

## Weed Management Practices in Nurseries

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Weeds are persistent problems in the production of ornamental plants and in the landscapes where these plants are sold. A relatively small number of species account for the most common weeds encountered in nursery culture. For instance, a report on weeds in container nursery stock in the UK cited Hairy bittercress (*Cardamine hirsuta*), Willowherb (*Epilobium sp*), Pearlwort (*Sagina recumbens*), Groundsel (*Senecio vulgaris*), and Chickweed (*Stellaria media*) as among the most common weeds found. This report could just as easily have been written to describe the most common weed problems in California, with the addition of a few local favorites such as Prostrate spurge (*Euphorbia supina*), Common woodsorrel (*Oxalis corniculata*) and Sowthistle (*Sonchus arvensis*). The occurrence of similar weeds in nursery production from widely differing geographies suggests that similar cultural practices play a major role in determining nursery weed survival and proliferation.

Plant growth requirements such as water, fertilizer, light and favorable temperatures are rarely lacking in the nursery environment. Conditions designed to promote rapid ornamental growth are ideal for weeds that tend to germinate, grow and reproduce faster than the crop, which is often more delicate and less competitive than the weeds. Weed competition is constant and transferable to the next crop, the next year and beyond. A nursery manager frustrated by weed problems knows that the weeds he's seeing have been selected by his cultural practices, which are designed to grow perfect plants. For that reason, weed control in nurseries is addressed through a combination of manual and chemical operations throughout the life cycle of the crop.

When it comes to preventing or removing weeds, crop safety is paramount. Hand weeding seems like an easy and obvious solution except that the high cost of repeated hand labor for stubborn weeds like spurge, oxalis and sowthistle may exceed the value of the crop. On the other hand, some weeds such as willowherb are relatively easy to pull due to their height and small root systems, but difficult to control with herbicides. The real challenge may be as simple as getting a crew to do it before the weeds proliferate and scatter new, windblown seed. Prostrate spurge is almost impossible to hand weed effectively due to sheer numbers and an easily breakable stem that leaves viable roots and stem pieces to regenerate in the soil. Most nurseries ultimately rely on hand labor plus selective herbicides, but with great attention to product label support for the intended use. As pesticide salespeople quickly learn, nurserymen may forgive you for lousy weed control, but not for crop injury.

Nurseries who view weed management as an ongoing program tend to get better results than nurseries who manage weeds reactively, after weeds have become established. In field grown roses, for example, preplant herbicides are broadcast over the field, and followed months later by post-emergence, directed sprays after the crop becomes established. Still, lay-by treatments often fail to completely control weeds like twining Morning glory (*Ipomea sp.*) that interfere with harvest. There are few herbicide solutions

for established weeds in nurseries, especially considering that a nursery may grow hundreds of different species and varieties of ornamentals. It may be possible to control weeds in field grown culture with timely applications of non-selective treatments, but in containers, only selective, pre-emergence herbicides can be used safely.

In a container nursery production cycle, there are predictable windows of opportunity when weeds should be addressed. These include 1) during liner propagation, 2) site preparation before setting containers on ground, 3) at potting, 4) approximately one month after potting.

- 1) Liner propagation is the process of establishing rooted cuttings or seedling plants in small pots or flats prior to transplanting to larger containers. Weeds such as bittercress that grow and reseed rapidly in moist shade can be tremendous problems in liner production, with the added consequence of transplanting these weeds or their seeds into the finished containers or field, where the weeds can increase and spread. Step One in a weed management program involves keeping the entire propagation area as clean as possible. Contact herbicides such as Scythe are labeled for use in greenhouses and propagation areas for control of weeds on the ground or under benches, but liner stock itself is usually too immature for herbicides and needs to be handweeded. Soils used in liner propagation should be clean and weed free. The goal should be for zero weeds going to seed in the propagation area, and zero live weeds leaving it.
- 2) Prior to setting out containers that may sit for months or years prior to sale, nurserymen should have a block-by block plan for managing weed competition from resident weeds that have eluded previous control measures, or simply blown in anew from outside the nursery. Airborne weed seed from fleabane (*Conyza bonariensis*) and sowthistle are notorious for re-infesting sites nurserymen thought were clean. These weeds may emerge in containers or on the ground among containers. The ground may be anything from bare soil, to soil covered with gravel, or the nursery may invest in weed mats as a longterm weed prevention measure. Weed mats must be maintained to repair holes and seams and kept clean or weeds will germinate in spilled soil on top of the mats. To prevent weeds growing up between the containers, nurseries often treat the growing area first with broadcast combinations of glyphosate to kill existing weeds plus pre-emergence such as Gallery (isoxaben), Dimension (dithiopyr), or prodiamine (Barricade). This helps get the crop started clean.
- 3) When the liner stock is mature enough, the plants are transplanted to larger containers or established directly in the field. Many nursery ornamentals can be treated safely over-the-top at this point with selective, pre-emergence herbicides, usually in granular form. Granular formulations of herbicides such as Snapshot (trifluralin + isoxaben) or OH2 (oxyfluorfen + pendimethalin) are often considered safer and easier to apply than spray applications of the same active ingredients, but granules are more expensive than sprayables. The usual sequence is to pot the plants up and settle the soil with a good irrigation before treatment. Treatment should be done as soon as possible after potting up

because the weeds won't wait. Delaying a week or two after potting before applying herbicides allows fast-emerging weeds like chickweed and spurge to germinate and become established, and most selective herbicides lack sufficient "reach-back" activity to catch them from behind. Following application, the plants should be watered overhead to remove granules or spray off the foliage, and begin the process of herbicide activation in the soil.

- 4) About a month after the new crop been treated with pre-emergence herbicides, Plan B begins. Plan B is a planned inspection plus hand weeding or cultivation to remove any weeds that have escaped control thus far. This is an important step, and an opportunity not to be missed, as 95% control still means 5% rapidly growing weeds, and you want to deal with them when they're small. Plan B emphasizes that you can't make a treatment and just turn your back on it. In general, herbicides tend to last about half as long in nursery culture as they do in landscapes, due to microbial breakdown aggravated by constant irrigation, fertilization and the use of high organic soil mixes that adsorb herbicides. This means a product label that promises six months control in landscapes may deliver only three months under nursery culture. Nurseries often need 2-4 treatments per year. Treatments should be timed as one season is ending and another is beginning, and weeds should never be allowed to go to seed.

In the end, weed management, like most pest control, is all about sanitation. Weeds may be a sign to some of healthy biodiversity, but they are also alternate hosts for insects, mites, diseases and nematodes. Their physical presence may shade the crop, impede worker access and disrupt air movement in the crop canopy, which creates conducive conditions for other problems. A tolerance for weeds may indicate a tolerance for other, more serious problems, and runs contrary to the quality standards nurseries seek to instill in their workers and project to their customers. Even if the growing area is clean, nurserymen still need to control weeds around the perimeter of the nursery, targeting weeds whose seed might blow in the wind towards the compost pile or growing area.

An old saying warns that "one years seeding means seven years weeding". This is because weeds not only invade but defend niches where the crop is not competitive. Waiting to spray till weeds are mature and have set seed may be satisfying for revenge, but it is not good weed control.