

Biology and Management of Hairy Bittercress (*Cardamine hirsuta*) in Ornamental Crop Production¹

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Species Description

Class: Dicotyledonous plant

Family: *Brassicaceae* (mustard family)

Other Common Names: Lamb's cress, spring cress, wood cress, flickweed

Life Span: Winter annual but can persist year-round in moist, shaded environments

Habitat: Occurs in disturbed areas; shores of rivers, lakes, swamps and wetlands; in greenhouses, container pads, growing media, and nursery pots. It is most often found in irrigated or shaded areas but can grow in full sun.

Distribution: Hairy bittercress (*Cardamine hirsuta*) is native to Europe and Western Asia and has been introduced and naturalized throughout much of the United States and the world, including parts of Eastern Asia, Africa, and Australia (Clapham, Tutin, and Moore 1987; USDA NRCS 2014).

Growth Habit: Dense basal rosette or upright growth habit (Figure 1).



Figure 1. Bittercress with clumping growth habit in loropetalum cuttings.

Credits: Chris Marble

Seedling: Cotyledons are small, round, and yellowish-green in color. The first true leaves are simple and slightly lobed (Figure 2).

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Figure 2. Bittercress in cotyledon to one-leaf growth stage.
Credits: Chris Marble

Shoot: Stems are usually 3 to 8 inches long and often reddish to purple in color toward the base of the plant and becoming greener up the stem (Figure 3). Leaves are alternately arranged on the stem, compound, may be lobed or slightly serrated, often club-shaped, and generally on the lower portion of the stem forming a basal rosette.



Figure 3. Mature bittercress. Note purplish color and leaves forming a basal rosette at the bottom of the stem.
Credits: Shawn Steed

Roots: Fibrous

Inflorescence: Occurs at the top of the stem in clusters called racemes. Individual flowers are white with four petals and can have either four, five, or six stamens.

Fruit and Seeds: Small brown to black seed are produced in pods called siliques, which are cylindrical or cigar shaped, and up to 1 inch long. The fruit is dry and when mature it splits open and forcibly expels seeds up to 6 feet (Figure 4).



Figure 4. Bittercress seed capsules.
Credits: Shawn Steed

Similar Species: Several species of bittercress are common weeds in ornamental production. Pennsylvania bittercress (*Cardamine pensylvanica*) is a native species that is similar in appearance but often has fewer basal leaves and always has six stamens in the flower. Small-flowered bittercress (*Cardamine parviflora*), also called sand bittercress, is another similar species that can be distinguished from others by smaller leaves and growth habit and by its preference for drier habitats.

Plant Biology

Bittercress occurs throughout the year in Florida in shaded and moist areas but is most problematic in the fall through the spring during cooler temperatures, which are more favorable for germination and growth. One bittercress plant can produce five thousand seeds (Bachman and Whitwell 1994) which have no dormancy requirement and can germinate quickly. In cases where environmental conditions are not conducive to germination, bittercress seed can remain viable in the soil or potting for several years. Bittercress seeds are small and sticky when wet, making them prone to sticking to the sides of empty containers or being transported on shoes or clothing of nursery employees. Upon germination, bittercress can reach maturity and begin flowering and seeding in as little as five weeks under favorable conditions. Bittercress is a known host for other common nursery pests including whiteflies, mites, and some diseases (Neal and Derr 2005).

Management

Physical and Cultural Control

Bittercress commonly grows in the potting media of container-grown ornamentals and often through drainage holes in nursery containers (Figure 5). It also can be a problem in propagation houses, greenhouses, and in the field. Bittercress prefers moist environments, but reducing irrigation is often impractical in a container production setting. Hand weed plants before they reach the flowering stage, as seeds can be dispersed by hand contact. Remove the pulled plants from the area and dispose, as they can continue dispersing seeds even when removed from the soil. Control bittercress in non-crop areas by mowing (when seeds are not present), and using densely growing groundcovers or a gravel layer to improve drainage and reduce germination. Coarse-textured mulches at depths of three inches or more also can reduce germination in nursery containers (Richardson et al. 2008). Inspect new plant shipments for bittercress infestations prior to potting or transplanting, as it is a common weed in propagation greenhouses. Sanitation is critical to prevent the germination and spread of bittercress in ornamental production. Ensuring that reused nursery containers are washed and free of debris can significantly reduce the number bittercress seedlings in nursery containers (Bachman and Whitwell 1994).



Figure 5. Bittercress growing out of drain hole in a nursery container. Credits: Annette Chandler

Chemical Control

PREEMERGENCE

Bittercress is effectively controlled with most preemergence herbicides. However, containers must be weed-free prior to application, as these products generally do not work on emerged plants. While these products do provide control, bittercress continues to be a difficult weed to control due the number of seeds produced as well as its fast germination and growth throughout the year. Table 1 includes a partial list of preemergence herbicides labeled for control in and around ornamentals. The only preemergence herbicide labeled for use inside greenhouses is indaziflam (Marengo[®], OHP, Inc.), a new active ingredient for nursery production. Marengo[®] is labeled for use on greenhouse floors, but greenhouses should be empty during application. Ornamentals can be placed back inside 24 hours after treatment. Marengo[®] can be tank-mixed with many different postemergence herbicides such as RoundUp[®] (glyphosate) to control existing weeds.

