CORNELL UNIVERSITY TURFGRASS TIMES

CUTT

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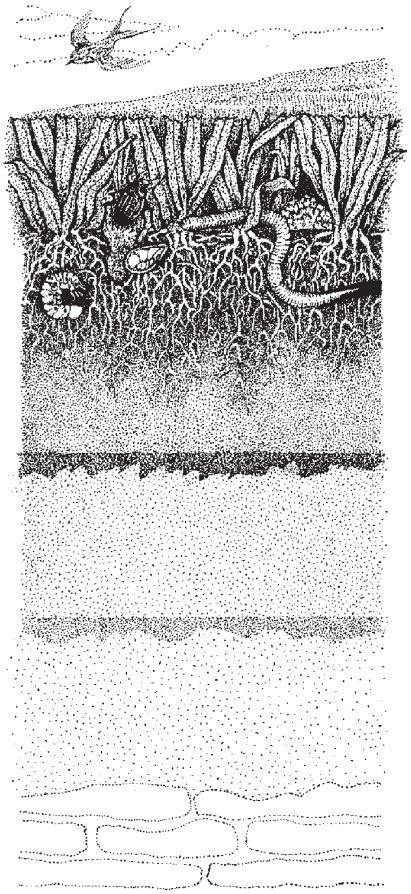

Biology And Control Of Pythium Root And Crown Rot Diseases

Over the past few years, Pythium root and crown rots (PRR) have become more of a problem on highly managed turfgrasses nationwide. The disease complex is characterized by a root and crown decay leading to a thinning or eventual loss of an established turfgrass stand. Although the occurrence of this disease has been most frequently associated with established, highly maintained bentgrass/annual bluegrass putting greens on golf courses, it can also be a serious problem on highly managed home lawns and newly seeded areas. The disease can be quite damaging to many of the commonly planted turfgrass species, but it is particularly severe on ryegrasses, bentgrasses and bluegrasses *(Poa annua* and *P. pratensis).* ■

While Pythium species can be readily isolated from healthy as well as diseased turfgrass roots and crowns, a number of different Pythium species associated with turfgrasses have been shown to be pathogenic. Some strains of *Pythium aphanidermatum, P. graminicola, P. myriotylum, P. aristosporum, P. periplocum, P. vanterpoolii* and *P. arrhenomanes* have been shown to be pathogenic to turfgrass roots under warm (75-85° F) conditions, while strains of *P. graminicola, P. vanterpoolii, P. torulosum, P. aphanidermatum* and *P. aristosporum* have been shown to be pathogenic under cool (45-60° F) conditions. All species require prolonged wet periods to induce severe disease development.

Early symptoms of PRR may be visible in the spring immediately after snow melt, but are most common in the early spring (Mar - May). Symptoms, however, may be evident at any time throughout the growing season and disease activity may continue into late autumn. From observations of the disease in the Northeastern U.S. over the past several years, it appears that particular sites are more prone to PRR damage in early spring and late autumn, while other areas experience the problem primarily in warmer parts of the season. This is perhaps related not only to variation in the native complex of pathogenic Pythium species

continued on page 4

This Times

Short Cutts

Cornell Turfgrass Field Day

June 27, 1991
Ithaca , NY
Details Will Follow

Please turn to page 7 for CUTT subscription information.

Cornell Recommends Available

The *Cornell Pest Management Recommendations* for 1991 is now available from your local Cornell Cooperative Extension Office, or from Cornell Publications Distribution Office, 7 Research Park, Ithaca, NY, 14850. The 1991 *Turfgrass Cultivar Recommends* should also be available at the time of this printing. It has been two years since the *Cultivar Recommends* has been printed, therefore there are many changes. The *Cultural Recommends* are expected to be in print later this season. Be sure to pick up your copies!

