Weed Management in Perennial Production

Joseph C. Neal, Ph. D.
Professor of Weed Science
Department of Horticultural Science
North Carolina State University

When it comes to weeds, “start clean – stay clean” should be the moto of every nursery manager. This is especially true for producers of herbaceous perennials. Although we can control most grassy weeds with postemergence herbicide; otherwise, we have few herbicides to use when weeds get out of hand. Furthermore, the herbicides labeled for use in herbaceous ornamentals are either safe on many ornamentals and do not control many weeds, or control lots of weeds but are safe on only a few ornamentals. Consequently, to manage weeds effectively a comprehensive nursery weed management program including exclusion, sanitation, preemergence herbicides, some postemergence herbicides and hand weeding will be needed.

Exclusion and sanitation
Preventing weed introduction and spread are crucial components of a weed management program for perennial producers. Weed seed and other propagules are introduced into nurseries in the potting substrates, by wind-blown seed, splashed into pots by rain, deposited by birds, and (perhaps most importantly) in the plant materials themselves.

• Inspect potting substrate sources for weeds.
• Inspect new shipments of liners before potting. If you observe weeds that are not currently present at your nursery you have two choices – (1) refuse the shipment or (2) remove the top ½ inch of potting media from the liners and dispose of that contaminated media.
• Closely monitor new plants in the nursery to prevent introduced weeds from going to seed.
• Cull plants from the nursery that are infested with perennial weeds such as nutsedge or mugwort.
• The worst weed infestations are those that build over time! Weed frequently to keep weeds from going to seed.
• After hand weeding, remove the weeds from the property (don’t let them go to seed and infest the adjacent pots).
• Recycled potting media tends to be loaded with weeds. Do not use recycled substrates in herbaceous perennial production.

Preemergence Herbicides
Herbaceous ornamentals are sensitive to many of the common nursery herbicides, particularly those that control a broad spectrum of broadleaf weeds. Broadstar, Marengo, Ornamental Herbicide 2, Rout, Regal O-O, and Ronstar control have been shown to injure many herbaceous ornamentals. Less efficacious herbicides are more likely to be safe on herbaceous crops but will, of course, not control as broad a spectrum of weeds. In Table 1 are a few of the preemergence herbicides which are safe on a number of herbaceous ornamentals.
Table 1. Preemergence herbicides commonly used in herbaceous ornamentals.

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>active ingredients</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Barricade 65 DG, or Regalkade 0.5G</td>
<td>prodiamine</td>
<td>Fairly broad spectrum weed control. The sprayable formulation can severely injure several species. Granule (Regalkade G) is much safer than the spray.</td>
</tr>
<tr>
<td>Corral, or Pendulum 2G</td>
<td>pendimethalin</td>
<td>Fairly broad spectrum weed control including annual grasses, spurge, chickweed and others. Labeled for a large number of herbaceous ornamentals. Granular formulations are much safer to the crop than spray formulations.</td>
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<tr>
<td>Devrinol 2G, 5G, or 50WP</td>
<td>napropamide</td>
<td>Somewhat narrow spectrum of weeds controlled in containers – annual grasses primarily. Safe on many herbaceous ornamentals but not widely tested on perennials.</td>
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<tr>
<td>Snapshot TG</td>
<td>isoxaben + trifluralin</td>
<td>Broader weed control spectrum than the others listed here, but can severely injure several herbaceous perennials, most notably: foxglove, lambsear, sedums, veronica, and carnation.</td>
</tr>
<tr>
<td>Surflan, XL</td>
<td>oryzalin, oryzalin + benefin</td>
<td>Broad spectrum weed control. Safe on several “blue collar perennials” such as hosta, liriope, peony, astilbe, daylily, &amp; iris, but the most injurious of the herbicides listed here on many herbaceous perennials. The granular formulation (XL) is much safer than the spray.</td>
</tr>
<tr>
<td>Preen;Treflan 5G</td>
<td>trifluralin</td>
<td>Controls annual grasses and a few broadleaf weeds including henbit, chickweed and oxalis. The weakest weed control of the herbicides listed here but also the safest herbicide on herbaceous ornamentals. More commonly used in landscape plantings than in production nurseries.</td>
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Due to the tremendous diversity of plants grown in herbaceous perennial nurseries and wide variation in tolerance to herbicides, small nurseries with diverse crops may prefer a simpler approach -- selecting a herbicide that is safer on a wide range of crop species, but may not provide as effective weed control. Larger nurseries, growing greater numbers of each species may benefit from an “optimized” approach. Regardless of the approach, whenever preemergence herbicides are used in perennials remember that very young plants are more sensitive that older plants. So, liner producers should rely primarily on sanitation while “finishing” nurseries will be able to use herbicides more widely. After potting liners, irrigate to settle the soil. The next day, apply the preemergence herbicide to dry foliage and irrigate to incorporate the herbicide and wash it from the foliage. Some herbicides specify a certain time after planting before the herbicide can be applied – consult the label for this and other precautions.

