WEED SANITATION AND HERBICIDES

Philip L. Carpenter 1/

Introduction

Any weed control program for any nursery, whether a woody ornamentals nursery or forest nursery, should be a total system. Three methods of weed control should be used: sanitation (removal of weed seed source near the nursery), mechanical removal and herbicides. If any of the three are missing in the system, the other methods must do double duty and often this is not possible. The result can be a less than satisfactory weed control program. Total dependence on herbicides should, also, be avoided. It is a misconception to believe that herbicides will solve all your weed control problems. The miracle herbicide has yet to be discovered. A combination of all these methods is needed to achieve as near as possible the ideal system for weed control.

Analyzing the Problem

A complete analysis of the weed control problem at the site is needed before starting to implement the weed control program. Be sure to consider all the factors involved with the problem. Not considering everything can result in failure to control the weeds or, even worse, crop injury. Factors to consider are:

1. Crop being grown including age and method of planting - i.e. seed bed or rows of larger trees.
2. Weed problem - species - annual or perennial.
3. Source of weed problem - blown in weed seed, existing weed seed, perennial weed plant parts such as underground stems or roots.
4. Soils present.
5. Methods of control available - sanitation, mechanical, and herbicides.

The crop being grown is of course the main concern. Whatever weed control techniques are to be used must at all costs protect the crop and in no way harm its growth and development. The selection of mechanical and chemical means of weed control must be tailored to the crop being grown. Not only is the species important but also, the age of the crop. Usually emerging or young seedlings are more sensitive to herbicides than the same species when it reaches larger, more mature sizes. The method of planting is of concern. The close planting in a seed bed eliminates almost all mechanical means of weed control except hand removal. Tree plantations of larger trees of course would allow the use of mechanical cultivation equipment as well as hand hoeing to remove weeds. The crop, its stage of growth, how it is planted, all must be considered in detail when evaluating a particular weed control problem.

The weed or weeds that are the cause of the problem must, also, be studied. Too often an herbicide is applied on the basis that it will not harm the crop.

1/ Professor of Horticulture, Department of Horticulture, Purdue Univ.

Unfortunately sometimes it will not control the particular weed that is causing the problem. Here again a study of the plant is important, in this case the weed. The stage of growth is important. If the weeds have not emerged a pre-emergence herbicide can be used. If they have started to grow then a post-emergence herbicide will be needed. Mechanical means can be used on emerged, actively, growing weeds. Is the weed an annual (coming up from seed every year) or perennial? This crucial question must be answered before determing the control method or combination of methods. A correct identification of the weed is essential if it is to controlled effectively.

Determining the source of the weed problem will aid in solving the problem. If perennial weeds exist in the area to be planted then they should be eliminated prior to planting. The use of soil fumigants must be considered, and if the area is large the possibility of allowing the area to lay fallow and treat the perennial weeds with a post-emergence herbicide and also mechanical means for their control. "Blow in" weed seeds can be a problem in a seed bed after the bed has been treated with a soil fumigant and planted. The combination of sanitation by reducing or eliminating the sources of the weed seed and the use of a pre-emergence herbicide will provide in most instances, satisfactory control of the weeds. Getting to the source of the problem will help reduce the problem not only this year but in future years.

The soils present will influence the use of herbicides and the rates at which herbicides are used. Some herbicides are "tied up" by organic matter in the soils so a soil that is high in organic matter will require more of a particular herbicide or may even preclude the use of certain herbicides. Read the label carefully to determine if the herbicide can be used on soils with a high organic matter content. Sandy soils can be a problem in that herbicide may leach rapidly into the root zone of the crop plant and cause injury. Often rates are reduced for certain herbicides which are to be used on sandy soils. Again determine the soil type and then read the label before applying any herbicide.

Finally, determine the methods of control that are available at the nursery. Personnel, equipment, and just plain "know how" all influence the selection of the weed control method or methods to be used. Each method will require some special knowledge of the problem and how to cope with it. Even the hand removal of weeds requires at least a knowledge of which is the weed and which is the crop plant. The methods for controlling weeds will be considered in more detail in the next section.