POSTEMERGENCE

There are many different postemergence products that are effective on bittercress and can be used in non-crop areas or in landscapes or fields as a directed application. Effective active ingredients include glyphosate (RoundUp[®]), glufosinate (Finale[®]), diquat (Reward[®]), and pelargonic acid (Scythe[®]), among many others. The spray formulation of flumioxazin (SureGuard[®]) can provide both pre- and postemergence control, but it is labeled only as a directed application. Both systemic and contact herbicides will provide effective control, though thorough coverage is needed for contact herbicides such as diquat or pelargonic acid. Very few products are labeled for use over the top of ornamentals in production or in the landscape. However,

research has shown that the preemergence herbicide isoxaben (Gallery®) can provide early postemergence control to small bittercress less than 2.5 inches tall before flowering (Altland, Gilliam, and Olive 1999). When using any herbicide, always consult the manufacturer's label and follow all precautions.

Disclaimer: Mention of a commercial or herbicide brand name or chemical does not constitute a recommendation or warranty of the product by the authors or the University of Florida, Institute of Food and Agricultural Sciences, nor does it imply its approval to the exclusion of other products that may also be suitable. Products should be used according to label instructions and safety equipment required on the label and by federal or state law should be employed. Pesticide registrations may change, so it is the responsibility of the user to ascertain if a pesticide is registered by the appropriate state and federal agencies for its intended use.

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Table 1. Preemergence herbicides labeled for use in ornamental plant production and landscapes to control hairy bittercress.

Common Name (active ingredient)	Example trade name and formulation	WSSA Herbicide Group	Efficacy	Container production	Field production	Greenhouse or fully enclosed structures	Landscape
dithiopyr	Dimension® 2EW	3	S-C	YES	YES	NO	YES
oryzalin	Surflan® 4AS	3	C	YES	YES	NO	YES
	Oryzalin 4 Pro	3	C	YES	YES	NO	YES
pendimethalin	Pendulum® 2G	3	P-S	YES	YES	NO	YES
	Pendulum® 3.3EC, 3.8AC			YES	YES	NO	YES
prodiamine	Barricade® 4FL, 65 WG	3	P-S	YES	YES	NO	YES
trifluralin	Treflan 5G	3	S	YES	YES	NO	YES
simizine	Simizine 4L	5	S	YES	YES	NO	YES
flumioxazin	Broadstar™ 0.25G	14	C	YES	YES	NO	YES
	SureGuard® 51WDG			YES	YES	NO	YES
oxadiazon	Ronstar® 2G	14	C	YES	YES	NO	YES
oxyfluorfen	Goal® 2XL (EC)	14	C	YES	YES	NO	NO
dimethenamid-p	Tower® 6EC	15	C	YES	YES	NO	YES
	Pennant Magnum® 7.6 EC	15	S	YES	YES	NO	YES
dichlobenil	Casoron® 4G	20	C	NO	YES	NO	YES
isoxaben	Gallery® 75DF, 4.16SC	21	C	YES	YES	NO	YES
indaziflam	Marengo® 0.622 SC	29	C	NO	YES	YES	NO
	Marengo® 0.0224G			YES	YES	NO	NO
bifenox + oryzalin	XL 2G	3 + 3	S-C	YES	YES	NO	YES
	FreeHand® 1.75G	3 + 15	C	YES	YES	NO	YES
trifluralin + isoxaben	Snapshot® 2.5TG	3 + 21	C	YES	YES	NO	YES
	Gemini	3 + 21	C	YES	YES	NO	NO
oxadiazon + pendimethalin	Jewel® 3.25G	14 + 3	C	YES	YES	NO	YES
oxadiazon + prodiamine	RegalStar® II	14 + 3	C	YES	YES	NO	YES
oxyfluorfen + oryzalin	Rout® 3G	14 + 3	C	YES	YES	NO	YES
oxyfluorfen + pendimethalin	OH2® 3G	14 + 3	C	YES	YES	NO	YES
oxyfluorfen + prodiamine	Biathlon® 2.75G	14 + 3	C	YES	YES	NO	YES
oxyfluorfen + trifluralin	Granular Herbicide 75 5G	14 + 3	C	YES	YES	NO	YES
oxyfluorfen + oxadiazon	Double O™ 3G	14 + 14	C	YES	YES	NO	YES
trifluralin + isoxaben + oxyfluorfen	Showcase® 2.5G	3 + 21 + 14	C	YES	YES	NO	YES

Common Name (active ingredient)	Example trade name and formulation	WSSA Herbicide Group	Efficacy	Container production	Field production	Greenhouse or fully enclosed structures	Landscape
<p>¹Herbicide groups are based according to primary sites of action and can be used to select herbicides that have differing sites of action (<i>Weed Technology</i> 17:605-619 [2003]) so as to minimize the potential for the development of herbicide resistant weeds.</p> <p>²P = poor control; S = suppression, C = good control.</p> <p>³Can only be used in selected conifer and deciduous tree species. Check manufacturer's label for a complete list of species and recommended application methods.</p> <p>⁴Can be applied as a directed application around established woody landscape ornamentals. ⁵Marengo 0.622 SC can be used in pot-in-pot container ornamentals as a directed application only. Specticle™ is labeled for use in landscapes.</p> <p>⁶Labeled for use on greenhouse floors prior to plant production. Plants can be placed back inside greenhouse 24 hours after application.</p>							