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Different sites, different concerns



Weed management in containers is different from weed management in field soils. This article will highlight some of the major differences in controlling weeds in these two production environments. One of the biggest differences between the two sites is the presence or absence of a seed bank, and most other differences stem from this discrepancy.

Seed bank

The seed bank is a reservoir of seeds in the soil. Seeds of many weeds persist for decades. Seeds of redroot pigweed (*Amaranthus retroflexus*) persist for over 30 years in soils, while seeds of field bindweed (*Convolvulus arvensis*) can persist for more than 60 years. Generally speaking, broadleaf weed seeds are very persistent (>10 years) while grass weed seeds are less persistent (<5 years).

Most weed seeds must germinate on or near the soil surface. Weed seeds are often disseminated onto a field, after which normal agricultural practices (plowing, etc.) bury the seed one or more inches in the ground. Worms and other small animals are also responsible for weed seed burial but probably less so than farm activities. Seeds remain dormant in the soil for decades, until agricultural practice: or animals bring them back to the soil surface, where conditions are conducive for germination. Whether seeds were disseminated in a field last year



or 30 years ago, they will germinate unless an aggressive management plan is in place to control their emergence.

Container substrates have no seed bank. Bark, pumice, perlite and peat moss are not contaminated with weeds under most situations. Therefore, recently potted containers are initially weed-free. If the nursery can be managed such that all weeds are aggressively suppressed in and around the production site, there would be little or no weed seed source to contaminate the otherwise weed-free containers.

Weed seeds in field soils

When managing a crop in field soils, remember these three simple rules: weed seeds are always present; weeds will germinate within 3 to 7 days of being exposed to ideal conditions; and weeds will germinate in any and all gaps in your preventative weed management program.

Weed seeds are ubiquitous in soil; thus, the potential for new weed growth is always high. No matter what

the cropping history of the field, weed seeds will be present in the soil profile. Even an application of methyl bromide will not eliminate all weeds, and even if it did, weed seed blowing in from surrounding fields will quickly negate any weed management benefits of soil fumigation.

Soil preparation and the planting process will bring new weed seeds to the soil surface. Exposure to light, nutrients (from fertilizers), water and elevated O_2 levels (from being brought to the soil surface) will trigger germination in most weed species. A newly planted field may be the perfect environment for weed seed germination, and weeds will germinate quickly.

When used correctly, pre-emergence herbicides form a chemical barrier over the soil surface that stunts or kills weed seedlings as they emerge through it. I have seen many situations in field nurseries where the chemical barrier is disrupted for one or more reasons. Any disruption in the chemical barrier creates a gap where weed seeds will germinate. Dragging your feet or any other object through the chemical barrier will create a gap. There is a 100 percent probability of weed seeds being located in the soil where the gap is created, and those weed seeds will germinate to exploit that gap.

For nurseries using a disk for weed control between tree rows, improper shielding around the disks also

causes poor weed control. The shielding should be designed to prevent soil from spilling onto the treated chemical barrier in the tree rows. Any soil that spills on top of the chemical barrier will certainly have weed seeds within it. There is a high probability that weed seeds within that spilled soil can germinate and grow successfully, despite the chemical barrier beneath it.

Weed seeds in substrates

While weeds are ubiquitous in a field soil, they are nearly absent in container substrates. Most weeds in container crops come from within the nursery site. The most common source of seeds is from weeds growing on the gravel beneath containers, weeds growing in walkways and roadways, weeds growing in drainage ditches, and weeds allowed to grow around the



Seeds of redroot pigweed can persist for over 30 years in field soil.

perimeter of the nursery.

Because container crops start out weed-free, a sanitation program to prevent the introduction of weed seed into the production system is a powerful form of weed control. This is a major advantage for the container nursery manager.

Pre-emergence herbicides used in container nurseries are just icing on the cake. They should be used to prevent germination of any weed seeds that make it past your sanitation-control measures. Overall weed control in a container nursery is directly

related to the level of sanitation, regardless of which pre-emergence herbicide is used.