Before starting the actual control of any weed problem analyze the entire problem. Study it completely before making any decision. Too often one starts to solve the problem by stages before the total analysis is complete. This makes for a haphazard solution that is often not completely satisfactory. Study the complete problem and then develop a weed control system that will reduce or even eliminate the problem completely.

Solving the Problem

Sanitation at a nursery is frequently overlooked as a means of reducing weed control problems. Nearby weeds are often sources of infestation of the "clean"

areas. "Blow in" weeds can be a real problem in a seedling nursery. Nearby cotton wood and poplar trees are sources of large members of "blow in" seeds and due to the tolerance to most herbicides of these plants the use of pre-emergence herbicides for their control in the seed beds is not likely. Herbicides that will control the weed problem will most likely injure the emerging crop plants. Not only are trees a source of the problem but also many herbaceous plants such as Canada thistle, milkweed, dandelion, etc. Sanitation means eliminating the plants near the nursery that are sources of "blow in" seeds. Of course it may be impossible to eliminate weed plants on someone else's property, but it will help to keep the nursery property free of seed sources. This can be accomplished by removing the plants by mechanical means and the use of herbicides. Post-emergent herbicides are a particularily effective means of removing herbaceous pest plants. Large trees should be cut down.

Besides killing the weed plants that might be a source of weeds in the nursery some other sanitation procedures should be followed. Of particular importance is to make certain that all cultivation equipment is cleaned before going into an area that is weed free. A piece of quack grass root or Canada thistle root hanging on a disc or plow is a good way to reinfest the field. In a short time the perennial weeds can be thriving and spreading to new areas. Also, make absolutely certain the seed source is reliable and not contaminated with noxious weed seeds. If an area is relatively weed free keep it that way.

Mechanical means of weed control has been used by man as long as he has been growing plants. The person removing the weeds should be trained to idenify both the weeds and the crop plants. They should be cautioned about damaging the crop plants with hoes and mechanical equipment. There are some new cultivators that can be used close to tree trunks. These cultivators have sensors which permit the cultivator to come very close to the trunk without actually hitting and causing injury. An important point with mechanical weed control is to remove the weeds prior to their forming seed. Just as important is to make certain those doing the weeding understand what is to be done and how to accomplish the task.

Herbicides when used in conjunction with the other two means of weed control will be a valuable tool in the development of a total weed control system. Herbicides must be used correctly throughout if they are to be effective. Study the problems and make a complete analysis of the situation including the weeds present or that will be present, the crop, the soil type, the equipment available for the pesticide application, and the training of the personnel that will be applying the herbicide. Once this analysis is made then the selection of the herbicide to do the job can be made. This next section will be concerned with specific herbicides and how they might fit into a forest nursery program.

Herbicides and Their Use

The herbicides will be placed in two broad categories - post-emergence and pre-emergence. Post-emergence herbicides are those chemicals that to be effective must be applied after the weeds are up and actively growing. Pre-emergence herbicides must be applied to the weed seed germinating and the

seedlings emerging. The post-emergence herbicides will be considered first.

Amitrole or Amitrole-T -Primary use is for the control of poison ivy. This herbicide is translocated throughout the plant and it must not come in contact with the crop plant foliage as severe injury will result.

Amizine - This herbicide is a combination of amitrole and simazine. It will kill the existing weed growth and prevent the growth of weed seedlings. The amitrole is the post-emergence herbicide in this mixture. Care should be taken not to get the herbicide on the crop foliage as it will cause severe injury.

Dalapon - The primary use for this material is the control of quack grass. It is applied when the quack grass is actively growing and then the area is plowed down two weeks later. It is apparent that this technique limits its usefulness.

Paraquat - Paraquat has been called a chemical hoe as it will kill only the parts of the plant it comes in contact with. It is not translocated so regrowth of the sprayed plants will occur. It kills anything green and should not come in contact with green barked trees. The use of a surfactant will improve the results obtained. This herbicide is on the restricted use list and only licensed applicators should use it. If taken internally serious injury can occur. Also avoid breathing the spray mist, and eye and skin contact. Follow handling directions given on the label very carefully.

