

Hairy Bittercress Seed Production, Dispersal, and Control in Propagation Beds

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Introduction

Bittercress (*Cardamine hirsuta*) is a major southeastern weed that germinates all year during propagation of landscape plants. Bittercress produces a great quantity of seeds that are forcefully expelled. Plastic containers are commonly reused during propagation with media residue from previous crops clinging to the sides of the containers. The residue in used containers could hold some of these seeds to germinate during the next crop cycle. The objectives of this study were to (1) investigate seed number and dispersal from hairy bittercress and (2) determine the effectiveness of certain preemergence herbicides for bittercress control.

Materials and Methods

Thirty bittercress seedlings from a population occurring in a greenhouse at Clemson, SC were transplanted into 4" square plastic containers. After 10 days, eight plants were selected for uniformity of growth. Data were collected from these eight plants concerning silique development, seed production, and seed dispersal (distance and pattern).

The second phase was conducted at Carolina Nurseries in Moncks Corner, SC. Two inch square containers with media residue were collected. These containers had a heavy hairy bittercress population during the previous propagation cycle. Half of the containers were rinsed (clean) with a pressure nozzle attached to a water hose and the other half the residue were not rinsed (dirty). This resulted in two container treatments. Propagation media, 50% peat moss and 50% perlite, was sampled at the outdoor storage area from two spots, the top and bottom of the pile, for two media treatments. The containers were placed into 18" square trays holding 64 containers. There were 16 replicates of each container•media combination per tray. The trays were placed in the center of 4' x 4' square blocks on the gravel floor.

Three uniform plants were selected from the bittercress that emerged from the unwashed containers. Each plant was placed in the center of a five tray (7.5') by five tray (7.5') block and allowed to seed. Each tray contained thirty-six 3" square new uninfested plastic containers with *Ilex crenata* 'Helleri' cuttings. Bittercress seedlings were counted on 21 Jan 94. The resulting counts were placed in a grid to determine the dispersal density (seedling/inch²) by distance from the mother plant. All data was analyzed using analysis of variance and regression analysis. Twelve preemergence herbicides at one rate was evaluated for control of bittercress. Liners of *Ligustrum lucidum* were potted into one gallon pots and herbicides were applied using either a shaker can or a CO₂ backpack sprayer. Bittercress seed (~50) were seeded in the pots after herbicide application and 30 days later. Evaluation of control were made at 30 days and 60 days after application.

Results and Discussion

After five weeks, the average number of siliques per plant was 68, however the number of siliques per plant ranged from 27 to 182. The average number of seeds per silique was 29. The total number of seeds ranged from 675 to 4980 per plant.

Hairy bittercress seeds are dispersed by a spring-like action of the locule (sides) of the silique rolling back on both sides perpendicular to each other. The seed are thrown to each side of the

silique on the same plane as the rolling locules. The average seed dispersal distance was 19.7". Germination of bittercress seeds was 90% after 13 days. Germination began after five days with no new germination after 13 days. Greatest germination occurred between 6 and 8 days after sowing. Presumably the other 10% of seeds were either not viable or more likely have a dormancy mechanism for later germination.

Emergence of bittercress from unwashed containers in the study at Carolina Nurseries correlated with previous results. All seedlings were within 1 cm of the edge of the container indicating the seed was in the media residue clinging to the container. There were several seedlings that germinated on the outside of the containers where media residue remained, but these seedlings did not survive. There was a difference between the number of weed seedlings emerging from the dirty compared to clean (rinsed) containers. Location of media collection revealed no difference in number of weed seedlings from the media from different locations indicating that the new media was not a significant source for hairy bittercress seed.

Seed dispersal was first observed 16 Dec with seedlings emergence beginning 4 Jan. Silique development, seed dispersal and seedling emergence continued until the end of the study 21 Jan. There were 3799 and 5128 seedlings produced from the two mother plants, respectively. Seedlings were counted up to 42" away from the mother plant with the mean dispersal distance being 24". Seedling density at the mean dispersal distance was 0.78 seedlings/in². Overall, seedling density was 1.2 seedlings/in² across the total dispersal area of 5542 in².

All preemergence herbicides (Table 1) except Southern Weedgrass Control and Kerb provided greater than 95% control at 30 and 60 days after application.

Hairy bittercress has the potential to quickly become a problem in a nursery. There were six times more bittercress seedlings in the unwashed containers compared to the washed containers. The problem is amplified by not being able to use preemergence herbicides in propagation.

Significance to the industry : Hairy bittercress is a prolific seed producer and disperses them efficiently in the propagation areas of nurseries. In trying to control the hairy bittercress, the cycle of seed production must be interrupted. Once this is accomplished a program of hairy bittercress prevention and sanitation should be followed.

Table 1. Preemergence herbicides, rates and percent bittercress control 30 and 60 days after treatment. (DAT)

Herbicide	Rate (lbs ai/A)	% Bittercress Control 30 DAT	% Bittercress Control 60 DAT
Gallery	0.5	99	100
Snapshot DF	2.0	100	100
Snapshot TG	2.5	97	99
Ronstar	2.0	100	100
Predict	2.4	100	100
OH-2	3.0	95	98
Factor	1.0	100	100
Rout	3.0	100	100
Stakeout	1.0	100	100
Surflan	3.0	100	100
Kerb	1.0	82	87
So. Weed Grass	3.0	78	83
Control	--	0	0
LSD (P > 0.05)		8.5	13.5