It seems almost too good to be true. Starting with weed-free substrates and aggressively managing sanitation should dramatically reduce the probability of weed growth in containers. That's a very simple formula for weed control, but it's not quite that simple. First, introduction of container weeds via airborne seed can occur regardless of how sanitarily the nursery site is maintained. The most common airborne offenders are common groundsel (*Senecio vulgaris*) and northern willowherb (*Epilobium ciliatum*). It is true that reducing the number of these two species within the nursery will dramatically reduce their occurrence in containers; however, seeds of these species can be blown in from neighboring properties and thus cannot be completely excluded from containers.

The biggest drawback in relying solely on sanitation for weed control is the introduction of weeds with the potted liner. I discussed this concept thoroughly in a previous article about bittercress (*Digger*, February 2006). Liners are often a source of bittercress, creeping woodsorrel, pearlwort and liverwort. If you purchase liners from another nursery, be sure you are receiving a weed-free crop. If you are producing your own liner source, it's incumbent upon you to make sure weed problems don't begin at the propagation stage.

Weed control in propagation is one of the most difficult sites to control weeds. Environmental conditions that are created for improving the survivability of the propagated crop are generally ideal for weed growth. This, coupled with the lack of weed management tools (herbicides), makes weed management in propagation areas extremely difficult. Nonetheless, concerted effort to reduce weed growth in propagation areas will result in magnified reductions of weed growth in the container crops.

Erosion control

Soil erosion is a concern for all facets of agriculture, with wind and water being the primary forces that cause agricultural soils to erode. Many Oregon nurseries have taken steps to prevent erosion, or at least to prevent soil from leaving their property. Grass filter strips, bioswales and cover crops are some of the partial solutions used to reduce soil loss from nursery and other agricultural lands.

All of these countermeasures must be managed to reduce weed populations. If areas planted for erosion control become weed-infested, they serve as a weed source for production areas. Managing these areas is an extra, and often difficult, management chore that requires attention. Clean cultivation, or the complete absence of crops other than the nursery crop, is much easier to maintain; however, clean cultivation is conducive to soil erosion.

Container nurseries are almost exclusively built on a bed of gravel, and there is no threat of soil erosion on these graveled production sites. Complete vegetation suppression is not only possible on graveled container nurseries, it is desirable. Complete vegetation suppression is part of an effective sanitation program. If weeds and other plants are aggressively controlled in and around the nursery site, there will be a noticeable improvement in weed management within the containers.

Postemergence herbicides

Preventing weed growth is certainly more difficult in field situations than it is in container crops. However, once weeds begin to establish, they are much easier to remove from field nurseries. Field nurseries can use several postemergence herbicides because under most conditions, the herbicides can be directed to the soil (and low-growing weeds) while avoiding the nursery crop. There are also several new precision herbicide application devices that utilize some sort of plant

shield. This allows the use of non-selective herbicides such as glyphosate for controlling weeds while protecting the nursery crop from spray damage.

Weed control in containers must be preventative. There are very few situations that allow postemergence herbicides or cultivation equipment for removing weeds. If weeds establish, they can only be removed by hand-weeding. Postemergence herbicides cannot be used for controlling weeds in containers. The only exceptions are graminicides, such as clethodim, sethoxydim and fluziflof, and spray-applied flumioxazin (SureGuard) and oxyfluorfen (Goal). While the grass-active compounds are effective, they only control weeds in the family Poaceae, and plants from this family constitute a very minor fraction of weeds in containers. Spray-applied oxyfluorfen and flumioxazin are also

labeled for use in dormant conifers; however, these products are not labeled for over-the-top applications to herbaceous, deciduous or broadleaf evergreen crops, which constitute a major fraction of container-grown ornamentals.

Summary

Weed control measures in container and field crops are different. Container nursery growers have a huge advantage in that container substrates are initially weed-free. This allows the use of sanitation strategies to prevent weed seed from ever occurring in the production site. Field nurseries are under far greater weed pressure; thus, preventative weed management in those sites is generally more difficult. However, field managers generally have more tools for controlling weeds postemergence than do container managers. I would not

suggest one job is easier than the other, but they are different. They should be approached with different strategies to take advantage of the opportunities and avoid the challenges that each production site presents. **e**

Disclaimer: This article is for educational purposes only. Mention of a specific product should not be interpreted as an endorsement, nor should failure to mention a product be considered a criticism. Always read the product label prior to using any herbicide.

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