

HERBICIDE APPLICATION TIMING

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Herbicides are applied to control weeds in turfgrasses and crops. In order to achieve the maximum weed control from each application, it is important to use these products correctly. One of most important factors to consider when using herbicides is the timing of the application. Most applications are made based upon when the weeds become most objectionable and this usually coincides with good weed control. However, there are times when herbicide applications work best and this should be taken into account when developing a sound herbicide program. Herbicide application timings should be developed as part of an overall management program that takes into account the best time to control a particular weed and the weed species present in the landscape.

In an established turf stand there are really only two possible application timings. A preemergence application is made prior to the emergence of the weeds to be controlled. These are by nature preventative applications because in most cases preemergence herbicides have no postemergence activity and must be put down before the target weeds have begun germinating. Therefore, one must have some knowledge of the kinds of weeds present and the severity with which they will invade the turf.

A postemergence application is made after the weeds have germinated and infiltrated the turf. Postemergence applications are made directly on the target weeds whereas preemergence applications are applied to the soil or thatch. Preemergence herbicide applications can be considered as simple applications. Postemergence applications are more complicated because the herbicide must get into the plants in order to exert their toxic effect.

PREEMERGENCE APPLICATION TIMING

In Michigan, preemergence herbicides can be used to control annual grasses and broadleaves as they germinate. Many turf managers annually apply a preemergence herbicide to control crabgrass. Crabgrass is a serious pest of turf but one that is easily controlled. Crabgrass is a summer annual that germinates in mid-spring after soil temperatures have surpassed 50 F. It is a good idea to apply your preemergence herbicides as close to the time crabgrass begins to germinate as possible. As soon as a preemergence herbicide is applied it begins to breakdown. In order to provide season-long weed control, the herbicide must maintain a concentration in the soil high enough to control germinating crabgrass. If the herbicide is applied early in the spring, well before crabgrass germination, then enough herbicide breakdown can occur to cause crabgrass control to be lost later in the season.

How do you know when crabgrass will begin germinating? While some effort has been expended to develop a crabgrass germination model based upon soil temperature, this is not really necessary when there are plenty of good environmental timing devices present right in our own backyard. Forsythia bush is the classic environmental indicator. When its yellow flowers begin to drop in the spring, that is considered a signal to apply a preemergence herbicide. My own observations is that the forsythia bush is still about 2 weeks ahead of schedule. I'm sure there are other plants that will also serve as environmental indicators for crabgrass emergence, all you need to do is look for them! Preemergence control of broadleaf weeds is a different story than preemergence crabgrass control. First, many turf broadleaf weeds are perennial and if they are emerged then a preemergence broadleaf herbicide will have no effect on them. Further, the cost of postemergence broadleaf weed control is quite low and preemergence broadleaf herbicides currently cost 5-6 times the cost of a broad spectrum postemergence herbicide. Since you normally have to apply a postemergence herbicide anyway to control emerged perennial broadleaf weeds, the need to then come back and apply an expensive preemergence herbicide has not been obvious to most turf managers. Therefore, preemergence broadleaf herbicide applications to turf are not widely practiced.

POSTEMERGENCE APPLICATION TIMING

Postemergence herbicide applications are more complicated than preemergence herbicide applications because the herbicide is not applied to the soil or thatch surface but the intended site of application is the foliage. The herbicide must be absorbed into the foliage and then translocated to the site in the plant where it exerts its toxic effects. Environmental factors such as temperature, drought stress, shade, etc. can affect the efficacy of herbicides by changing the amount of herbicide absorption into the plant. Thus, the use of postemergence herbicides has more potential problems than can occur with preemergence herbicides.

FACTORS AFFECTING POSTEMERGENCE HERBICIDE ACTIVITY

Several factors affect the control achieved with postemergence broadleaf herbicides. First, the growth stage of the plant is critical. In general, the younger the plant, the easier it is to control. This is most applicable to annual plants, however, even established perennials have growth periods where control is more easily achieved.

As an example, fall is an excellent time to control established perennials because they are storing food reserves in their root systems and the herbicide will be transported to the roots, killing the entire plant.

Second, the weeds must be actively growing in order to take up a sufficient dose of the herbicide for effective control. When weeds are actively growing, they are translocating photosynthate to the plant's growing sites. The absorbed herbicide can be carried with the photosynthate to these growing sites which are often the site of the herbicide's action. When weeds are actively growing they tend to be more succulent and possess a thinner cuticle. The cuticle is the primary barrier to herbicide absorption, and when plants are actively growing the cuticle tends to be less well developed. Plants produce a thicker cuticle as a means of conserving water loss during high temperatures and water stress, and as a consequence, the thicker cuticle makes it more difficult for herbicides to penetrate the cuticle and move through the plant.

Cuticle thickness can also explain why better postemergence weed control is sometimes seen in the shade and why turfgrasses under shaded conditions are sometimes injured by postemergence herbicide applications.

These factors - plant growth stage, herbicide absorption and plant growth rate - control the effectiveness of post-emergence herbicides. In light of this discussion, what is the best time to apply postemergence broadleaf herbicides? The answer depends on the life-cycle of the weed.

