PREEMERGENCE AND POSTEMERGENCE ALTERNATIVES FOR WEED CONTROL

By T. L. Watschke, Associate Professor of Turfgrass Science, The Pennsylvania State University

Turfgrass chemical weed control has evolved from a non-selective, spot treatment approach prior to 1944 to selective broad spectrum programs during the 1970's. With a few exceptions, almost all broadleaf weeds could be controlled selectively in turf until the Environmental Protection Agency (EPA) action against silvex in February, 1979. The loss of silvex has reduced the completeness of broadleaf weed control in turf, but hopefully the problems that have been created can be resolved with existing technology. Action by EPA against any other currently used selective broadleaf herbicides for turf would cause a significant reduction in weed control capability for turf managers. Successful weed control is the result of the following steps: 1) identification of the weed, 2) recognition and implementation of proper cultural control practices, and 3) selection and proper application of herbicide. The following is a review of some of the currently available pre- and post-emergence herbicides.

Cultural Practices

Weeds are excellent indicators of soil conditions, use of an area, and its management. For example, compaction, pH, poor drainage, low fertility (particularly nitrogen), and poor structure are soil conditions that may be indicated by the presence of certain weeds. Inappropriate mowing and irrigation practices can make certain weed species more competitive than turfgrasses. The lack of good disease and insect control programs can result in weakened turf that is easily invaded by weeds. The objective of sound cultural weed control practices (in reality—good management) is to eliminate voids in the turf stand where weeds can get their start. Without space to grow the weeds cannot compete.

Preemergence Control

The primary preemergence herbicides used on cool season turfgrasses are benefin, bensulide, DCPA, and siduron. The rate of control will vary depending on formulation, timing of application, soil type, rainfall, location, and other factors. Regardless of the material used, the most important factor is the timing of application. These materials must be applied prior to the germination of the weed species that is to be controlled. Ideally, application should be made 7-10 days prior to the anticipated germination of the weed.

Benefin is a 2.5 G granular product recommended for use at 2 pounds of active ingredient per acre (ai/A). This material provides excellent control and may cause minor injury to fine fescues. Benefin is labeled for multiple season application which allows for second applications (when needed) to eliminate late season germination. Benefin is not recommended for use on bentgrasses.

Bensulide is formulated in both granular and liquid forms. It is recommended for use at 7.5 pounds ai/A for the control of smooth crabgrass. Bensulide has good safety on all cool season grasses and provides excellent control. Bensulide also provides good preemergence control of annual bluegrass.

DCPA is formulated in both wettable and granular forms. It is recommended for use at 10.5 pounds ai/A and provides excellent control. DCPA may cause minor injury to fine fescues, but the injury is not permanent. DCPA is not labeled for use on bentgrasses.

Siduron is most commonly marketed in the wettable powder form (50 W). It is recommended for use at 12 pounds ai/A. Siduron may be used in a seedbed at 6 pounds ai/A to control summer annual grasses without inhibiting the germination of the desired species. Siduron also has early postemergence activity, but is recommended for use preemergence. Due to solubility, siduron may not be as effective as the others for season-long control in wet years. Repeat applications may be required.

Postemergence Control

Postemergence control of summer annual grassy weeds may be necessary and the best materials to use are the organic arsenicals (AMA, CMA, DSMA, MAMA, and MSMA). These materials require multiple applications and are generally not as effective as preemergence materials.

Selective postemergence broadleaf weed control is primarily accomplished through the use of 2,4-D, MCPP, dicamba, and various combinations. When the weed population consists of dandelions and plantains 2,4-D alone provides satisfactory control. The recommended rate of 2,4-D is 1 pound ai/A from liquid formulations and 2 pounds ai/A for granules. However, in most situations, the spectrum of weeds present usually includes those that 2,4-D alone will not sufficiently control. Fall applications are preferred for controlling dandelions because early spring flowering will be avoided. Spring applications are also successful and preferred over summer application. For the control of wild onion and wild garlic, the ester formulation of 2,4-D should be used in the spring at a rate of 1 pound ai/A.

Dicamba is recommended at the rate of 0.5 pound ai/A for the control of knotweed, spurge, clover, and other legume type weeds. However, if dandelion and plantain are part of the stand, 2,4-D and dicamba should be combined at the rates of 1 and 0.25 pound of ai/A, respectively. This combination controls a broader spectrum of weeds with a lower dicamba rate than when it is used alone due to a synergistic effect which results from the combination. Dicamba used alone should not be applied under the dripline of ornamentals.

Mecoprop (MCPP) is effective on many of the weeds controlled by dicamba, but is rarely used alone except for weed control in bentgrass. It may also be used alone in situations where ornamentals are involved, as applications of MCPP under the dripline can be safely accomplished.

Most frequently, broadleaf weed populations on home lawns consists of many different types of weeds. Consequently, 2,4-D, MCPP, and dicamba are com-

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tions will provide important information for the turf industry. Discovery of the greenbug's overwintering site may reveal a weak link in the aphid's life cycle that is vulnerable to control. The possibility that greenbug damage can be minimized by cultural practices such as timely irrigation, seeding with resistant lawngrasses, or use of a bagging mower should also be investigated.

Literature Cited

(1) Niemczyk, H. 1980. New evidence indicates greenbug overwinters in north. Weeds, Trees and Turf 19(6):64.
(2) Street, J. R., R. Randell, and G. Clayton. 1978. Greenbug damage found on Kentucky bluegrass. Weeds, Trees and Turf 17(10):26.

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bined to provide a broader spectrum of control plus this combination has the advantage of using dicamba at a lower rate than when it is used alone. This combination should be applied at the rate of 1.0 pound ai/A, 2,4-D + 0.5 pound ai/A MCPP + 0.10 pound ai/A dicamba. Fall and spring are the best times for control with early fall being preferred especially when turf stands are contaminated with later germinating summer annuals (particularly spurges and *Oxalis).*

Some broadleaf weeds require more specific treatment. Creeping speedwell *(Veronica filliformis)* can be controlled with DCPA 75 W applied in May at 12 pounds ai/A. The granular formulation is not effective. Control using the 75 W often takes as long as three to four weeks to occur. Once the chemical begins to work, the level of control should be nearly 100 percent. DCPA 75 W is not currently recommended for control of any other speedwells.

Oxalis and wild violet are also difficult to control since silvex cannot be used. The combination of 2,4-D and 2,4-DP at 1.0 pound of ai/A from each has provided good control of *Oxalis.* Wild violet control from this combination is not as good as for *Oxalis.* Spring application is the best time of the year for wild violet control.

Regardless of the broadleaf weed control approach being used, treatments should be made only when soil moisture is adequate to support vigorous weed growth. Avoid spray drift onto sensitive plants, clean equipment properly after application, and dispose of empty pesticide containers in an approved manner. **WTT**