Cornell's Turfgrass Short Course

Only a few weeks ago Cornell's Turfgrass Science Program hosted its Sixth Annual Turfgrass Management Short Course for professional turfgrass managers. Actually, with 75 hours of instruction, the course is not all that short! The students were challenged by long classroom sessions and evening labs that were often three hours long. The format allowed for exposure to turfgrass management principles during the day sessions, followed by hands-on experience identifying grasses, insects, and weeds in the evening lab sessions. Within this intense schedule, however, there was time during breaks, labs, and socials to exchange professional ideas and to establish friendships.

Graduates from this year's course came from all over the United States and the World! Of the 76 attendees, 80% of the class was from New York. We were pleased to also have attendees from other Northeastern states, Colorado, Wisconsin, Delaware, eight guests from Canada, and a golf resort manager from Paris, France. Most of the students were involved in golf course management (57%), and lawn maintenance (33%). We also had three Cornell Cooperative Extension staff in attendance. For them, the Short Course was an inservice education opportunity and a chance to interact with industry professionals.

We are already planning for the Seventh Annual Turfgrass Short Course which will be held next January. Details will appear in *CUTT* and in your county Cooperative Extension newsletter.

Faculty and Staff Update

Beginning July 1, 1991, I will be taking a one year leave of absence from the University. During this time I will be working on a project with the United States Golf Association on standardizing laboratory procedures for testing greens construction mixes, and writing a research-based rationale behind the USGA specifications for greens construction. This should be a very challenging project for me, but one I'm very excited about.

My absence will in no way disrupt the publication of *CUTT*, or affect other major programs like the short course. I will not be available to speak at association meetings, or for phone or on-site consultations. — Norm Hummel

Rossi Earns Ph.D.

Dr. Frank Rossi has just completed the requirements for his Ph.D. in Weed Science. Frank worked on a project studying the influence of drought stress on fenoxyprop (Acclaim) performance, under the guidance of Dr. Joe Neal. Frank's project was partially supported by the New York State Turfgrass Association. Three days after his thesis defense, Frank began his job at Michigan State University as Coordinator of Environmental Education. We wish Frank well.

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Foliar Application of Urea-Nitrogen

Foliar application of urea-N is a common practice in turfgrass management. It is generally thought that a large percentage of the applied nitrogen is rapidly absorbed by leaves. Two western researchers earlier reported that 43% and 35% of applied N was foliar absorbed in Kentucky bluegrass and perennial ryegrass, respectively, in 48 hours. They once again put this assumption to the test, this time using tall fescue ('Mustang') and creeping bentgrass ('Penncross'). The experiment was conducted in pots in an environmental chamber using radioactively labeled urea.

Urea uptake by the two species averaged 55% of the applied N, and occurred almost entirely through the leaves and shoots. Most uptake occurred within 12-24 hours of application. Partitioning of the absorbed N averaged 1/3 in new leaves, 1/2 in old leaves and shoots, with the remainder in roots. The researchers also found about 40% of the applied N in and on new leaves produced during the 72 hours of the experiment, all of which could be lost to mowing if clippings are removed. The researchers note, however, that commercial applicators, due to their larger droplet size, may apply a higher percentage of N to the soil than was the case in this experiment.

These workers conclude that foliar uptake of foliar applied N, and subsequent partitioning within the plant (with the exception of low accumulations found in bentgrass roots), is quite similar between the four turfgrass species. They conclude by recommending that clippings be returned to the turf to avoid substantial losses of applied N.

(From: D.C. Bowman and J.L. Paul. 1990. The Foliar Absorption of Urea-N by Tall Fescue and Creeping Bentgrass Turf. J. Plant Nutrition 13(9): 1095-1113.)

Soil Amendment with Sewage Sludge

Scientists at the University of Nevada investigated the effects of two types of composted sewage sludge — 'city' vs 'county' — on the growth of tall fescue ('Mustang') in a greenhouse pot experiment using 3 desert soils (loamy sand, sandy loam and clay). Results were compared to controls which received a 15-15-15 commercial fertilizer. Sludge treatments were incorporated into the soils at the beginning of the experiment whereas Fertilizer was applied as a topdressing. Five levels of sludge amendment varied from 0-60% by volume. Production of new growth, color, turf density, and elemental composition of leaf tissue were all measured. Several soil parameters such as pH, salinity, redox potential and oxygen diffusion rate were also monitored. The latter two measurements may reflect changes in physical properties, such as soil structure, and soil-air-moisture relations.