In controlling annual weeds, the first principle is most important. Controlling these weeds just after they have germinated is highly recommended. Right after germination, these weeds are actively growing, young, and do not have a well developed cuticle. Control is very easy at this time. For summer annual broadleaf weeds, the best time to control them is immediately after germination in the late spring or early summer. For winter annual broadleaves, best control is achieved in the late summer or early fall, right after germination. Some summer annual broadleaf weeds are controlled by certain preemergence crabgrass herbicides. For instance if you know that prostrate spurge is a weed problem on your site and you're going to make a preemergence grass application, then choose an annual grass herbicide that controls germinating spurge as well. Examples include pendimethalin (trade name - Scott's Weedgrass Control, PreM, or Pendulum), dithiopyr (trade name - Dimension), and DCPA (trade name - Dacthal).

For perennial broadleaf weeds, spring and late summer/early fall represent excellent windows for postemergence broadleaf weed control. Avoid applications in the summer if possible. Of the two preferred timings, fall is considered the best time for 3 reasons. First, perennial weeds are actively storing food reserves for the winter and the herbicide is usually translocated throughout the entire plant giving excellent and complete weed control. Second, you can safely use ester formulated broadleaf herbicides without the attendant risk of damage to non-target plants. Third, non-target plants are not very susceptible to broadleaf herbicides at this time so again there is less risk of non-target injury. By delaying postemergence broadleaf herbicide applications until later in the fall, effective control of existing and fall-germinated weeds can be obtained. If one makes an application in early September, excellent control of emerged weeds will be obtained. Weeds that germinate after the early September application will not be controlled and may not even be noticeable in the turf canopy that fall. However, next spring those weeds will most certainly be noticeable and require an additional postemergence broadleaf herbicide application. By delaying the late summer application until the fall, control of both emerged and fall-germinated weeds will result in a weed-free turf next spring.

A common question that is routinely asked is how late can I apply a broadleaf herbicide in the fall and still get effective broadleaf weed control? This is an important question because many turf managers assume that September is the optimal time to control broadleaf weeds. For maximum effectiveness, fall weed control applications should be delayed, as stated above, until October to ensure control of all the recently germinated weeds. Applications as late as mid-November have shown excellent control in research conducted at MSU. The data in

Figures 1 and 2 compares applications of several broadleaf herbicides made in late September or late October. Notice that the level of weed control the following spring is reduced in the late September treated plots as compared to the late October treated plots. The later applications controlled all the weeds that had germinated in the fall. The late September application missed some weeds that apparently germinated after the application and weren't noticeable until next spring.

Figure 1. Dandelion Control. Applications made on 9/24/86.

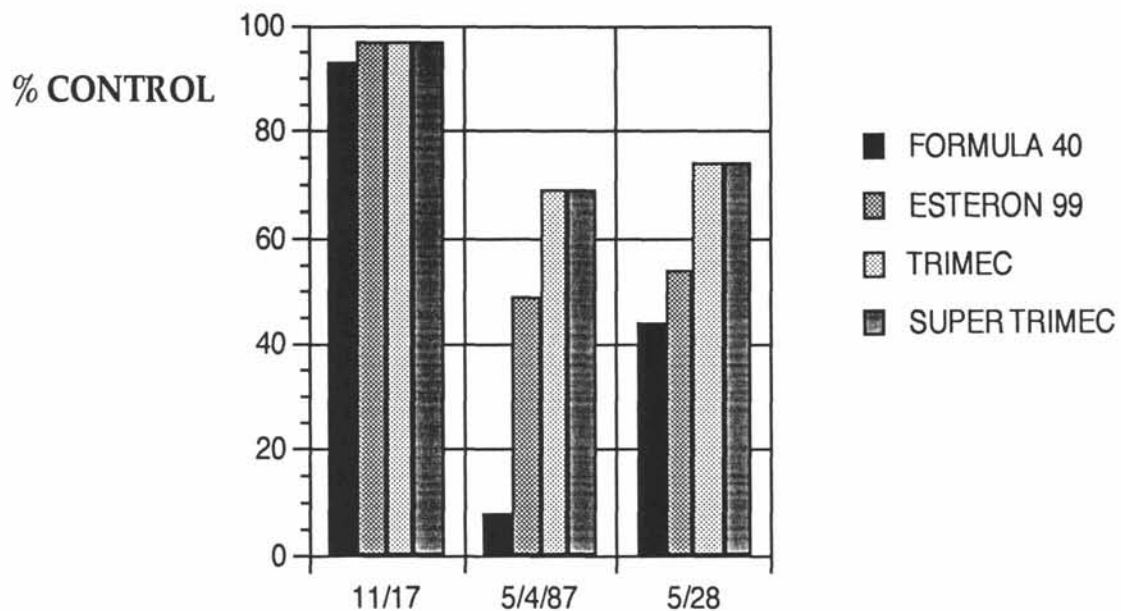


Figure 2. Dandelion Control From 10/30/86 applications

