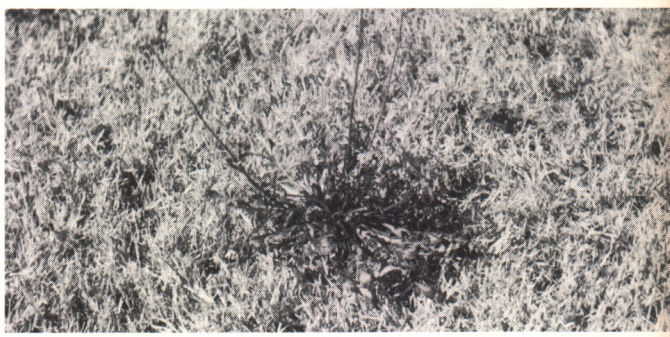
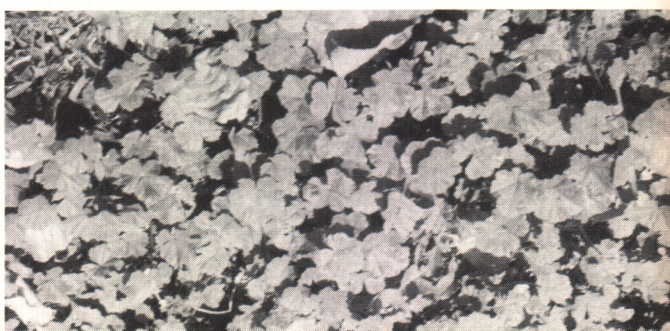
MAY 1972

# USGA GREEN SECTION RECORD

## A Publication on Turf Management by the United States Golf Association

*Pre-emergence control for weeds such as (clockwise) dandelions, goathead, shepherd's purse, purslane, clover.* *See page 1.*





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**VOL. 10, NO. 3** **MAY 1972**



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# How Dependable Is Pre-Emergence Weed Control?

by **HOLMAN M. GRIFFIN** Director, USGA Green Section Mid-Atlantic Region

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.

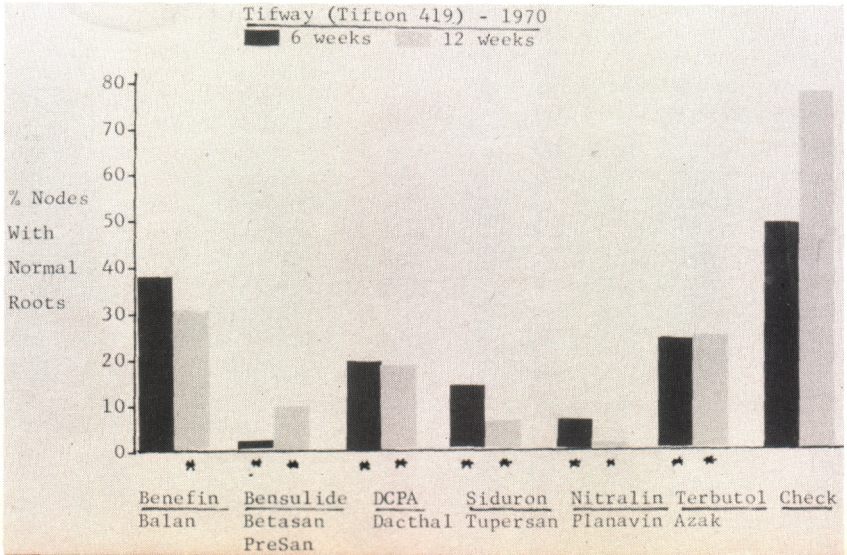
As of now, no one is certain of the optimum time of application, residual, effectiveness, safety or proper use of any of the pre-emergent chemicals.

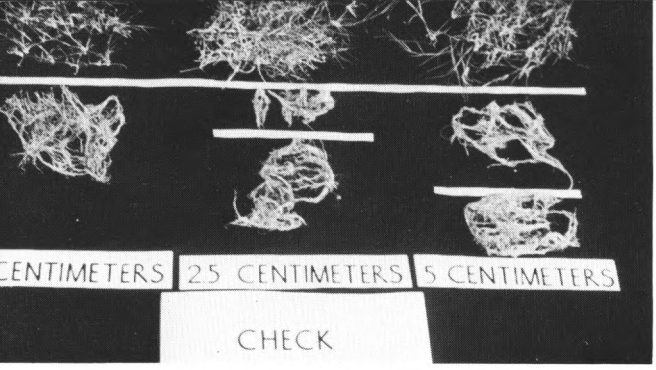
Let's make a list and examine the most commonly used chemicals, one by one:

