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Nursery Series

Weed Control in Field Nurseries

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An effective weed control program is critical to the success of a field nursery growing ornamental plants. Research conducted at the University of Arkansas indicated that trunk caliper could be increased by as much as 110 percent, depending on the species, by keeping the ground around trees free of vegetation. Maintaining a vegetation-free zone around field-grown plants will enhance growth and reduce disease and insect problems. As will be discussed later, the ideal field nursery layout would include a narrow vegetation-free band within the plant row separated by an aisle covered in a cover crop. Since field nursery production in Arkansas is almost exclusively for shade trees, that will be the primary focus of this publication.

Mechanical Weed Control

Cultivation has been a time-honored method of weed control in field nurseries. Methods include hand-held hoes, tractor-mounted cultivators and rototillers. A tractor mounted with an in-row cultivator is a popular option (www.weedbadger.com). The in-row cultivator should be attached to a retractable arm with sensors to avoid damaging tree trunks.

While cultivation is an effective way of controlling weeds, several problems are associated with this method. First, cultivation is time-consuming since the process must be repeated many times during the growing season. Cultivation is most successful when weeds are small. Secondly, repeated deep cultivation may injure the nursery crop since the cultivation process will damage the trees' root systems. Root damage is most likely to occur when cultivating shade trees. Third, cultivation may break apart and spread vegetative parts of perennial weeds such as nutsedge (nutlets) and bermudagrass (rhizomes), increasing a weed problem in the nursery. Finally, repeated passes with heavy cultivation equipment can damage plant roots and alter soil structure. Equipment weight and the type of tires used can influence the amount of impact on the roots and soil. Despite these drawbacks, cultivation is still a useful way to control weeds especially in herbicide-sensitive crops.

Chemical Weed Control

Most field nurseries start with a vegetation-free band when nursery crops are planted. The trick is to maintain that vegetation-free zone in

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a cost-effective manner. Adoption of a simple herbicide program can help achieve this goal.

Planning an herbicide strategy starts with keeping the three major weed groups (grasses, broadleaves, sedges) in mind when you are selecting herbicides. One herbicide will not control all weeds. The most effective approach is to use a combination of products that will result in control of the largest number of species possible. In field nurseries, this involves combining preemergence herbicides for grass and broadleaf control with a nonselective postemergence herbicide for control of existing vegetation.

The two most effective preemergence **broadleaf** herbicides for field nurseries are simazine (Princep) and isoxaben (Gallery). Good preemergence **grass** products include oryzalin (Surflan), pendimethalin (Pendulum) and prodiamine (Factor). For burndown of emerged weeds, nurserymen rely heavily on glyphosate (Roundup) or paraquat (Gramoxone).

Why pick paraquat (a skull and crossbones material) over a relatively safe product like glyphosate? The primary reason is that if you overspray some paraquat on your nursery stock it will not translocate to other parts of the plant. The only damage will be the burned area where the paraquat makes contact. If you use paraquat, follow all of the safety precautions on the label including wearing gloves and an OSHA-approved respirator, not a dust mask from the hardware store. In contrast to paraquat, glyphosate will translocate to all parts of the plant and, therefore, has greater potential for injuring the plant. Finale is labeled for this use, but price and effectiveness limit its practicality.

Preemergence **sedge** control is difficult. Metolachlor (Pennant Magnum) is effective on annual sedge and yellow nutsedge but has no effect on purple nutsedge. It will suppress yellow nutsedge but not eliminate it. Pennant Magnum is also effective for control of many grasses and small-seeded broadleaf weeds.

Many factors control herbicide selection. Our experience is that price and availability are very important considerations with most nurserymen. The following programs were put together with price, availability and overall effectiveness in mind. In many cases, products exist which would have a slight edge over our recommendations, but we have followed the *Consumer Reports* model and have listed what we consider to be the best buy. While the label provides a range of rates, the rates listed below are specific and based on experience in Arkansas. It is always wise to try a new product or rate on a trial basis before treating wall to wall. Always leave an untreated area or a standard treatment for comparison.

