

Weed Control for Ornamentals Inside Greenhouses and Other Enclosed Structures¹

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Maintaining a weed-free greenhouse is important for producing healthy and marketable crops. Weeds compete with crops for water, light, and nutrients, and will reduce crop marketability. Weed growth is typically more of an issue in woody nursery crops as opposed to floriculture crops, primarily because most floriculture crops are grown with high-quality media with little to no weed seed contamination. However, weeds can still be an issue, especially in structures with gravel, dirt, or ground-cloth floors. In some cases, gravel will become saturated with organic material, providing favorable conditions for germination. Weeds can also germinate along edges, tears, and worn areas of ground cloth. It is important to frequently scout for weeds. Weeds under benches and on walkways do not directly affect plant growth but often harbor pests such as aphids, whiteflies, thrips, and mites, as well as diseases (Neal 2015) (Figures 1 and 2). A good IPM program will use chemical and non-chemical methods to ensure efficient and economic weed control.



Figure 2. Close-up of mulberry weed (*Fatoua villosa*), which can harbor whiteflies and other insects.

Credit: Jeremy Pickens, Auburn University

Non-Chemical Methods

1. Sanitation and Prevention

The best weed control strategy is sanitation and prevention. Growing plants inside greenhouses offers growers the ability to exclude or reduce the amount of weed seeds that enter. However, weed seeds can still be blown into greenhouses through vents, doors, or windows; carried by water; and brought in on plant material, tools, equipment, animals, and people (Neal 2015, Pundt 2014). Keep weed seeds and other propagules (tubers, rhizomes, etc.) out of the greenhouse by using weed-free plant materials and sterile growing media. Monitor new shipments of plants and closely inspect them for small weeds or other pests before placing them inside the greenhouse. Keep walkways and aisles leading into the greenhouse entrance free of vegetation or mow grass and other vegetation frequently and close to the ground to prevent weed seeds from being introduced by foot traffic. Screen exclusions on vents may also decrease the amount of wind-borne seed that enters the greenhouse (Smith 2014). Keeping the areas under benches free of container media and plant debris will also help reduce weed germination. Concrete floors or weed barrier fabrics placed over gravel will help prevent weed seed germination and allow easy clean up. If reusing containers,



Figure 1. Weeds growing underneath benches can harbor insects and disease organisms.

Credit: Jeremy Pickens, Auburn University

wash with pressurized water and chemical disinfectants to remove any dirt, pathogens, and weed seeds.

2. Hand Weeding

Common greenhouse weeds such as spotted spurge (*Euphorbia maculata*), bittercress (*Cardamine* spp.), and oxalis (*Oxalis* spp.) can produce thousands of seeds that germinate very quickly. Scout and hand-pull weeds before they flower and produce seed and before they become so large that weeding risks dislodging un-rooted cuttings. Never leave pulled weed material on the floor. Most weed species are resilient and can re-root, especially in the humid environment of a greenhouse. Seeds left on pulled weed material are often still viable and can easily germinate given the right conditions.

3. Cultural Control Practices

Algae, moss, and liverworts (*Marchantia polymorpha*) thrive in wet environments (Figure 3). Overwatering greenhouse crops can cause these species to grow and quickly spread on the surface of container media, concrete, gravel, and ground-cloth floors. One algae-like species called *Nostoc* (Figure 4) can grow on greenhouse floors and other surfaces and is very slippery, creating a safety hazard for workers. Avoid overwatering crops and maintain irrigation equipment to ensure efficient and uniform applications. Reducing the amount of standing water inside a greenhouse by increasing drainage, using coarse gravel, and sloping the concrete correctly will allow water to quickly exit the greenhouse. Increasing greenhouse ventilation and properly spacing plants can reduce humidity levels and may reduce weed seed germination. Many different disinfectants are available to control algae, moss, and liverworts, but all of these products generally require frequent reapplication for continual control.



Figure 3. Liverwort (*Marchantia polymorpha*) is a common greenhouse weed. This weed spreads by spores and can quickly spread from greenhouse floors into containerized ornamentals.

Credit: Chris Marble, UF/IFAS



Figure 4. *Nostoc* spp. thrives in the moist environment inside enclosed structures. It is very slippery and can become a safety hazard for nursery workers.

Credit: Chris Marble, UF/IFAS

Chemical Control Methods

There are very few herbicides labeled for use inside greenhouses due to the potential for crop injury from volatilization (production of vapors). It is best to use non-chemical methods when possible, but herbicides can be used to control escaped weeds. Most herbicides labeled for use inside greenhouses are postemergence herbicides, which control weeds after they germinate. These herbicides work best when weeds are small and actively growing. Indaziflam (Marengo®) is a preemergence herbicide labeled for use inside greenhouses and enclosed structures, but it can only be applied to greenhouse floors. Marengo® can be tank-mixed with many different postemergence herbicides to control existing weeds. Flumioxazin (SureGuard) is an additional preemergence herbicide that can be used in enclosed structures, but no plants can be present during the application. Plants can be placed back inside a structure treated with SureGuard after at least 24 hours and after the site has been irrigated.

Table 1 provides a partial list of herbicides labeled for use inside greenhouses. When using these herbicides, always follow the manufacturer's label recommendations in order to achieve the best weed control and avoid crop injury.

