

How Dependable Is

Pre-Emergence Weed Control?

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When anyone shows up at your course with an answer to all your weed problems, *beware!* A considerable amount of study is necessary to be familiar even with the name of the chemicals currently available, let alone how to use them. Focusing our attention on pre-emergence chemicals alone, we find a vast array of products which are somewhat bewildering. If you really want to know how confused we are about pre-emergence weed control, I suggest you refer to the December, 1967, issue of *Grounds Maintenance* magazine and examine the recommendations for crabgrass control. Since 1967, the recommendations may have changed slightly, but the confusion for the consumer and the difference of opinion among experts still exists.

I have personally encountered two instances within the last year where representatives of a well-known company were selling chemicals for *Poa annua* control in bent greens. Both superintendents needed help with their *Poa annua* problem desperately, and they trusted the representative who in both cases was rather vague with technical information. However, he promised outstanding results with their chemical, as well as appropriate gifts to the superintendent for doing business with him.

Each course received a 55-gallon drum with a very technical label of ingredients and directions for use. In both cases the material was the same and contained as the main ingredient, 2-4 dichlorophenoxyacetic acid, which

most of us recognize as 2,4-D. The chemical 2,4-D does give some pre-emergence control for many plants, but the problem is, it gives post-emergence control of bent grass and would have wiped out the greens for the season.

There is a mountain of data on pre-emergence weed control, but all of it is insufficient to give us the certain practical information we need for effective use. Results are highly variable, and in many cases the chemicals cause more problems than they solve.

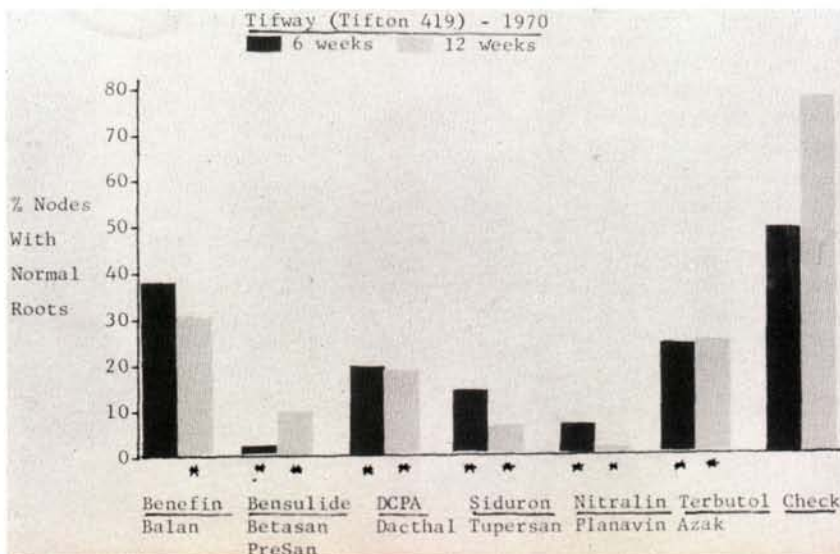
As of now, no one is certain of the optimum time of application, residual, effectiveness, safety or proper use of any of the pre-emergent chemicals.

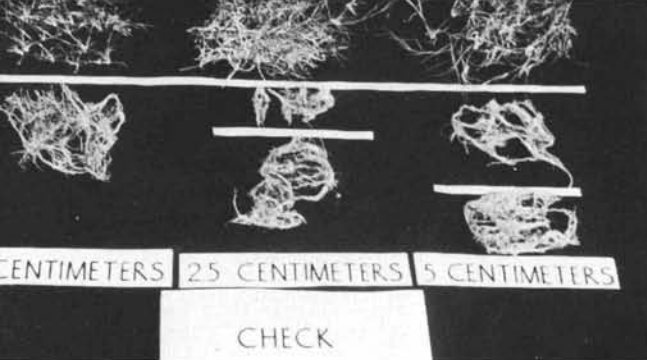
Let's make a list and examine the most commonly used chemicals, one by one:

Terbutol-Azak—a carbamate herbicide, is in somewhat limited use because of margin of safety to turf, especially cool season species. Control of crabgrass and goosegrass is good, but very little is known about the physiological and biochemical action of this material. It restricts root and rhizome growth, and it can cause delayed long-term injury. Absorption of the chemical is through the root of the plant and damage occurs after the chemical is absorbed rather than as a direct foliage burn. Bermuda varieties seem reasonably tolerant to this chemical, and it may prove quite good for this purpose.