The size of the liner matters! In recent years there has been a trend to start with transplants as small as 288-cell plugs. Our research has demonstrated that transplants this small are very sensitive to herbicide injury – even from herbicides labeled for use on those species. And, this sensitivity to herbicides is persistent for at least 4 weeks following potting. Preemergence herbicides should not be applied to these small transplants until they are well rooted. In contrast, 72-cell tray liners were not injured when labeled herbicides were applied one day after transplanting. So, the take home message here is, if you are using preemergence herbicides, start with a larger liner. If you are potting 288-plugs, plan to hand weed.

Hand weeding is an essential component of any weed management program and should be done frequently (about every two weeks) to prevent seed production. Due to the short term nature of the crop, it is rarely necessary for repeated herbicide applications. However, for crops that require more than 12 weeks to produce, herbicide re-applications may be required about eight to ten weeks after the initial treatment. Thoroughly hand weed pots before the herbicide reapplication. Because plants will typically have new, tender growth at this time, be cautious not to use herbicides that may damage the foliage.

**Postemergence Herbicides**

No selective postemergence herbicides are available for broadleaf weed control in herbaceous perennials. However, grasses can be easily controlled in most broadleaf ornamentals with selective postemergence graminicides (grass-selective herbicides) such as Acclaim (fenoxaprop), Envoy (clethodim), Fusilade (fluazifop), or Segment (sethoxydim). These herbicides are all selective for controlling emerged grasses but not control broadleaves or sedges. Differences between them are in the relative effectiveness on certain grass weeds and safety on ornamental plants.

*Fenoxaprop-ethyl* (*Acclaim*) is labeled for postemergence control of summer annual grasses in cool-season turfgrasses and many ornamentals. It is most commonly used to control crabgrass in cool-season turfgrasses but since it is not as effective as the other three graminicides on perennial grasses, it is less commonly used in ornamental plantings.

*Fluazifop-p* (*Fusilade II*) is labeled for annual and perennial grass control in ornamentals, a few vegetable crops and some fruit crops. Fusilade II controls perennial grasses including quackgrass and johnsongrass, but is weak on fescues. I have observed some injury to a few cultivars of tulip but otherwise have not observed injury on herbaceous ornamentals.
**Sethoxydim (Segment)** controls both annual and perennial grasses in woody and herbaceous ornamentals. Segment has controlled crabgrass better than Fusilade II or Envoy, but is generally considered to be weaker on perennial grasses. Do not use additional spray additives when applying Segment. Particularly, the addition of crop oil concentrate will increase the chance of foliar injury to ornamentals.

**Clethodim (Envoy)** is the only postemergence graminicide that controls annual bluegrass. It is generally considered to be one of the better graminicides on perennial grasses including bermudagrass and fescues. When applied to the top of very young spring growth, some foliar injury has been observed on liatris, heuchera, evening primrose, and a few other species. Plants recovered from this injury.

**Getting the most out of graminicide treatments:**

Use the right product at the right time. As stated above, the herbicides differ in their effectiveness on several weeds. Envoy is the only one that controls annual bluegrass; Fusilade and Envoy are better on perennial weeds; Segment tends to outperform the others on crabgrass. The graminicides are more effective when applied to young, actively growing weeds, and less effective when applied to large, mature weeds. For example: Acclaim is most effective when applied to young plants – 1 to 3 tillers in size. At larger growth stages higher doses and repeated applications might be required. Similarly, Fusilade II and Envoy are more effective on bermudagrass in early summer (with 6 to 8 inches of new growth) than in late summer when plants are flowering. Environmental conditions that reduce the growth of weeds will reduce the effectiveness of the graminicides. Use spray adjuvant or surfactant only as directed by the product label. Surfactants and other spray adjuvants can damage flower petals; avoid treating crops when they are in flower.

**Clean-up Dormant Over-wintering Perennials**

Over-wintered crops are a chronic source for weed seeds that spread to newly potted crops. Standard practice is to hand weed these plants after over-wintering covers have been removed. This is often a laborious and expensive task. To avoid weed problems in over-wintered stock, apply a preemergence herbicide several weeks before covering. Even the "weakest" herbicides labeled for nursery crops will control many winter annual weeds.

In regions where herbaceous perennials can be over-wintered outdoors it may be possible to clean-up emerged winter annual weeds with a non-selective herbicide. Scythe (pelargonic acid) and Reward (diquat) are labeled for this use. Crop plants must be fully dormant at the time of treatment. Weeds controlled by such winter treatments have included bittercress, groundsel, and seedling oxalis. Annual bluegrass was not controlled by these herbicides. If annual bluegrass is present, it can be selectively controlled with clethodim (see above).

No herbicide will control all weeds. Supplement herbicide applications with frequent hand weeding to reduce spread and secondary infestations. Herbicide programs will be more effective when combined with diligent sanitation. Weed management in perennial production depends upon an integrated weed management program that includes sanitation, herbicides and hand weeding.