No effect on redox potential or ODR was found for any treatment. Soil pH, on the other hand, decreased (from an initial value of 8.0) while soil salinity and water holding capacity increased with increasing sludge amendment in all treatments.

Cumulative plant height, fresh & dry weight of clippings, rate of growth, quality (color) and density of turf, all generally increased with increasing sludge loading and clay content of soil, as compared with controls. The degree of turfgrass response depended on both sludge source and soil type. City sludge out-performed county sludge in all cases, the latter often failing to better the fertilizer controls, except at highest loading rates.

Most macro- and micronutrients increased in tissue concentrations with increasing sludge loading, but results varied with soil type and sludge source. There was no accumulation of heavy metals, reflecting the non-industrial character of the sludge sources. The authors conclude that municipal composted sewage sludge is an effective soil amendment for turfgrass, increasing soil moisture holding capacity and producing healthy turf, but warn of the danger of nitrate leaching at high application rates.

(From: D.A. Devitt, R.L. Morris and D.C. Bowman. 1990. Response of Tall Fescue to Composted Sewage Sludge used as a Soil Amendment. J. Plant Nutrition 13(9): 1115-1139.)

Crabgrass Control with Fenoxaprop

A Cornell researcher, Dr. Joseph C. Neal, studied postemergent crabgrass control in turfgrass using fenoxaprop under varying environmental conditions and with differing application methods. Working on field plots in both Massachussetts and New York, Dr. Neal investigated the effects of soil moisture, plant growth stage, spray volume, application rate, nozzle type, and adjuvants on the control of smooth and large crabgrass in cool-season turf. In some trials, the efficacy of fenoxaprop vs MSMA was also evaluated.

In NY, fenoxaprop gave good control of smooth crabgrass at 0.18 lb/A, when applied

continued on page 5

Scanning the Journals

A review of current journal articles

Researchers recommend that clippings be returned to the turf to avoid substantial losses of applied N.

Municipal composted sewage sludge is an effective soil amendment for turfgrass, increasing soil moisture holding capacity and producing healthy turf.

Dr. Neal concludes that low rates of fenoxaprop can control crabgrass in cool season turfgrass

Root & Crown Rot Diseases

continued from cover

Severity of PRR damage can apparently be avoided by maintaining an extensive and vigorous plant root system. In general, any management practices that will reduce plant stress or eliminate prolonged wet periods will help to minimize losses from PRR.

Pathogen inoculum levels in soil are rarely suppressed following fungicide applications.

associated with different sites, but also to the management practices unique to particular areas that may limit the activity of certain species and favor the activity of others.

Under the cool wet conditions typical of early spring (Mar - May) and late autumn (Oct - Nov), symptoms may first appear as small diffuse yellow or reddish brown patches of turf approximately two to three inches in diameter. Symptoms often closely resemble the early stages of pink snow mold *(Microdochium nivale)* damage. In the spring, plants may be slow to come out of dormancy and growth may be less vigorous than in uninfected plants. Under severe conditions, patches of infected turf may coalesce and large areas may appear yellow and in a general weakened condition. Commonly, affected turf responds poorly to the application of fertilizers. As the season progresses and temperatures warm, large areas of turf may wilt, turn yellow to brown, and then die.

Under warm wet conditions of mid-summer (Jun - Aug), initial symptoms appear as small tan to brown or bronze patches of turf very similar in appearance to dollar spot patches. These patches may converge on one another and affect large areas of turf where extensive stands of plants rapidly wilt and die. With severe infections, plants may wilt rapidly under heat stress and thinning may be so extensive that large areas of turf may become devoid of plants. Recovery of these severely affected areas may take an entire season.

