

## Developing a Weed Management Program

Controlling weeds in production or landscape areas can be a burdensome task. The objective of an effective and efficient weed management program is to achieve the desired level of weed control at an acceptable expense (*cost*). Labor is very expensive and sometimes unavailable, and may require training and supervision. Management must avoid the laborious task of physically removing weeds whenever possible.



This objective is best achieved by an integration of cultural practices focused on minimizing the introduction of weed seed, followed by preemergence and postemergence herbicides (refer to page 10, Herbicide Types) applied correctly at the optimum time to achieve the most benefit. The basic principle of this integrated approach is the same for both production and landscape areas; however, the steps to achieve the desired objective are different.

### Weed Management in the Production Area

In commercial plant production, weed prevention begins with cultural practices. In and around the production areas, take steps to minimize the potential



for weeds to produce and spread weed seed (and other vegetative propagules). Weed seed can be transported into the production areas by wind, animals, equipment, humans and infested soil or plant stock. For container-grown ornamentals, the production area may be

covered with geo-textile, gravel or a combination to reduce weed establishment. Often it is necessary to treat these areas with a preemergence and/or postemergence herbicide during non-production periods to control escaped weeds.

In addition to the production area, roads, aisles, fence rows and ditches should be kept clean or mowed frequently to prevent weeds from producing seed. Neat and clean nurseries generally have fewer weed problems than nurseries with weed infestations close to the production area.

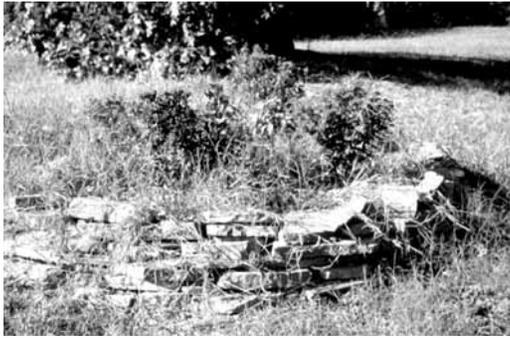
Container media such as pine bark and other amendments should be stored on a concrete pad on high ground, preferably with a wall on three sides. This reduces weed seed from being washed into the pile or blown in by wind. Prevent unnecessary vehicle traffic on the pad. Tires can carry particles of soil or mud, which will likely contain weed seed and pathogens. Never allow weeds to grow in the piles of pine bark. Keep the area surrounding the container media weed-free to prevent weed seed from contaminating the media.

Annuals are generally potted in a commercially prepared, bagged, sterile media and grown start-to-finish inside a greenhouse. In this production system, weeds are seldom a problem. Plants grown in containers larger than one quart in a pine bark media have a greater potential to encounter weeds during the growing season, primarily due to these plants being grown outdoors. Weed control is imperative in these growing conditions. After plants have been potted, watered in and placed in the growing area, a preemergence herbicide should be applied. Preemergence herbicides provide residual control for 60 to 90 days depending on the product(s) and application rate. Thus, timely retreatment is required to produce season-long control that prevents weeds from becoming established. In container-grown ornamentals, the re-treatment of preemergence herbicides is typically broadcast, which helps to prevent weeds in and between the containers.

Escaped weeds or those not controlled by any herbicide should be physically removed prior to seed formation and prior to each retreatment. Often, if a weed is left and seed are produced, the area surrounding the weed-infested container will become contaminated with weed seed and develop a large population that may be difficult to manage. Peak periods of weed seed germination are in the spring and fall.

Weed seed have been found in used containers, clinging to the container walls. After soaking the containers, remove the debris with a stiff brush. Then dip containers in a 10 percent bleach dip for sanitation. Weeds and seeds also enter a production area with potted liners. When repotting plants with a weed problem, remove the top half inch of media and any weeds present to reduce future weed populations.

Postemergence control of weeds in and around the growing area is limited due to the risk of injury to the ornamental crop. When the use of postemergence herbicides is not an option, then established weeds will need to be physically removed.