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

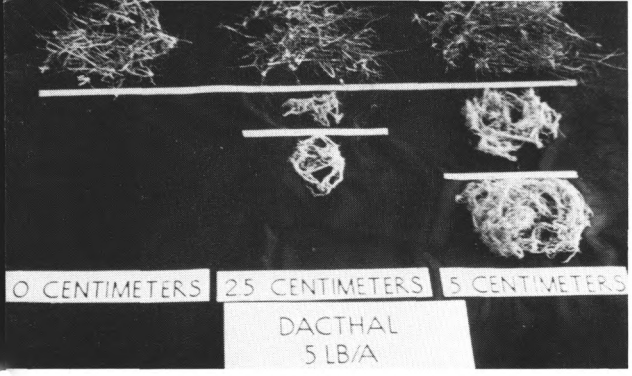
**Tri-Calcium Arsenate**—an arsenical product, gives some control of insects as well as pre-emergence control of *Poa annua*, crabgrass, and chickweed. Residual may last up to five years. This chemical also acts as a post-emergence control in some cases, especially on *Poa annua*. The mode of action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

**Zytron** (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, sizamine 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.

# *Research Needs Your Support Through National Golf Day*

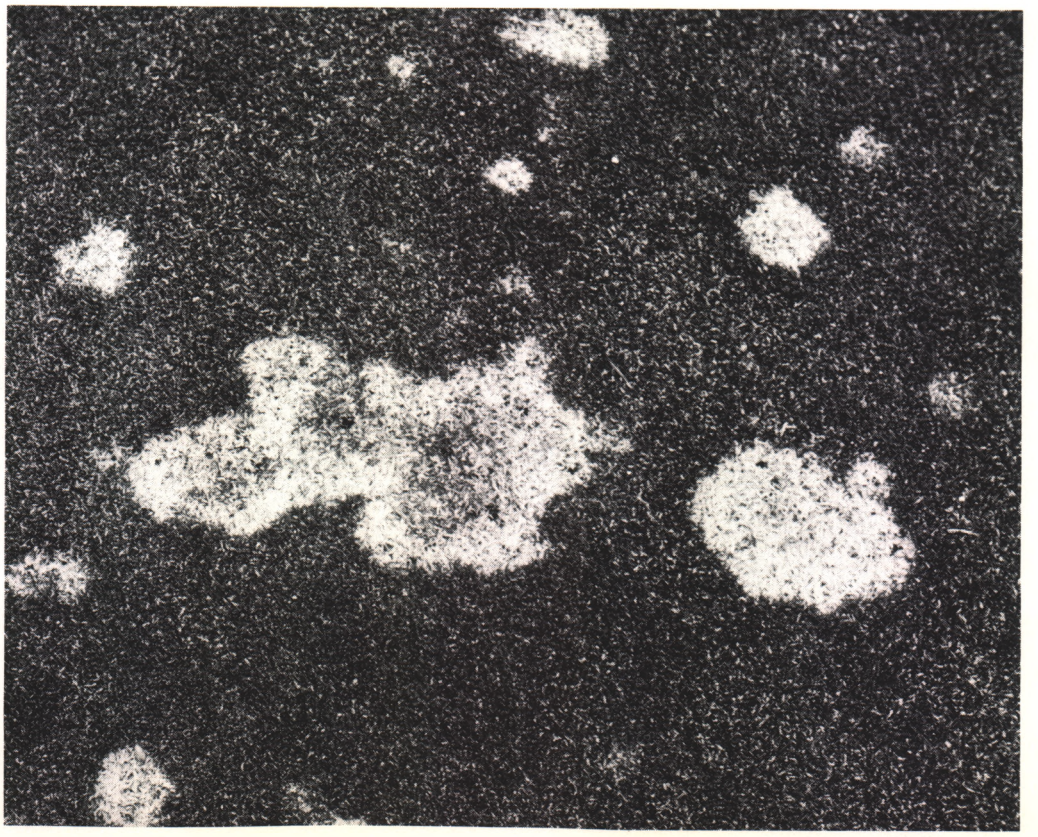
**by ALEXANDER M. RADKO**
**National Research Director, USGA Green Section**

During telecast of the PGA sponsored Hawaiian Open at Wajalae C.C., announcer Chris Schenkel observed that "players were putting these greens better this year than they were last year." Co-announcer Dave Marr, offered the information that "the Waialae greens were indeed putting far better this year due to the fact that they were converted to an improved dwarf strain of bermudagrass."