Fungicides for the Control of Root-Rotting Pythium Diseases of Turfgrasses

Fungicide	Trade Name(s)	Formulation(s)	Application Rates (per 1000 ft²)*
Chloroneb	Teremec SP®	65W	Not Recommended
	Tersan SP®	65W	Not Recommended
	Scott's ProTurf Fungicide II®	6.3G	Not Recommended
Ethazole	Koban®	30W	7-9 oz
		1.3G	8 lb
	Terrazole®	35W	8 oz
Mancozeb	Fore®	80W	Not Recommended
	Lesco 4®	80W	Not Recommended
	Lesco Mancozeb®	DG	Not Recommended
	Manzate 200®	37F	Not Recommended
		75DF	Not Recommended
	Tersan LSR®	80W	Not Recommended
Metalaxyl	Subdue®	2E	2 oz
		2G	1.5 lb
		5G	10 oz
	Scott's Pythium Control®	1.2G	2.5 lb
(+triadimefon)	Scott's Fluid Fungicide II®	16AS	Not Recommended
(+mancozeb)	Pace®	7+14S	Not Recommended
Phosetyl-Al	Aliette®	80W	4-8 oz
Propamocarb	Banol®	6S	2-4 oz

** NOTE: All fungicides must be thoroughly watered-in to get effective Pythium root rot control. Only Aliette can be applied as a spray and still maintain control of PRR.*

Unlike Pythium blight, no foliar mycelium is evident during periods favorable for infection and rarely can PRR be diagnosed from field symptoms alone. Only upon microscopic examination of roots and crowns can one effectively determine whether root and crown damage from Pythium species has occurred. Typically, damage is first evident in the crown with the roots largely unaffected. However, on severely infected plants, root systems are greatly reduced in volume and vigor and may be extensively discolored. Crown areas may also appear water-soaked and greatly discolored. If root systems are not well developed prior to infection by Pythium species, the level of damage that a root system can sustain and still function becomes dramatically reduced, and severe plant decline can occur. Heavily infected roots and crowns may also contain abundant oospores of the pathogen. These spores allow the fungus to survive unfavorable environmental conditions in a dormant state. As a result, the disease is insensitive to many control measures, including most fungicidal treatments. Therefore, for fungicides to be effective, the target Pythium species must be in a non-dormant, active state.

Severity of PRR damage can apparently be avoided by maintaining an extensive and vigorous plant root system. In general, any management practices that will reduce plant stress or eliminate prolonged wet periods will help to minimize losses from PRR. If conditions warrant the application of fungicides, it is recommended that a currently labelled Pythium fungicide be carefully chosen and thoroughly watered-in. Although turfgrasses affected with PRR respond to drenches with Pythium-selective fungicides, symptoms may frequently recur, particularly as temperature and precipitation change. Pathogen inoculum levels in soil are rarely suppressed following fungicide applications.

Damage from PRR has also been observed to be enhanced following continuous applications of broad-spectrum fungicides. It is therefore recommended that these types of fungicides be used sparingly on sites with a history of PRR and during periods favorable for Pythium infection.

The currently available Pythium fungicides are listed in the table on page 4. Of the systemic fungicides, Banol or Aliette have been most effective in controlling PRR in the Northeastern U.S. Subdue has been effective in some locations but has failed in others. The granular formulations of Subdue have been more effective than the liquid formulation. Koban and Terrazole are contact fungicides that have also been effective in some locations for the control of PRR. For those sites with a history of early spring PRR problems, a fall application (mid Oct - mid Nov) of an appropriate Pythium fungicide (usually Banol) is most effective in suppressing disease development early in the spring. This should be followed-up by another application in the spring. In order for control to be effective at any time during the season, the fungicide must reach the root zone. We therefore recommend that all fungicides be thoroughly watered-in at the time of application. It is also advisable to avoid continuous application of any one fungicide on the same site since this practice may enhance the development of fungicide-resistant Pythium populations.