Program #1

Products and rates: Pendulum (pendimethalin) @ 3 lb ai/A + Princep (simazine) @ 1.0 to 1.5 lb ai/A. If emerged weeds are present, add RoundUp Pro (glyphosate) @ 1 qt/A or Gramoxone Max (paraquat) @ 1.7 to 2.7 pts/A to burn down existing vegetation.

Note: Pendimethalin gives better control of annual grasses than annual broadleaf weeds. Princep will provide postemergence control of many annual weeds if they are very small at the time of application. If possible, water-in preemergence herbicides with overhead irrigation soon after application. Drip or furrow irrigation is not effective for activating preemergence herbicides. Continued use of this program or any other program year after year will cause weed population shifts. New weed species will require a change in weed control practices. Rotate herbicides and modes of action to reduce population shifts.

How often? From two to three applications per year will be needed, depending on weed pressure.

Application timing: February 1 to March 15 is a good target for the first application of the season. Delaying beyond mid-March will produce disappointing results. A mid-summer treatment may be difficult because rainfall is less frequent during this time. Many growers focus on total postemergence weed control during mid-summer. When using Princep (simazine), apply between Thanksgiving and Christmas. If Princep is applied too early, it will dissipate before winter annuals begin to emerge. Princep will provide postemergence control of small winter annuals through root uptake. Gallery is more persistent and may be applied from late September to December. It is best to apply Gallery earlier in the fall because it will provide no postemergence control of emerged winter weeds. Tank mixing Roundup or Gramoxone with either Gallery or Princep will give good control of emerged weeds. Princep will provide decent control of annual bluegrass, but it is necessary to add Barricade, Pendulum, Pennant or Surflan to the tank to control other winter grasses.

Do not spray newly transplanted stock until the soil around the base has been sealed by irrigation or adequate rainfall. Spraying soil with cracks may result in the herbicide being carried directly to the roots. Unless specified on the label, shoot for a water volume of 20 to 30 gallons per acre. Try to run from 20 to 30 pounds of pressure. High pressure creates a lot of fine droplets which are prone to drift. For example, if you chose a Teejet® UB 8503 tip and sprayed a 20-inch band while operating it at 20 psi and traveling three miles per hour, the output would be about 20 gallons per acre. The UB designation stands for Underleaf Banding (it used to be called an off-center nozzle). An 8503 nozzle sprays an 85° arc and puts out 0.3 gallon per minute at 40 psi.

Program #2

Products and rates: Surflan AS (oryzalin) @ 2 lb ai/A + Princep (simazine) @ 1 lb ai/A.

If emerged weeds are present, add RoundUp Pro (glyphosate) @ 1 qt/A or Gramoxone Max @ 1.7 to 2.7 pts/A to burn down existing vegetation.

Note: Surflan, while more expensive, is more stable than pendimethalin. Surflan requires better agitation than pendimethalin. Both dinitroaniline herbicides leave a yellow stain, but this is not a critical issue in field nurseries.

How often? From two to three applications per year will be needed, depending on weed pressure.

Application timing: March, (June), October

Program #3

Products and rates: Tank mix Pendulum (pendimethalin) @ 3 lb ai/A + Gallery (isoxaben) 75DF @ 0.75-1 lb ai/A. If emerged weeds are present, add RoundUp Pro (glyphosate) @ 1 qt/A or Gramoxone Max @ 1.7 to 2.7 pts/A to burn down existing vegetation.

Note: Gallery is an excellent preemergence broadleaf weed herbicide, but it is used less frequently because of the cost.

How often? From two to three applications per year will be needed, depending on weed pressure.

Application timing: March, (June), October

Program #4 (yellow and annual nutsedge)

Products and rates: Tank mix Princep (simazine) @ 1 lb ai/A and Pennant Magnum (metolachlor) @ 2-4 lb ai/A.