This is but one example of the great strides that research has made in bringing better grasses for better golf throughout the nation, but most dramatically to courses where bermudagrasses are grown. Not too many years ago southern greens were established to common, coarse types of bermudagrass that caused one foreign competitor, a professional golfer also, to say that "putting on bermudagrass was like putting over a mass of wire cables." Everybody accustomed to putting on bentgrass certainly agreed. Golf has come a long way since then, and so has the research that makes it possible to enjoy better golf. Turfgrass research as it is related to golf is unglamorous, and seldom heard of, but it has brought to golf the excellent grasses that all golfers, amateur or professional now enjoy so much throughout the world.

One of the principal investors in the research that has made all this possible is the professional golfer himself. How? Through National Golf Day! National Golf Day is sponsored by the PGA. It is the competition in which the golfer pays an entry fee to compete against the scores of Champions. When it first began, only the Open Champion set the target score. Later, the PGA Champion competed against the Open Champion, and the lower score of the two was the target score. In 1971 lady golfers had a

*Fungicides to control major diseases have greatly improved conditions for pleasurable golf.*



seperate competition of their own. Their target score was set as a result of a contest involving the United States Women's Open Champion and Ladies Professional Golf Association Champion.

Receipts of National Golf Day are disbursed through the National Golf Fund, and a healthy percentage is channelled to turfgrass research. The agency through which this is done is the U.S.G.A. Green Section Research and Education Fund, Inc.

The Green Section of the United States Golf Association is no stranger to golf turfgrass research. It is the agency which the USGA established in 1920 for the purpose of collecting and distributing information of value respecting the proper maintenance and upkeep of golf courses. Thus, the PGA and the USGA have teamed up quietly in an effort to bring you better grasses for better golf.

Unheralded? Yes!

Unproductive? No!

Funds provided by the PGA as a result of National Golf Day have helped bring improved conditions that golfers enjoy today. How? Through a network of universities and experiment stations that are deeply involved in turfgrass work. Presently, nearly every state enjoys a solid turfgrass program of research, extension and/or education. Problems are worked out at state level and this insures better coverage and pertinent solution. The National Golf Fund contributes to the U.S.G.A.'s Research and Education Fund, which in turn selects golf related turfgrass projects that require attention. The USGA's Green Section Staff is comprised of trained scientists who determine the most pressing golf course turfgrass needs and recommend support of selective projects designed to answer these problems.

Do you remember when:

Japanese beetle grubs completely destroyed the turf on a number of courses?

Crabgrass and dandelion comprised most of the green vegetation on golf courses?

Worm casts made greens so bumpy they had to be poled often to smooth them for play?

Kentucky bluegrass mowed at 1½ inches was considered fairway turf?

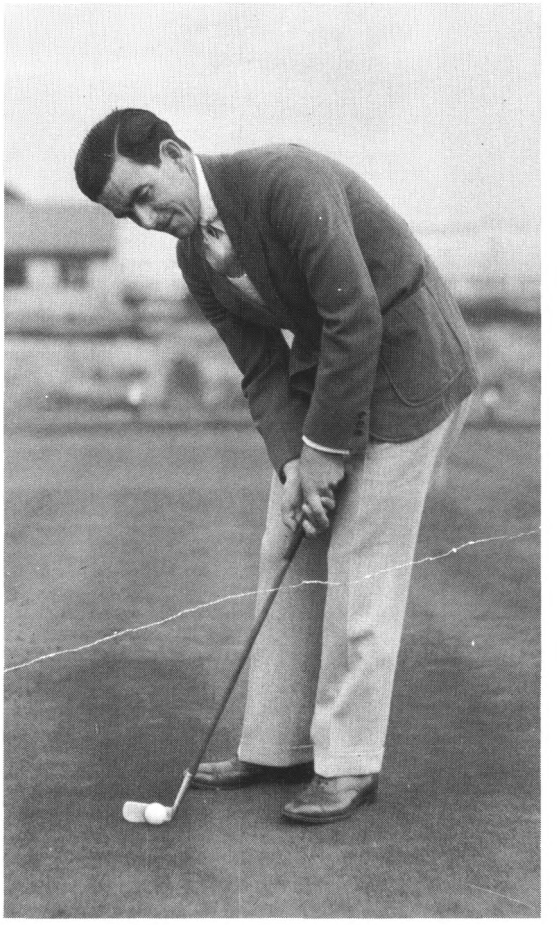
Southern greens were established to common coarse types of bermudagrass . . . and were unputtable?

Knotweed ran rampant?

Clover infested all turf areas including greens?

Greens were so full of crabgrass that the ball never rolled, it bumped into the cup?