### Weed Management in the Landscape

The best defense against weeds in the landscape is an effective mulch layer, 2 to 3 inches thick, that allows water to pass through to the underlying soil and plant roots. However, for better control and to minimize the physical removal of weeds, preem-

er- gence herbicides may need to be included in the weed control program. Two and sometimes three preemergence herbicide applications may be required during the growing season, beginning in late February or early March. Spring and fall are the peak periods for weed seed germination.

The physical removal of escaped weeds and weeds not controlled by preemergence herbicides is necessary prior to each re-treatment. These may be hand-pulled, removed with a hoe or spot-sprayed with a postemergence herbicide.

Perennial weeds should be eliminated prior to establishing an ornamental planting, because controlling these weeds is very difficult after ornamentals are planted. The physical removal of certain perennial weeds, such as wild violet and bermudagrass, is ineffective. Established perennial weeds are best controlled with a systemic herbicide such as Roundup® (glyphosate) or Finale® (glufosinate) applied to the weed foliage prior to planting ornamentals.

Avoid using a preemergence herbicide where grass or flower seed will be planted.

### Weed Types and Life Cycles

Herbicide selection is dependent on the ornamental species, the stage of establishment, and weeds both present and anticipated. Weed identification is necessary to develop the best and most cost-effective weed management program. Generally, weeds are easiest to control early in their life cycle. Most weeds, depending on the desired plants being grown, are best controlled with

preventive or preemergence herbicides. To achieve this, preemergence herbicides must be applied prior to seed germination. Thus, the timing of herbicide application is dependent on the life cycle of the target weeds.

For control purposes, weeds can be divided into three types: broadleaf weeds, grass weeds and sedges. Within each type, weeds may have one of three basic life cycles: summer annual, winter annual or perennial.

### Types of Weeds

**Broadleaf Weeds:** Broadleaf weeds are generally easiest to identify. Weeds like dandelion and clover have a distinctive appearance. Their leaves are broad (hence the name), and are generally produced in pairs or multiples. Leaves are detached from the main stem by a sub-stem or petiole. Leaves may be simple (having one leaflet, like dandelion) or compound (having more than one leaflet, like clover). Veins within the leaf give a netted appearance in most cases.



Broadleaf weeds must be controlled prior to planting, either physically or with postemergence herbicides. If broadleaf weeds become established, postemergence herbicide control options may be limited or non-existent due to potential injury to the broadleaf ornamental crop.



**Grass Weeds:** In general, grass weeds (like crabgrass and bermudagrass) are distinctively different from broadleaf weeds. However, distinguishing one grass weed from another can be very difficult (especially in the seedling stage). Unlike broadleaf weeds, grass leaves are not detached from the main stem. Leaves of grasses are narrow with a blade-like appearance, and are produced one at a time in two vertical rows. Leaf veins run parallel with leaf margins. Stems are usually round or flat.

Establishment of grass weeds can be prevented with preemergence herbicides. After grass weeds emerge, a selective postemergence herbicide can be sprayed without damage to labeled ornamental plants. To control small, actively growing grasses in herbaceous ornamentals, apply an over-the-top application of Envoy®, Fusilade® or Vantage® (all are herbicides with control activity that is selective for just grass weeds). Refer to **Table 5, Grass and Grass-like Weeds Controlled by Postemergence Herbicides**, for weeds



controlled by a particular grass-control herbicide. Refer to Table 2 and the product label for ornamental plant tolerance to a particular grass control herbicide.

**Sedges:** Sedges (like yellow nutsedge) are often the most difficult-to-manage weeds in ornamental plantings. Sedges are not grasses. However, sedges have leaves that are similar in appearance to grasses and are often misidentified. Herbicides used to control grass weeds are generally not effective on sedges. Thus, effective control of weed grasses and sedges is dependent on correct identification of these types of weeds.

Sedges have two key identifying characteristics: leaves are arranged in three vertical rows and stems are triangular. By contrast, stems of grasses are either round or flat, and leaves are present in two vertical rows. Herbicides to control sedges are usually applied as curative treatments. Herbicide selection is limited and control is difficult with the herbicides available.

## Life Cycles of Weeds

**Summer Annuals.** Annuals complete their life cycle within one growing season. Summer annuals generally germinate in the spring, grow during the summer, produce seed and die by late fall.