Bensulide—Presan and Betasan—has a long

The influence of pre-emergent herbicides on root development of 419 Bermudagrass. Photo by Dr. William M. Lewis, North Carolina State University at Raleigh.





Series of three photographs showing Check Plot, Betasan at 15 pound per acre rate, and Dacthal at 5 pound of turf on check plot and with each of the pre-emergent applications is significant. Pictures contributed stitute, Blacksburg, Va.

residual life, and was test marketed in 1964. Pre-emergence control with this material ranges from excellent to poor, and timing of the application or applications seems to be very important. Research results and field applications seem to indicate a reduction in root growth when the material is used and sometimes damage to the stand of turf with repeated use. This is a most useful material, but it would help to know a great deal more about its proper use. If properly applied, bensulide will prevent the establishment of almost any seed during the residual life.

Benefin—Balan—is a trifluralin derivative which has proven effective for control of crabgrass, *Poa annua*, and goosegrass with a wide margin of safety to certain turf species. Benefin will injure bentgrass but it appears to be relatively safe on bluegrass, zoysia, and common bermudagrass in fairways. Injury from benefin has been noted on Tifdwarf and Tif-green bermuda. Residual is about 3 months or longer, depending upon many variables. This chemical should not be applied in the spring following a fall seeding.

Bandane—a chlorinated hydrocarbon is actually an insecticide which is similar to chlordane. It has a good residual and controls ants, grubs, and Japanese beetles. Mode of action in preventing crabgrass and goosegrass is unknown, but test results are favorable in regard to safety and effectiveness, although Tennessee reported some phytotoxicity on bent greens. The main objection to this material is cost, which is in the area of \$60 per acre. It has found some favor in the Washington, D.C., area for the past two years for use on bentgrass, and as yet there have been no reports of injury.

Chlordane—is used very little today as a pre-emergent because of danger of long term damage, which shows up several months after application and may last for years, appearing when the turf is under stress. This is a good insecticide which is safe on turf at the recommended insecticidal rate. It has been used on bentgrass greens as a pre-emergence in Ten-

nessee in several instances for as long as 10 years without any ill effects directly attributed to it.

Tri-Calcium Arsenate—an arsenical product, gives some control of insects as well as pre-emergence control of *Poa annua*, crabgrass, and chickweed. Residual may last up to five years. This chemical also acts as a post-emergence control in some cases, especially on *Poa annua*. The mode of action is through absorption in the plant replacing phosphorus.

One course has applied it to bermudagrass and bentgrass greens for three years with no complications to permanent turf or overseeding establishment at the rates we recommended. Good weed control has been achieved.

When using a tri-calcium arsenate program, light, frequent applications at certain times of year to coincide with the growing season of the turf and the planned overseeding dates is suggested. Fertilizer applications should omit phosphorus, and light applications of phosphorus may be made to counteract injury, which may occur on permanent turf. Control rates are variable, depending on phosphorus content of the soil.

DCPA—Dacthal is in the group known as phthalic acids or terephthalic acids, which are quite different in mode of action but chemically related to Dicamba (Banvel "D"). Dacthal is neither absorbed by the foliage nor translocated in the plant, and is effective only when applied before germination.