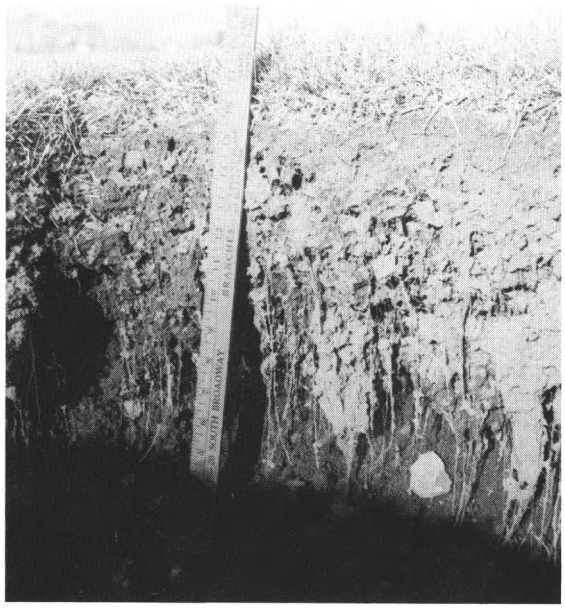
If you remember any of these serious conditions, you know that golfers didn't always enjoy the superb playing conditions that now exist. Research has indeed paved the way, and



*Johnny Farrell on the Arlington Farms testing a new putting green selection in 1932.*

research takes money. That's why everyone in golf is indebted to the PGA for their great support of research. Without National Golf Day funds it would not be possible for us to support as many worthwhile projects that are now in effect at 16 research institutions throughout the nation. Golf related projects are now being supported with combined PGA National Golf Fund and U.S.G.A. Green Section Research and Education Fund, Inc. money in the amount of slightly over $50,000 this year at the following institutions:

Rutgers University
Georgia Coastal Plain Experiment Station
University of California, Riverside
Mississippi State University
University of Georgia
Oklahoma State University
Kansas State University
Pennsylvania State University
University of California, Davis
University of Arizona
Virginia Polytechnic Institute



*Deep-rooted, tough grasses for golfing excellence is the aim of research.*

Clemson University
North Carolina State University
Texas A&M University
Michigan State University
Washington State University

The research program is national in scope, it is golf related, and it is designed to bring you better turfgrasses for better golf courses. National Golf Day is important to the future of golf and deserves the support of every golfer whether or not he is able to participate in the National Golf Day tournament. Solid support is vital to the continuity of a solid research program of golf related turfgrass problems. *SUPPORT NATIONAL GOLF DAY!*

Typical of local interest in National Golf Day is exhibited by officials at the Greenacres C.C. in Lawrenceville, N.J. To quote Professional Mike Franko, "The PGA makes it easy for us . . . they send a packet that contains all the necessary posters . . . which we put up in the locker rooms . . . then we send every member a personal invitation to participate." Green Committee Chairman Bob Albert adds that "it's an easy tournament to run and an easy accounting job . . . we have a tournament fund . . . we simply count the number of entries and the front office sends the check to the PGA." Supt. Vic Perrone offers that "it isn't a difficult tournament to prepare for . . . we get an advance list of tournaments and we try to provide the best playing conditions possible . . . as we do for all tournaments." Greenacres President Leon Levy says, "I say amen to the prior statement that courses have improved over the years . . . we now enjoy far better courses than when I first took up this game . . . we are happy to have the opportunity to work together to do as good a job as we possibly could for National Golf Day!"

*Green Committee Chairman Bob Albert, Superintendent Vic Perrone, Board Chairman Leon Levy, and Professional Mike Franko make advance plans for National Golf Day.*

*Fig. 1 Enclosed greenhouse and mist systems changed thatch microfloral balances but not thatch depth.*

# Concerning Biological Control of Thatch in Turf*

by JAY SANFORD KOTHS

**Abstract.** *Changing the thatch microenvironment with a polyethylene canopy, intermittent mist, energy sources for microbes, introduction of selected microbes, and topdressing with several materials enriched composts were tested during 3 years of investigation. While all treatments produced marked changes in microbial balances, topdressings were the most effective in altering the thatch decomposition rate, and tended to effect a natural balance between thatch formation and microbial degradation.*

## INTRODUCTION

Thatch in turf normally disappears due to microbial degradation. Thatch formation balances degradation, but sometimes degradation lags behind, and the thatch layer increases in depth to a point that it is undesirable or even detrimental.

*This research was supported in part by the USGA Green Section, the Connecticut Research Commission, and the Storrs Agricultural Experiment Station.

