

Weed Control in Woody Liner Production[®]

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INTRODUCTION

Weed control in the production of woody nursery stock relies heavily upon the use of broad-spectrum preemergence herbicides. These herbicides effectively control most weeds if applied before weed seeds germinate. However, all too often rooted cuttings or liners arrive at the nursery already containing weeds. Additionally, in recent weed scouting programs it was observed that several "new" weeds were introduced to nurseries in liners purchased from other regions (Neal and Williams, 1998). In this way growers start the production cycle with emerged weeds that are not controlled by preemergence herbicide treatments, and introduce new weeds into their nursery that may not be controlled by existing management programs. To prevent such events it is imperative that liner producers maintain rigorous and effective weed management programs. Sanitation, hand weeding and judicious use of herbicides must be integrated into a comprehensive weed management program.

SANITATION

Currently, no preemergence herbicides are labeled for use on unrooted cuttings and few herbicides are labeled for use on liners; consequently, weed management programs in propagation must rely upon sanitation — preventing the introduction of weed propagules, early detection and removal of weeds before they produce seed, and control of weeds around propagation beds. Determining the source(s) of weed seed in a nursery may not be as simple as it sounds. Depending upon conditions in each nursery potential sources may include potting substrates, weeds growing in areas near production space, and the pots themselves.

Potting substrates such as pine bark, peat moss, and perlite are generally free of weed seeds. However, when such materials are stockpiled, either at the nursery or the substrate supplier's facility, many weeds can be introduced. At N. C. State University we have recently had two loads of pine bark infested with large crabgrass (*Digitaria sanguinalis*) seeds and bermudagrass (*Cynodon dactylon*) rhizomes.

The presence of weeds in areas adjacent to production beds or substrate piles will provide the opportunity for weed seed introduction via wind, physical dispersal (such as bittercress, *Cardamine hirsuta* L. that can throw its seed several meters), and encroachment by rhizomatous and stoloniferous weeds. Removing weeds from the ground around propagation or liner production can be accomplished through sanitation and herbicides. Ground cloth can be cleaned before each new crop is placed in the area; whereas, gravel tends to fill with spilled potting mix and will become an environment for weed growth. Several postemergence herbicides [including glyphosate (Roundup-Pro), glufosinate (Finale), diquat (Reward) and pelargonic acid (Scythe)] are labeled for controlling weeds under benches and along the foundations of enclosed structures, but care must be taken to prevent spray drift onto the crop. Of the many herbicides labeled for use in nursery crops, Smith et al. (1997) reported that prodiamine (Barricade) provided superior control of bittercress

in gravel areas. Such treatments should be made before pots or flats are placed on the gravel surface. A reminder: no preemergence herbicide is labeled for use in enclosed structures. Outdoors, around propagation facilities and near potting substrate storage areas, several preemergence and postemergence herbicides can be used to provide residual control of weeds as well as control of emerged weeds. To avoid the movement of spray drift into greenhouses, make sure exhaust fans are off and vents are closed before spraying herbicides near greenhouses.

Recycling pots and flats can introduce weeds. Whitwell (personal communications; T. Whitwell, Clemson University, Clemson, S. Carolina) has demonstrated that by simply washing pots and flats with high pressure water, bittercress infestations were reduced seven-fold. Similarly, weeds should be controlled around pot storage areas to prevent the introduction of weeds into new and cleaned pots and flats.

HERBICIDE EFFECTS ON ROOTING OF CUTTINGS

Previous work has shown the potential for use of preemergence herbicides in propagation beds but also the potential for crop injury. Several studies have shown that Surflan (oryzalin), applied at the time cuttings are stuck, can reduce the percent rooting, the number of roots per cutting, and the quality of rooting (Johnson and Meade, 1986; Thetford and Gilliam, 1991). This observation is logical considering that oryzalin's mode of action is root growth inhibition. However, other root-inhibiting herbicides with lower water solubility than oryzalin, including pendimethalin and proflam, did not inhibit rooting of azalea (*Rhododendron × obtusum*) cuttings (Johnson and Meade, 1986; Neal 2000 unpublished data). Non-root-inhibiting herbicides such as oxadiazon (Ronstar) and oxyfluorfen (several granular formulations containing oxyfluorfen) did not reduce rooting percentages of a wide variety of woody nursery crops (Johnson and Meade, 1986; Langmaid 1987; Thetford and Gilliam, 1991). As a result, Ronstar (though not specifically labeled for this purpose) is used by some nurseries for weed control in woody plant propagation beds.