**Winter Annuals.** Winter annuals complete their life cycle in 12 months, but generally overlap two calendar years. Winter annuals germinate in late summer to early fall and begin to develop. Winter annuals are dormant or semi-dormant through the winter, and flower the following spring. Winter annuals mature and die in late spring or early summer.

Summer and winter annuals reproduce and spread by prolific seed production. This seed bank serves as a ready source of infestation and establishment when conditions are favorable. Thus, in a normal year, there are two periods of intense weed seed germination: in the spring when summer annuals begin to germinate, and in the late summer or early fall when winter annuals start to

germinate. Summer annuals will often continue to germinate throughout the summer, with the heaviest flush of germination in the spring to early summer especially following soil disturbance.

**Perennials.** Perennials live for more than two years and may regenerate indefinitely. A simple perennial, like dandelion, may germinate from seed, but produces a tap root that, when severed, can produce a new plant. A complex perennial can spread by seed and by vegetative structures above- or below-ground, such as stolons, rhizomes or nutlets.

Perennial weeds are often the most difficult to control. If they are well-established, repeat control measures may be required. Removal of the above-ground shoot growth does little towards long-term control. Long-term control usually requires herbicide treatments that act on the above- and below-ground structures.

Thus, an effective weed control program is dependent on knowing the weed type and life cycle.

## Herbicide Types

Herbicides for use in ornamental plantings can be divided into two types: preemergence or postemergence.

**Preemergence herbicides** work on germinating weed seeds, preventing them from emerging. Thus, preemergence herbicides should be applied to weed-free soil or growing media prior to weed seed germination. Preemergence herbicides do not control established weeds.

Preemergence herbicides vary in the spectrum of weed control. Certain preemergence herbicides provide effective control predominantly of grasses, with limited control of broadleaf weeds, while others provide control predominantly of broadleaf weeds. Therefore, two or more herbicide active ingredients may be factory-mixed into a single herbicide product or tank-mixed by the user to provide control on a broad spectrum of weeds.

To activate a preemergence herbicide, irrigation or rainfall must be applied within a specific time period (See **Table 8, Carrier Volumes, Rain-fast Times and Re-entry Intervals for Preemergence and Postemergence Herbicides**). The water moves the herbicide into close contact with the soil and weed seeds and initiates the herbicide activity.

Preemergence herbicides generally provide residual control for 60 to 90 days. The length of control is dependent upon the product selected, the application rate, when activation occurs, weed species and weed pressure. Thus,

timely retreatment may be needed to extend the residual control and prevent weeds from becoming established.

**Postemergence herbicides** control weeds after they have emerged or become established. These herbicides may be selective or non-selective in the weeds controlled. Some selective herbicides control grass weeds with no activity towards broadleaf weeds. Examples are Envoy<sup>®</sup>, Fusilade<sup>®</sup> or Vantage<sup>®</sup>. Postemergence herbicides for control of established broadleaf weeds in ornamental plantings are very limited. Non-selective herbicides, such as Roundup<sup>®</sup> or Finale<sup>®</sup>, will kill both grass weeds and broadleaf weeds and may severely injure ornamentals. Thus, their use in ornamental plantings may be limited to spot treatment.

## Herbicide Formulations

Herbicides are formulated to achieve ease of application and optimum performance. The active ingredient, which has the herbicidal or weed control activity, is not the only component contained in the herbicide product. The active ingredient is often mixed or formulated with inert ingredients that improve the herbicidal activity, ease of handling and application.

There are both liquid and dry herbicide formulations. Dry formulations are either applied as a dry granule or mixed with water and sprayed on the weed foliage or soil surface. The common herbicide formulations and the letter codes often used to designate the formulation are listed below.

### Dry Formulations

**Granules (G or GR).** Granular herbicides are dry particles ready for application to soil, mulch or container media surface. The herbicide active ingredient is formulated onto a dry carrier such as clay. After application, the herbicide is activated by rain or irrigation, which creates a chemical herbicide barrier on the surface.