Glyphosate (Roundup) - This herbicide is relatively new and just recently has been labelled for use in the nursery as a directed spray and preplant treatment. It is translocated and will provide excellent control of many perennial weeds. It should not come in contact with any green portions including green bark of the crop plant. It is not hazardous to use.

There are other post-emergence herbicides available but these are the ones that will be of the most use in the nursery situation. Remember to read the label and follow the directions carefully.

There are several pre-emergence herbicides that might be useful but again which one to use will depend on several factors. The weeds to be controlled, crop plant, and soil conditions must all be considered. Some herbicides to consider are:

Dacthal (DCPA). This is a relatively safe herbicide for most ornamentals. It is a particularly effective herbicide for the control of annual grasses. It will control some broadleaved weeds. Be sure to check to determine if it will control your particular weed problem before using. It does not need to be incorporated. It should be considered for use in seed beds after the crop has emerged.

Casoron(Dichlobenil) - This herbicide will control a wide spectrum of weeds but probably cannot be used safely in seed beds. It is volatile and should be incorporated probably anytime of the year it is used. It will injury certain conifers such as the firs and hemlocks. Probably this herbicide would find only limited use in most forest nursery situations.

Enide (Diphenamid) - This is another annual grass herbicide that will control some but not all annual broadleaved weeds. It does not need to be incorporated unless no rain occurs within two weeks after application. It should be considered for use in seed beds after the crop has emerged.

Lasso (Alachlor) - This herbicide was recently labelled for limited use in the nursery. It is primarily an annual grass herbicide but will control species of broadleaf weeds. It could be considered for use in seed beds but probably the granular formulation would be safer than the EC. It does not need to be incorporated.

Princep (Simazine) - This herbicide will control a wide spectrum of weeds for one season but even at reduced rates probably should not be used in seed beds. Its main use will be for the control of weeds in established plantings. It does not need to be incorporated. It can be tank mixed with Paraquat or Roundup but the precautions for use of Paraquat or Roundup must be followed.

Surflan(Oryzalin) - This herbicide is another that recently received a label for use on nursery crops. It will control annual grasses and several broadleaf weeds and will last throughout a growing season. It does not need to be incorporated. It may cause severe injury in the seed bed, so should be used there with caution.

Ronstar (Oxadiazon) - Another of the newly labelled herbicides that is effective in control of annual grasses and some broadleaf weeds. It should be incorporated with irrigation or applied immediately before a rain. It might be used in seed beds, but some injury on some species has been observed. Use in beds only as a trial basis.

Treflan (Trifluralin) - This herbicide is labelled for use on many woody species. It should be incorporated for best results either mechanically or with irrigation. This herbicide will control primarily annual grasses and some broadleaf weeds. It should be considered for use in the seed bed.

Before selecting the herbicide make certain the herbicide will control the weed species that is causing the problem and that the herbicide will not injure the crop. Read the label carefully and follow the directions carefully.

Safety with Herbicides

When using any herbicide for the first time always use it on a trial basis. Do not make a 40 acre trial. Check for effectiveness in weed control as well

as crop injury. Always leave an untreated area to compare to the treated area. Herbicide injury may be nothing more than a growth reduction and will be difficult to determine unless a non-treated area is left for comparison. Provide adequate training for the personnel applying the herbicides and check the equipment frequently to insure it is functioning properly. Calibrate the equipment before each major use.

Avoid the use of soil sterilants in the nursery. The hazard to the crop plants and desired plants is too great. Good sanitation practices plus the use of the post-emergence and pre-emergence herbicides listed will give nearly the same result without the danger.

Finally always read the label and follow its directions carefully. This includes storage procedures.

Summary

Always make a total analysis of the weed control problem. Then apply all three methods of control-sanitation, mechanical and chemicals. Good sanitation practices will reduce the weed control problem from adjoining areas. Mechanical means will provide good control in many areas of the nursery and should be used in combination with herbicides.

Herbicide usage is an absolute necessity for a total weed control system. Make certain that the herbicide used will control the weed problem and not injure the crop. Always leave an untreated check area to compare to the treated area. Finally read and follow the label recommendations carefully.