The material was most effective and had a high degree of safety for several years. About three years ago, some changes were made in Dacthal which gave it greater solubility, and since that time we have had some reports that this chemical did not seem to perform as well as the older material that some superintendents still had in storage. Dacthal does interfere with the pegging down of bermuda, but then so do all pre-emergents to some degree, with the possible exception of tri-calcium arsenate. Many have decided to wait and see the results of further use of the "improved" formulation. This chemical is not recommended for Cohansey



per acre rate. Difference between root development by Dr. S. Wayne Bingham, Virginia Polytechnic In-

bent or fine fescue.

Siduron—Tupersan is a substituted urea in the amide group. Tupersan interferes with the photosynthetic processes in certain weeds and is a good pre-emergent with a high degree of safety to most turf species except C 1 and C 19, Washington, and some of the grasses which appear as a result of segregation of seaside. Tupersan is particularly damaging to bermudagrass and is now being used selectively to take bermuda out of bent greens. Tupersan may be applied before, during, or after seeding with good results.

PMA—Phenyl Mercury has some action in preventing crabgrass in that it burns the young, tender plants. It may possibly have some pre-emergent qualities which have yet to be discovered—but it is a proven fungicide and has some anti-transpirant action on turf which helps reduce water loss during stress periods. PMA must be used properly to avoid burning of turf, and it works best when mixed with Thiram.

Some other pre-emergence materials worth mentioning are Simazine, Atrazine, Diphenamid (Enide), Zyrton (DMPA) and Kerb.

Simazine and **Atrazine** are both post and pre-emergent materials and have been used in the Carolinas and in Tennessee for some years. They are effective and inexpensive, but without much of a safety factor on any turf.

Diphenamid is experimental and information on it is limited.

Zyrton (DMPA) has been taken off the market and used only for testing for 2 or 3 years.

Kerb is an experimental post and pre-emergence chemical which has shown excellent promise in Florida tests.

Now for some general observations about all the pre-emergence materials.

Timing is critical, but there is little conclusive information on when the optimum dates of application are. For most of the materials mentioned, between March 15 and April 15 seem to be good dates, with March 15 to April 1 being best. This applies over a large portion of the United States. Natural indicators may also

be watched and applications timed to coincide with the fading of the forsythia flower and when lilacs and dogwoods first bloom. The exceptions are tri-calcium arsenate, phenyl mercury, simazine and atrazine.

To be effective for goosegrass, applications have to be made before common crabgrass germinates, with the previously mentioned exceptions.

Soil must be left undisturbed by any cultivation which brings up soil from below, and it should be left undisturbed altogether if possible. Even though residuals in many cases may not last more than 45 days, according to the labels on materials and recent research information, season-long control may be achieved with a single well-timed application if the soil is left undisturbed. Split applications at half rates may be helpful. Exceptions are tri-calcium arsenate and PMA.

Actually, these general statements should be qualified with many special exceptions, because it is essential to have a thorough knowledge of each individual material to use it safely and with the greatest effectiveness. Quite often it is possible to improve upon the recommendations of the manufacturer, but always remember that in doing so you void any warranty, either expressed or implied, and whatever the result, you are the sole owner.

Manufacturers have put a great deal of time and money into the recommendations for a product and into labeling it for turf use, but even so they can't cover every eventuality any more than they can print every use and precaution on a label. In every case you should try the material on a limited basis before covering the course with it. If you have the facilities and the time, you will be able to determine how you can best use the material on your course. If not, you will at least learn that the material does or does not do what you require at the manufacturer's rates. No matter how good it sounds, nothing is ever without some disadvantages, and it is helpful to know exactly what disadvantages you may encounter before going overboard with any material.

Many of these materials such as Benefin, Simazine, Atrazine and Terbutol may damage an overseeding, and such materials as Bensulide, Bendane, Tri-calcium arsenate, and DCPA may prevent its proper establishment.

These observations are simply made in an effort to help us all understand better the pre-emergence materials, and they should provide a little food for thought. These observations certainly are not intended as recommendations for or against any of the products.

Finally, weed control chemicals should not be used as a substitute for good cultural practices, because a strong healthy turf is still the best weed control possible.