A soil microbiologist in the Plant Science Department, University of Connecticut, Dr. Koths is conducting research in ammonium ion toxicities in soils, heavy metal effects on the soil microflora, biological control of soilborne plant pathogens and also has Extension responsibilities in commercial greenhouse operation.

To accelerate degradation, the biological activity of the thatch microflora must be sped up so that the thatch layer depth will be acceptable. This suggests alteration of the microbial population or the microenvironment.

External influences can alter microbial balances and change biological activity. Previous researchers have investigated many facets of thatch degradation including introduction of microbial foods, enzymes, mechanical removal and topdressings. During the last three years some of these premises, and others, were tried. These are described briefly as follows:

### 1. The greenhouse effect.

Grasses can flourish in empty, closed greenhouses during the summer when temperatures sometimes exceed 140°F. To determine whether this would accelerate thatch degradation, a 12'x 18'x7' high greenhouse (Fig. 1) was covered with polyethylene and placed over turf for periods of seven days. Six experiments were conducted on separate sites. Even with adequate soil moisture and/or constant moisture from an intermittent low pressure mist in the greenhouse, the turf showed signs of stress. Therefore, this approach was abandoned. No acceleration of thatch degradation was found.

*Fig. 2. Light actuated mist equipment with injection of fertilizers and humic acid. Portions of the plastic mist barriers were temporarily removed.*

**2. Water stress.**

If it is true, as postulated, that water is the usual limiting factor in thatch degradation, the application of mist (Fig. 1) so that the area is uniformly constantly moist should be beneficial.

A Solatrol (a light-operated interval switch) controlled mist application in proportion to solar radiation so that just enough water was applied to maintain moisture from the leaves down through the thatch layer. With impinging nozzles spaced 2'x2', a 12-second mist period every six minutes during bright sunlight was found to be optimum. Since misting was in proportion to solar radiation, the frequency gradually decreased until misting ceased at nightfall.

In instances where dead leaf blades from mist treatments were examined, decay was advanced in seven days, and the tissue was at times swarming with protozoa and nematodes. This was not found in non-misted areas when similar leaves were wetted for an hour or two, then examined. Although this decay was observed on softer tissue, no decrease in thatch was attributed to seven day treatments in eight experiments when measurements were made for two months (in one experiment, 13 months) following treatment.

**3. Fertilizer injection in mist.**

Frequent watering and sprinkling of golf greens leaches soluble fertilizer elements from the thatch layer. Although carbonaceous compounds are plentiful in the thatch layer, available nitrogen may be insufficient for microbial growth. This may limit thatch degradation. In eight experiments, the mist contained a fertilizer solution proportioned through a 1:128 injector to provide 100 ppm N, 50 ppm $P_2O_5$ and 100 ppm $K_2O$. (Fig. 2) This resulted in a rate of 1.1 to 2.3 lbs. N/1,000 sq. ft. depending upon the calls for mist.

This introduction of fertilizer elicited more luxuriant growth than that occurring under the accompanying non-treated areas. This growth might be expected to increase the thatch layer. This did not occur and it is postulated that degradation was increased in proportion to thatch formation, resulting in no net change.

**4. Energy sources for microbes.**

The introduction of foods for microbes in solution through low pressure mist (Fig. 2) for a period of a week changes the ecological balances in thatch. If glucose or sucrose is added, the rapid multipliers proliferate. If humic acid is supplied, microbes adept at utilizing it multiply. When casein is applied as dried milk, the population of ammonifiers increased to 3 million per gram from a normal of 1.1 million, then rapidly decreased to less than the normal population but returned to a balanced condition in about three weeks. None of these changes however, were associated with accelerated thatch breakdown.

**5. Introduction of thatch-degrading microbes.**

When isolations of microbes are made from thatch (6,000 plates were poured during these experiments), some of them will grow on sterile thatch plugs and degrade them. Several were selected, grown in microbial media and reintroduced to the turf. One of these, a form of *Actinomyces albus,* was successfully established by insistent introduction in mist over 7-day periods in 4 experiments. (Fig. 3) While this demonstrates that the procedure may be successful, the increase in thatch degradation was not significant. Efforts were therefore directed toward increasing the activity of the resident microflora rather than attempting to change the population through isolate introduction.