**Wettable Powders (W or WP).** Wettable powders are meant to be mixed with water as a carrier and applied as a liquid spray. The herbicide formulation is a dry, finely ground particle. Wettable powders form a suspension in water and frequent agitation is required to maintain a uniform suspension.

**Water-Dispersible Granules (WDG or DG) and Dry Flowables (DF).** These are improved wettable powders. They are easy to handle, as they produce little or no dust during mixing. After mixing with water as a carrier, frequent agitation is required to maintain a uniform suspension.

**Soluble Powders (SP).** Soluble powders are dry formulations that mix readily with water. After the initial mixing, they hold in solution readily.

### Liquid Formulations

**Liquids or Aqueous Solutions (L or AS).** Certain active ingredients are finely ground and suspended in a liquid. The suspension is then mixed with water as a carrier for application. These formulations require frequent agitation to maintain a uniform mixture.

**Emulsifiable Concentrates (E or EC).** Emulsifiable concentrates are liquid formulations that are mixed with water as the carrier for application. Once mixed, emulsifiable concentrates readily stay in solution. Emulsifiable concentrates contain organic solvents to which certain plants may be sensitive. Look for precautions on the label warning of possible injury to ornamentals.

**Solutions (S).** Solutions are true solutions and mix readily with water with little to no agitation.

# WEED IDENTIFICATION

## Broadleaf Weeds

### Summer Annuals



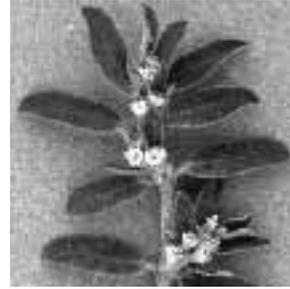
Bedstraw



Prostrate knotweed<sup>1</sup>



Prostrate spurge<sup>1</sup>



Spotted spurge<sup>1</sup>



Common groundsel

### Winter Annuals



Buttercup



Henbit<sup>1</sup>



Deadnettle



Common chickweed<sup>1</sup>



Mouse-ear chickweed<sup>1</sup>



Carolina geranium

<sup>1</sup> Photo Credit: Arlyn W. Evans

## Perennials



Dock, Curly



Dock, Broadleaf



Wild onion/Wild garlic<sup>1</sup>



Dandelion



White clover



Hop clover



Ground ivy



Plantain, Broadleaf



Oxalis<sup>1</sup>



Wild strawberry



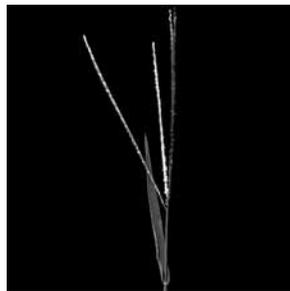
Wild violet

## Grass Weeds

### Summer Annuals



Large crabgrass<sup>1</sup>



Smooth crabgrass<sup>1</sup>



Goosegrass



Yellow foxtail<sup>1</sup>



Green foxtail<sup>1</sup>

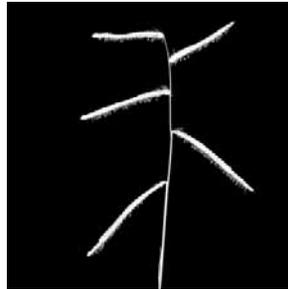
<sup>1</sup> Photo Credit: Arlyn W. Evans

## Winter Annuals



Annual bluegrass<sup>1</sup>

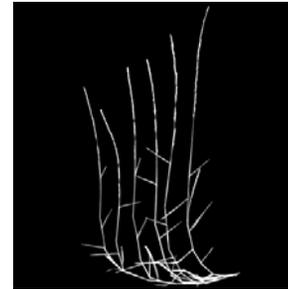
## Perennials



Dallisgrass<sup>1</sup>



Bermudagrass



Nimblewill<sup>1</sup>

## Sedges

### Summer Annuals



Annual sedge<sup>1</sup>

### Perennials



Yellow nutsedge<sup>2</sup>



Purple nutsedge



Leaftips,  
Far Left - Purple nutsedge,  
Two Right - Yellow nutsedge

<sup>1</sup> Photo Credit: Arlyn W. Evans

<sup>2</sup> Photo Credit: Jimmy R. Summerlin