. Any plant classified as susceptible in Table 1 should not be treated with Marengo. ©

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*Marcelo L. Moretti is an assistant professor and researcher in the Department of Horticulture at Oregon State University. He can be reached at 541-737-5454 or marcelo.moretti@oregonstate.edu.*

*David King is a faculty research assistant in the Department of Horticulture at Oregon State University. He can be reached at david.king@oregonstate.edu.*



**Figure 4.** *Philadelphus* × *virginalis* 'Minnesota Snowflake' is susceptible to Marengo applied over the top (left 4a). Plants recovered from a Marengo application, but growth was significantly stunted two months after treatment (right 4b). Within each picture, plants on the left are nontreated and on the right and treated with Marengo. PHOTO COURTESY OF OREGON STATE UNIVERSITY