**6. Topdressings and compost.**

The speed of biological disintegration of thatch is determined by the activity of the

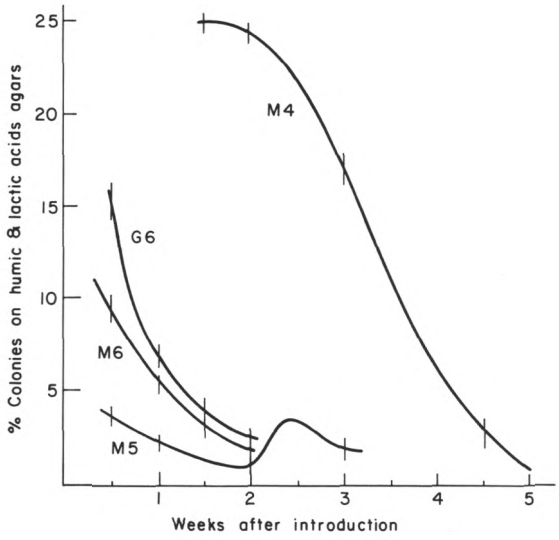



*Fig. 3. Re-isolation of an introduced thatch-degrading micro-organism from three mist and one greenhouse experiment where they comprise less than .9 per cent in the controls.*

microflora/microfuana complex. The small proportion of the living flora that is active can be increased by topdressing with soil. This provides sites for microbes on otherwise relatively clean thatch strands and retains enough water to sustain biological activity over more extended periods.

## DISCUSSION AND RESULTS

The simplest way to alter the microenvironment and enable microbes to remain active in degrading thatch is introduction of soil to the thatch layer. In other words, topdress with a compost or soil mix that will provide conditions favorable for the normal thatch microflora and also result in proper structural support when the organic matter from the thatch is mineralized.

For example, the addition of clay might improve the physical properties for microbial activity within the thatch layer, but would also result in the worst possible physical properties as soon as the thatch begins to disappear. A topdressing mix should provide an ideal matrix after the thatch disappears. Mixing this clay with sand, calcined clay (arcillite) or other coarse aggregate along with some organic matter such as sphagnum peat is often practiced. The benefit from sphagnum peat moss in this situation is open to challenge.

Sphagnum peat is frequently used as a topdressing additive. It improves the appearance of the mix. Furthermore, if prepared in advance, the microbes in the mix may increase in sphagnum peat degradation activity. But stimulation of the thatch degradation activity of the resident thatch microflora by the addition of this topdressing is questionable. There are sufficient carbonaceous materials in the thatch layer. If sphagnum peat accelerates thatch decomposition, it is probably through physical changes in the thatch layer, rather than the introduction of available food or thatch degrading organisms.

A composted topdressing should be of greater value than a mineral soil. For example, a compost prepared from thatch would contain more thatch decomposing organisms, since those capable of utilizing thatch as food would be favored. Applying a 2 mm topdressing (1 cubic yard per 4,000 square feet, a light application) to a 20 mm thatch layer indicates (if the same microbial counts are present) an introduction of 10 per cent enriched microflora. Normally, introducing organisms to a soil situation where an existing population is established is not successful. In thatch, the introduced microbes from enriched compost should find their new home satisfactory and become established even in face of the resident population. Results in this study, presented in Fig. 4, show that topdressings reduced damage caused by lack of water in this greens nursery.

The composts used in the Fig. 4 study were placed in composters (Fig. 5) after being prepared as follows:

*WCC* 3 parts aerifier plugs containing little soil, from the greens nursery area at the Waterbury Country Club which had a thatch layer of nearly ¾ inch; 2 parts fine sandy loam; 1 part coarse washed sand; 15 lbs. limestone per cubic yard (to give a pH of 6.4); and 5 lbs. superphosphate (0-20-0).

*ECC* aerifier plugs from the Ellington

*Fig. 4. Influence of topdressings on percentage of bentgrass (with 2/3 inch thatch layer) surviving water stress.*

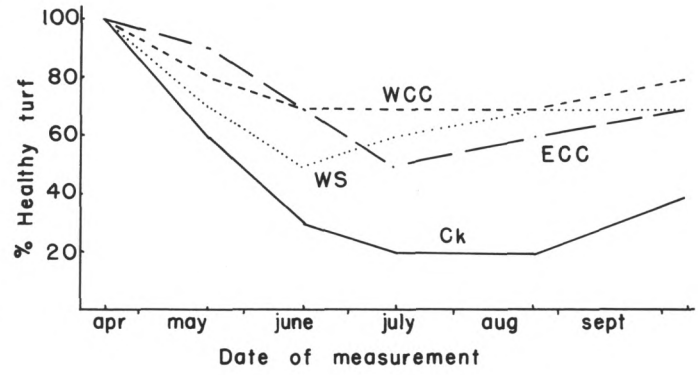


*Fig. 5. Composters containing thatch plug mixtures to produce topdressings containing higher proportions of thatch degrading micro-organisms. The maximum temperature during composting was 131°F.*

Country Club which were two to three years old and contained about 50 per cent sandy loam soil were shredded and placed in a composter without amendment.