Note: Pennant is in this program since it is the best preemergence herbicide for control of yellow nutsedge and because it controls many annual grasses and some broadleaf weeds. Pennant is not effective on purple nutsedge. For serious nutsedge problems, growers may follow the Pennant application with a post-emergence product like Manage (halosulfuron) or Image (imazaquin), which are effective for the control of yellow and purple nutsedge.

Other notes: Many producers are unhappy with the performance of summer-applied preemergence herbicides when the spray is applied several days after cultivation. It may appear clean, but actually the germination of many thousands of seed can occur in one day during warm soil conditions. The preemergence herbicides don't kill weeds after germination. They act during or immediately after germination. A major reason for herbicide failure is a lack of rain within the required time to activate the preemergence herbicide sprayed. A half-inch of rain or irrigation is required to activate the herbicide within 7 to 30 days, depending on which preemergence herbicide is sprayed. This is very critical and of major concern during the summer. A good nursery manager should spray freshly cleaned blocks the same day they are cleaned in order to avoid escaped weeds. Herbicides are not miracles. They must be used properly in order for them to work correctly.

Warning: While they are largely preemergence herbicides, Surflan (oryzalin) and Pendulum (pendimethalin) have some postemergence activity. Postemergence damage from Pendulum and Surflan is most likely to be a problem on tender, new growth. Barricade (prodiamine) is safer in this respect because it is so insoluble that it has essentially no postemergence activity. Avoid serious plant injury by spraying seedling cutbacks and first-year budded plants while they are dormant or after the new growth has hardened. Spraying over swelling buds with Surflan + Princep has occasionally stunted growth. Pendulum has taken out the central bud and culled first-year dogwood buds. First year pear buds have been deformed and stunted, but they usually grow out of it.

Postemergence Weed Control

Nonselective Herbicides

While the primary nonselective herbicide used in field nurseries is glyphosate (RoundUp Pro, etc.), other options include glufosinate (Finale) and paraquat (Gramoxone). Many tree farmers have chosen a total postemergence weed control program using glyphosate and some sort of shielded sprayer. This is much more effective once the nursery stock is bigger than the weeds. If there is no height differential between the weeds and the crop, shielded spraying is very difficult. Do not spray green bark or stems with nonselective herbicides such as glyphosate, paraquat or Finale. The bark must be brown, mature and free of any wounds from equipment or weed whackers to avoid injury. A recent introduction to the

field nursery trade is the application of RoundUp Pro using a shielded low-volume sprayer (http://www.bubco.com/sprMounted.asp). To avoid bark tissue injury, follow the manufacturer's directions closely.

Grass-Specific Herbicides

These herbicides are effective on grasses only. They will not control "nutgrass" because it is a sedge. They are also safe on other non-grass monocots such as liriope, iris and monkey grass. The most commonly used grass-specific, postemergence herbicides include Fusilade II (fluazifop) applied at 0.25-0.4 lb ai/A, Vantage (sethoxydim) applied at 0.3-0.5 lb ai/A and Envoy (clethodim) applied at 0.1-0.25 lb ai/A. These may be sprayed over-the-top on non-grass plants, but it is always a good idea to direct the spray as much as is practical. Use nonionic surfactants with these products instead of crop oil concentrates, especially when spraying over the top of tender foliage or open blooms.

Vegetation Options Between Nursery Rows

We strongly encourage maintaining vegetation between nursery rows to minimize soil erosion and to provide for a stable road surface for machinery. The cover crop should be mowed for aesthetics and to minimize hiding places for animals such as rabbits and deer.

In Arkansas, the preferred cover crop for aisles would be tall fescue. Drill 30 lb/A between August 15 and September 15 or between February 20 and April 1. Other choices include bermudagrass and crimson clover. Fall-seeded (August 15 to September 15) crimson clover is an excellent winter-spring cover crop that will minimize erosion, add nitrogen to the soil as a result of nitrogen fixation and may reduce deer browsing on nursery crops. Although crimson clover is an annual, it may reseed the following year.

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