ERIC NELSON
DEPT. OF PLANT PATHOLOGY

Scanning the Journals

Continued from page 2

before tillering, but the rate had to be doubled to produce control after tillering. In MA, however, excellent control was seen on tillered crabgrass at the lower rate in plots which were irrigated and fertilized. Control with MSMA at 2.0 lb/A was equal to that obtained with fenoxaprop. Best results in NY were obtained with fenoxaprop plus DCPA applied before tillering at the 0.34 lb/A rate, or fenoxaprop alone applied after 3-5 tillers had formed. Slight and temporary turfgrass injury was seen at some sites at the higher fenoxaprop rates, but none at the lower.

Fenoxaprop efficacy was not affected by spray volume (between 37-296 gal/A) but increased with application rate (0.18 - 0.36 lb/A). Results of nozzle type tests varied by site. Fan nozzles appeared to work better in dense turf or dry conditions. Surfactant results varied but generally were without effect.

Dry conditions, which reduce crabgrass growth, also reduced fenoxaprop efficacy, but had less effect on MSMA. Dr. Neal concludes that low rates of fenoxaprop can control crabgrass in cool season turfgrass, but further research is needed to assess its performance under drought conditions.

(From: J.C. Neal, P.C. Bhowmik, and A.F. Senesac. 1990. Factors Influencing Fenoxaprop Efficacy in Cool-Season Turfgrass. Weed Tech. 4:272-8.)

Damage from PRR has also been observed to be enhanced following continuous applications of broad- spectrum fungicides.

It is also advisable to avoid continuous application of any one fungicide on the same site since this practice may enhance the development of fungicide-resistant Pythium populations.

Beware Of Insects This Spring

Use endophytic grasses and avoid water stress to reduce chinch bug infestation and injury.

Remove leaf litter prior to adult migration to reduce adult numbers and overwintering cover for Annual Bluegrass Weevil and Black Turfgrass Ataenius.

Much like turfgrass managers, insects are shaking off the winter chill and getting back to the turf. Some common insect pests you can expect to see this spring are found below. Managers interested in more detailed information are directed to *Turfgrass Insect and Mite Manual* by Shetlar, Heller and Irish or *Turfgrass Insects of the United States and Canada* by Haruo Tashiro.

Sod Webworm

Sod webworms overwinter as caterpillars in soil and will usually pupate without feeding. There is little likelihood that you will see any spring feeding damage from common species. Depending on the species present, adult moths may be seen flying over turf in mid to late June.

Spring Management: None

Chinch Bug

Adult chinch bugs will move from overwintering sites into turfgrass when air temperatures are above 45° F. After mating, females must feed for about two weeks before laying eggs. Eggs are laid in leaf sheaths and take a month or more to hatch in spring. Eggs hatch to a nymph stage that is similar to adult chinch bugs in every way, except for a lack of wings. In May and June all stages of the chinch bug may be present in turf.

Spring Management: Determine the presence of chinch bugs through careful examination of turf and thatch, or by flotation. In general, chinch bugs are a mid-summer problem and are not considered a spring pest of turf. Use endophytic grasses and avoid water stress to reduce chinch bug infestation and injury.

Annual Bluegrass Weevil

formerly Hyperodes

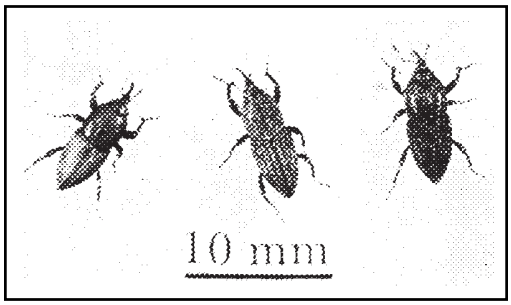
Annual bluegrass weevils overwinter as adults under grass or leaf litter. Adults will migrate from overwintering sites in spring about the time forsythia is in full bloom (about mid-April in southeastern New York). Females will lay eggs in annual bluegrass leaf sheaths and hatching weevils will burrow into stems and feed inside. Larger weevils will emerge from the stems and complete development by feeding on turf roots in the soil.