*WS* a fine sandy loam topsoil.

The thatch layer measurements in this experiment were undoubtedly influenced by the lack of vigor and browning out of the turf. Samples were taken only in the healthiest areas. With initial topdressing on April 20 and repeated on June 17, 1971, the decrease in thatch depth in comparison to the control was as follows:

| May 20 | June 17 | July 17 | August 24 | October 6 |
|---|---|---|---|---|
| 7% | 1% | 19% | 16% | 14% |

This difference was highly significant. No significance was found due to the three types of topdressings. This is in accord with a 1970 experiment where a 10 per cent reduction in thatch due to topdressing was highly significant. While these reductions appear to be minimal, it should be remembered that the process of biological degradation of thatch should be slow and natural, achieving a desirable balance through years of turf management.

Compost preparation may be altered in many ways. If an amended sewerage sludge or similar organic fertilizer (Milorganite or Electra) is added to a compost containing freshly collected plugs (and/or grass clippings), striking results are produced. The temperature rise during composting is much greater than that produced by comparable amounts of nitrogen from calcium nitrate or ammonium nitrate. Even though temperature increase was minimal in some tests due to small compost volumes, the microfuana was severely affected. Nematodes disappeared. Protozoa, sometimes reduced to a single species, were usually eliminated.

The decimation of the microfuana may have no beneficial effects. Nematodes are not considered to be especially harmful to greens turf in Connecticut, but the concomitant death of undesirable weed species such as *Poa annua* is desirable. Elimination of many pathogenic fungi occurs before weed seed death during composting so it may be assumed that plant pathogen incidence is minimal.

Microfuanal degradation of thatch may be of overlooked importance. Some of these small animals are able to utilize organic particles, and some parts of thatch may be considered as possible food sources, but the microfuana almost never operates alone. They coexist with bacteria in commensalistic, if not symbiotic harmony, while feeding upon them. The study of such interactions is complex to an indescribable degree, since the removal of any species in this ecological balance changes the capabilities of the others.

## SUMMARY

Although changes in the thatch microenvironment bring about quantitative changes in microbial balances, such ecological changes do not necessarily contribute to a more desirable thatch balance. A great proportion of the viable microflora is inactive. Increasing activity is important and can be obtained through topdressings. Composting such topdressings may enhance their desirability by depleting the populations of weed seeds, nematodes and some protozoa, while proportions of thatch degrading microbes are increased. The advantage of compost over soil topdressing may be of more importance than indicated in these experiments. Changing the physical characteristics of the thatch layer to provide microecological sites that promote continued activity by the resident microflora may be the most important attribute of topdressing.

# Something From Thistle Dhu

by GARY WIREN

The literature of golf is fascinating. What a variety! If golf writing was limited to "How I Hit A Golf Ball Great" by (fill in name of current tour star), it would be tedium personified. But the variety of offerings—history, psychology, novels, humor, records, and those wonderful books about the courses themselves suggests a whole spectrum of reading material that can satisfy the golf addict's compulsion when he can't physically be on the course.

I don't really know why I started collecting golf books, but I do know now there is a great satisfaction in having them here, on the shelves, ready to provide some new twist, another golf adventure, a fact, or bit of minutia; like loyal friends when I need them. About five years ago, it struck me that not all golfers were so lucky to have such a wealth of reading available to them. When I came upon a particularly interesting story, it seemed a shame to not share it with my golfing friends, and so I decided to start sharing. The result is a quarterly newsletter I call "Thistle Dhu" and of "who knows how many editions on anything to do with golf."

Since the GREEN SECTION RECORD is "A USGA Publication on Turf Management," I have been asked to share some of the old golf stories that relate to your profession as golf course superintendents. I hope you will find them as enjoyable as I.

## THISTLE DHU— A STRANGE NAME FOR A GOLF PAPER?

First, let me explain the odd given name of the newsletter.

*"In 1930 'Tom Thumb' golf courses were a national craze (some of you may well remember). There was hardly a town in the United States that didn't have one or two of these miniature courses, while large cities sprouted them by the hundreds. For some unknown reason, when the spring of 1931 rolled around, people forgot about miniature golf as quickly as they had discovered it. Its rebirth was not to be seen again until after World War II.*

*"The first of the small golf courses can be traced to the artistically planned layout in the front yard of James Barber's winter home at Pinehurst, N.C. Its name was "Thistle Dhu." This peculiar Scotch-sounding name had its origin in the fact the E. H. Wiswell, who constructed the tiny course, was not quite satisfied with his work. He turned to Barber with a sigh of relief and said, 'This'll do.' Someone with a flair for Scottish names supplied the burr, and the name stuck."* (From H. B. Martin's *50 Years of American Golf)*

My feelings being similar to Mr. Wiswell's after finishing the first issue, prompted me to choose his remark for the masthead of my paper.