HERBICIDE SAFETY ON LINERS

In the production of liners, sanitation remains the first and foremost defense against weeds, but a few preemergence and postemergence herbicides are labeled and can assist in this battle. There are six preemergence herbicides specifically labeled for use in liners: Goal (oxyfluorfen), Devrinol (napropamide), Pennant (metolachlor), PrePair (oxadiazon + napropamide), Ronstar, and Regal O-O (oxyfluorfen + oxadiazon) (Neal et al., 1999). Postemergence herbicides are available to control emerged grasses but not broadleaf weeds. To assist in selecting the most appropriate herbicide for a particular site, resources (such as Neal, et al. 1999) are available through many cooperative extension associations that provide information on weeds controlled and ornamental crop safety. For a complete list of species on which these herbicides are safe, consult the product labels. Apply preemergence herbicides at the time of potting and reapply at regular intervals of approximately 90 days. Hand weed frequently to prevent escaped weeds from going to seed.

Goal is a preemergence and postemergence herbicide that is frequently used in conifer seedbeds, transplant beds, and liners. Goal injures most broadleaf and herbaceous ornamentals and should not be used on those species. Spray applications of Goal should be applied before conifers break bud or at least 6 weeks after

budbreak. Treatment during rapid spring growth will result in damage to the emerging foliage. When used according to manufacturer's recommendations, Goal will control most annual grasses and broadleaf weeds. Many emerged seedling broadleaf weeds will also be controlled by Goal.

Devrinol is available as a sprayable formulation or a granule. The granule is more commonly used in nursery crops. Devrinol is effective on annual grasses and some broadleaf weeds but is weak on some important container weeds including bittercress (*Cardamine* spp.), woodsorrel (*Oxalis* spp.), and spurge (*Euphorbia* spp.).

Pennant is currently only available as an emulsifiable concentrate formulation; this formulation can burn the tender foliage if applied over liners within a few weeks of budbreak. Pennant controls annual grasses from seed and a few broadleaf weeds including galinsoga (*Galinsoga* spp.). However, the most common use for Pennant in field liner or transplant beds is for preemergence control of yellow nutsedge (*Cyperus esculentus*). Pennant is not commonly used in container liner stock.

Ronstar, Pre-Pair, and Regal O-O are each formulated on granule carriers; consequently, they are safer on a wider range of woody ornamental species than sprayable formulations of the same active ingredients. Each of these products has a relatively broad spectrum of weeds controlled and is safe on a wide range of nursery crops. Ronstar is probably the most widely used on woody liners because it has been on the market longer than the other two and has a well established market distribution network. Ronstar controls annual grasses and most broadleaf weeds from seed. Two notable exceptions which are not well controlled by Ronstar are chickweed (*Stellaria media*) and spurge (*Euphorbia* spp.). Combining Ronstar with napropamide or oxyfluorfen in Pre-Pair and Regal O-O, respectively, expanded the spectrum of weeds controlled (when compared to Ronstar alone).

Postemergence Weed Control in liner beds is generally restricted to hand weeding with a few exceptions. Goal can be used to control many young, seedling broadleaf weeds in conifers. In broadleaf liners, Goal should not be applied. Several selective postemergence grass herbicides, sethoxydim (Vantage), fluazifop (Fusilade II), and clethodim (Envoy) are labeled for over the top applications in seedbeds or liners. Vantage controls summer annual grasses and perennial grasses. Fusilade II and Envoy are somewhat better on perennial grasses than Vantage. Envoy is controls annual bluegrass whereas Fusilade and Vantage do not. Vantage is the most commonly used postemergence grass herbicide in seedbeds. In transplant beds or liners any of the three grass herbicides may be used. However, check the Fusilade II label carefully for juniper and azalea variety restrictions.

SUMMARY

In each step of propagation and liner production, sanitation remains the most important strategy for controlling weeds. Prevent the introduction of weeds by controlling weeds around the propagation, production, and potting substrate and pot storage areas. Prevent the build-up of weed populations by frequent hand weeding before weeds can shed their seed. Judicious use of preemergence herbicides to control weeds in walk-ways, in gravel pads, and in liner pots or beds will greatly reduce the amount of hand weeding that is necessary to produce quality, weed-free liners.

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