Spring Management: Remove leaf litter prior to adult migration to reduce adult numbers and overwintering cover. Check for adult weevils in greens mower boxes when forsythia is in full bloom. Because young larvae feed inside annual bluegrass stems, adult populations should be targetedwith insecticides when needed. The treatment window is generally that period after forsythia full bloom but before flowering dogwood full bloom.

Bluegrass Billbug

Adult billbugs may be seen wandering on driveways and sidewalks in May and June on sunny afternoons as they move from sheltered overwintering sites into turf for egg laying in July.

Spring Management: Because larvae feed inside grass stems much like Annual Bluegrass Weevil it is the adult stage that is the preferred target to manage. If five to ten adult weevils can be collected in a five minute period by one person, then treatment may be required. Fungal endophytes found in some ryegrasses and fine fescues will reduce billbug feeding damage.



Bluegrass Billbug

Annual White Grub

White grubs are the larvae of Japanese beetles, European chafers, Oriental beetles, Asiatic garden beetles, and masked chafers. Large white grubs will be moving up in the soil into the root zone to feed in early to mid-spring (depending upon grub species). Grubs will feed for a period before moving down in the soil to pupate. Adults may emerge in June.

Spring Management: Under normal conditions spring treatment for grubs is not recommend because grubs will feed for only a short period of time before pupating, rapid turf growth in spring often compensates for moderate grub feeding, large spring grubs are difficult to control with insecticides, and treatment in spring will not reduce fall grub populations. Spring application of insecticides may be warranted if high grub population causing heavy turf damage is detected in early spring. Reduced efficacy should be anticipated.

Black Turfgrass Ataenius

Overwintering adults of BTA are active in late March through April and May. These tiny black adults are often seen swarming in early evening over turf or around lights. Eggs are laid in the soil in May and June, with hatch usually within ten days. It is not unusual to find all developmental stages in the soil in late spring.

Heavy grub populations (> 50 grubs/square foot) may cause general wilting of the turf.

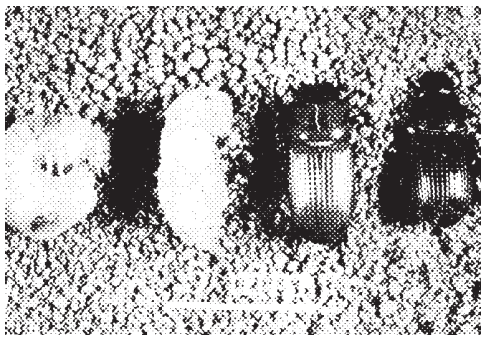
Spring Management: Remove leaf litter prior to adult migration to reduce adult numbers and overwintering cover. Naturally occurring milky disease often reduces ataenius populations within a year or two of a heavy infestation. High spring populations (>30-50 grubs/square foot) may require insecticide applications.

May and June Beetles

(*Phyllophaga sp*)

Several species of large grubs have multi-year life cycles. Adults or grubs of May or June beetles may be seen in spring, with feeding damage occurring to turfgrass roots in spring, summer and fall. This situation is different from the more common, annual white grubs.

Spring Management: Five to seven May or June beetle grubs/square foot is generally considered high enough to treat with insecticides. Grubs not controlled in spring feed throughout the summer.



Turfgrass Ataenius

Black Cutworm

This insect will not overwinter in the north-east, but must migrate from more southern regions in late spring. Cutworm adults are often seen around lights in June in New York State.

Spring Management: None

MICHAEL G. VILLANI
DEPT. OF ENTOMOLOGY - GENEVA

Fungal endophytes found in some ryegrasses and fine fescues will reduce billbug feeding damage.