Moving Herbicide-Treated Plants Inside Enclosed Structures

Ensure that plants are weed-free before moving them inside a greenhouse or covering for winter protection (Figure 5). Treating plants outside of an enclosed structure and then immediately moving them back inside can cause crop injury from herbicide volatility. In most cases, herbicide-treated plants should be kept outside of an enclosed structure for at least two to three weeks before bringing them inside or covering for winter protection. Each herbicide label may require different time intervals for when plants can be moved inside or covered. Table 2

includes a summary of recommendations from herbicide labels. However, it is important to note that herbicide labels can change, and users must always read each label and follow all precautions and recommendations.



Figure 5. Ensure that ornamentals are weed free before covering or moving inside a greenhouse. Small weed problems (shown by red arrows) can become major issues in a protected environment.

Credit: Chris Marble, UF/IFAS

References

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<https://ag.umass.edu/fact-sheets/managing-weeds-in-around-greenhouse>

Table 1. Herbicides labeled for use inside greenhouses and enclosed structures.

Trade name	Active ingredient(s)	Activity	Weeds controlled	Use with crop in house	REI ¹
Axxe®	ammonium nonanoate	Contact (Postemergent)	Non-selective	YES	24 hrs.
Envoy® Plus	clethodim	Systemic (Postemergent)	Grasses	YES	24 hrs.
Finale®	glufosinate	Systemic ² (Postemergent)	Non-selective	YES	12 hrs.
Fusilade® II	fluazifop-butyl	Systemic (Postemergent)	Grasses	YES	12 hrs.
GreenMatch® EX	lemon grass oil	Contact (Postemergent)	Non-selective	YES	0 hrs.
Marengo®	indaziflam	Residual (Preemergent)	Annual ³	NO	12 hrs.
Reward®	diquat	Contact (Postemergent)	Non-selective	YES	24 hrs.
RoundUp® Pro	glyphosate	Systemic (Postemergent)	Non-selective	NO	4 hrs.
Scythe®	pelargonic acid	Contact (Postemergent)	Non-selective	YES	12 hrs.
SureGuard	flumioxazin	Residual (preemergent with some postemergent activity)	Broadleaf and grasses	NO	12 hrs.
TerraCyte®	sodium carbonate peroxyhydrate	Contact (Postemergent)	Moss, algae, liverwort	YES	0 hrs.
WeedPharm, other vinegar herbicides ⁴	acetic acid	Contact (Postemergent)	Non-selective	YES ⁴	48 hrs.

¹REI = Restricted entry interval, which is the period of time after a pesticide is applied when employees may not enter the pesticide treated area without required personal protective equipment.

²Glufosinate is only minimally translocated and may act more as a contact herbicide. Thorough coverage is needed.

³May also control or suppress some perennial weeds.

⁴Check specific product labels for use directions. Only products labeled as herbicides are legal to use for weed control.

Table 2. Abbreviated list of label instructions for moving treated plants back inside greenhouses, polyhouses, and other enclosed structures after herbicide application.

Example Trade Name	Active Ingredient	Label Instructions
Barricade®	prodiamine	Uncovered polyhouses must remain open for at least 7 days and ornamentals must receive 2 irrigations and at least 0.5 in. of water before covering.
RegalKade® G	prodiamine	Uncovered polyhouses must remain open for a minimum of 30 days following treatment.
Biathlon®	oxyfluorfen + prodiamine	For application in the fall, apply 2 weeks prior to placing plants in an empty, enclosed greenhouse structure.
Broadstar®/SureGuard®	flumioxazin	Do not apply in enclosed greenhouse structures. SureGuard can be applied inside enclosed structures if no plants are present. Plants can be placed back inside the house after 24 hours and the herbicide is watered in.
Dimension®	dithiopyr	Do not apply in enclosed structures; do not apply within three weeks prior to enclosing greenhouses or poly-type structures.
FreeHand®	dimethenamid-p + pendimethalin	Do not apply in greenhouses, polyhouses, or other fully enclosed greenhouse-type structure.

Example Trade Name	Active Ingredient	Label Instructions
Gallery®	isoxaben	Do not apply within three weeks prior to enclosing greenhouses or poly-type structures.
Gemini®	isoxaben + prodiamine	Do not cover treated plants until 21 days have passed after application.
Marengo® SC	indaziflam	May be used in ornamental production facilities such as greenhouses (floors only), hoophouses, lathhouses, and shadehouses. Prevent spray from contacting foliage. Make applications to these sites during clean up, sanitation, and preparation prior to plant production.
Marengo® G	indaziflam	Do not use on ornamentals being grown in a greenhouse. Can be applied to the floors of hoophouses, lathhouses, and shadehouses prior to plant production.
OH2®	oxyfluorfen + pendimethalin	Product should not be applied within two weeks prior to enclose in greenhouse-type structure.
Pendulum® G	pendimethalin	Do not apply in greenhouses, shadehouses, or other enclosed structures.
Pendulum® EC	pendimethalin	Do not apply in greenhouses, shadehouses, or other enclosed structures.
Pennant Magnum®	s-metolachlor	Do not use in greenhouses or other enclosed structures.
Regal OO®	oxyfluorfen + oxadiazon	No greenhouse instructions; note that greenhouses not listed on use sites.
Ronstar®	oxadiazon	Do not apply in greenhouses.
Rout®	oxyfluorfen + oryzalin	Fall applications should be made two weeks prior to placing plants in enclosed greenhouse-type structures.
Snapshot®	isoxaben + trifluralin	Do not apply within three weeks prior to enclosing greenhouses or poly-type structures.
Tower®	dimethenamid-p	Do not apply in greenhouses, polyhouses, or other fully enclosed greenhouse-type structure.
XL®	benefin + oryzalin	Do not apply to plants or areas in greenhouses or other enclosed structures.

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