Five to seven May or June beetle grubs/square foot is generally considered high enough to treat with insecticides.

Turfgrass Pest Spring Life Cycles

Pest	March	April	May	June
Sod Webworm	L	L	L / P	P / A
Chinch Bug	A	A	A / E / N	N / A
An. Bluegrass Weevil	A	A / E	A / E / L	L / P
Bluegrass Billbug	A	A	A	A
An. White Grub	L	L	L / P	P / A
Bl. Turfgrass Ataenius	A	A	A / E / L	E / L / P
May & June Beetle	A / L	A / L	A / L	A / L
Black Cutworm	X	X	A	A

A = adults; E = eggs; L = larvae; N = nymph; P = pupa; X = not present

What is *CUTT* ?

CUTT is a quarterly newsletter from the Cornell University Turfgrass Faculty. The purpose of *CUTT* is to bring to you the latest research results from Cornell, as well as other universities, in a timely manner. Each issue, published to coincide with the change in seasons, will help you understand turfgrass better, enable you to manage your turf better, and maintain healthier turf with greater environmental protection ■

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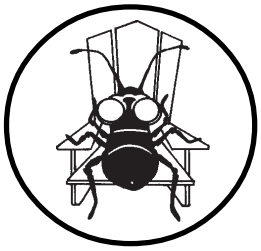
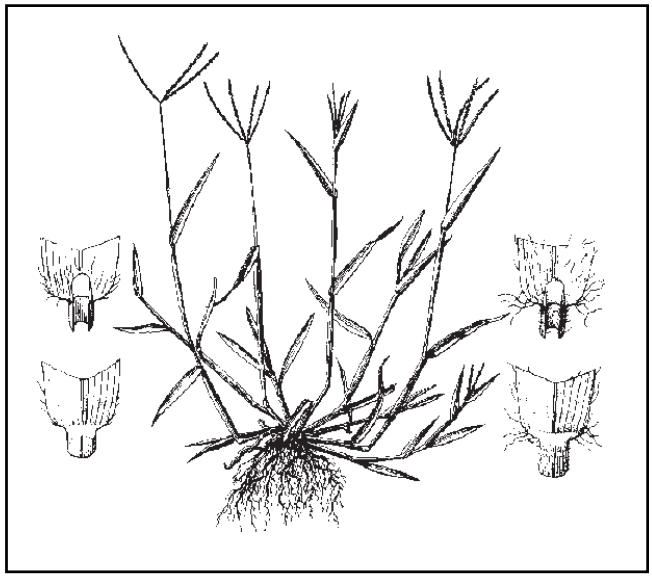


Pest Watch

Crabgrass

Once again spring approaches, and with it – crabgrass. Preemergent herbicides should be applied before the Forsythia (yellow bells) completes its bloom. Several herbicides are available including benefin (Balan), bensulide (Betasan), DCPA (Dacthal), oxadiazon (Ronstar), pendimethalin (Halts or Pre-M), and the combination product of benefin + trifluralin (Team). The choice of which preemergent herbicide is difficult and will depend on the following: 1) cost; 2) formulation you prefer (granular or spray); 3) other weeds you wish to control; 4) turfgrass species to be treated; 5) longevity of control needed; and 6) seeding or overseeding restrictions. For assistance in planning your crabgrass control program, refer to your first issue of *CUTT*, Spring 1990, Volume one, Number one, for the article "Waging War on Crabgrass".



Smooth Crabgrass *Large Crabgrass*

Broadleaf Weeds

Spring is also the traditional season for postemergent control of broadleaf weeds. Fall is the preferred time for these treatments, but mid-spring (May) applications are also effective. Many products are available for broadleaf weed control, most containing 2,4-D with MCPP, dicamba, 2,4-DP, or triclopyr. In selecting from among the many formulations available, you should consider cost and how many of the "difficult-to-control" broadleaves, such as groundivy and healall, are to be targeted. Check the *Cornell Recommends* and the herbicide labels for lists of species controlled.

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