## THE EVOLUTION OF THE BUNKER

There have been some wonderful stories written about courses that were in books not dealing primarily with golf architecture or maintenance. Here is one on golf's favorite hazard—the bunker.

*"My first knowledge of bunkers was gained, as most golfers are probably aware, on the links of the Royal North Devon Club at Westward Ho, where I served an apprenticeship first as caddie, and later as groundsman. In those early days, the made bunker was unknown. On such a light sandy soil as the Westward Ho links are situated,*

*A fairway bunker at St. Andrews, Scotland showing the shoring up of the sides.*

*it took little for a bunker to make its appearance after a dozen players had used the old-fashioned lofting irons. The turf was easily cut, and once this protection was gone, the continual tramping soon broadened the scar until it spread some yards around. After the start the work went on merrily. The North-west wind, the prevailing wind in that part of the country, simply scooped sand away, and where some three months before had been a divot-marked patch of turf now appeared an irregular hollow of sand gradually being widened by the caving in of the sides under pressure of the players' and caddies' feet.*

*"One could see the bunkers grow larger day by day, until means had to be taken to keep them within reasonable bounds. This was accomplished by disused railway sleepers or other such timber being driven into the sand, forming a background upon which was nailed wide pieces of board the whole depth of the bank. The space between the boards and the bank was filled in and turfed over level with the surrounding country, but such is the aggravating nature of the wind, that no sooner had one bunker been properly harnessed than it immediately started to make another."* (From *The Art of Golf* by Joshua Taylor, 1913)

There have probably been many times in your golfing career when you couldn't have cared less how the bunker was invented—particularly when you were in one. But since you are in charge of caring for them, I thought you'd like to know how it all got started.

### GREEN$ $UPERINTENDENT$

This next story was written for the benefit of all my golf course superintendent friends.

*"The story goes that some years ago, a wealthy but penny-pinching club was determined to have the best course in the entire area, so they sent the head greenkeeper to the National Greenkeepers Association of America conference. Upon his return, the green committee eagerly met with the man. 'What all did you learn?' he was asked. 'First of all,' he said, 'I learned that I am the lowest paid greenkeeper in the country!' "*

But times are better. Read this from the record of the Aberdeen Golf Links of July 6, 1820, as printed in the book, *British Golf Links*, by Horace Hutchinson (1897):

*"The secretary was instructed to pay Alexander Monro at the rate of £4 (approximately $15) per annum for taking charge 'of the links and providing accommodation for the members' club boxes,' and for that sum Monro is to pay 'particular attention to keeping the holes in good order' and to 'be at the call of the members on all necessary occasions.' If that was not bad enough, the above allowance was diminished in 1822 to £3, an alteration which may be regarded as an illustration of the well-known prudence of the Aberdonians in financial matters."*

### GETTING BACK

Sometimes the superintendents have their sweet revenge. Such was the case at Muirfield in 1966 when Jack Nicklaus won the British Open.

*"The rough has been allowed to grow as high as four feet in some places in order to keep the course from being torn apart. With narrow fairways, mirror-like greens, and the hellish rough, players became ultra-cautious. Many players left their woods in their bags on the tight driving holes. As one reporter put it, 'Never have so many irons flashed so tentatively on so many tees, nor have swings grown so much shorter, nor have heads risen so fast.' "* (From *Golfers Digest*, Ken Bowden, 1967)

### GIMME PUTTS

In Thistle Dhu, there have been a few short quips about golf courses that have been placed in a column called "Gimme Putts," not too original but it fills the bill. Here are a few that I wouldn't want you to miss . . .

*"A frightening description of golf's hazards . . .*

*"On each side bristle all kinds of furzy horrors—whins, thick tufted heather and many other situations of distress for a wandering ball."* (From H. B. Farnie's *Golfer's Manual*, 1857)

*"A golf course put a lagoon at the bend of a dogleg hole and called it their 'water-on-the-knee hole'."* (Reg Manning)

*"Did you know that the year 1857 saw the introduction of the first spiked golfing shoes?"*

*"Dave Marr tells of going into a club in Colorado and seeing this notice on the board: 'Six inches of snow will make our greens unusually slow this weekend!' "*

*"The grounds on which golf is played are called links, being the barren sandy soil from which the sea has retired in recent geological times . . . links are too barren for cultivation; but sheep, rabbits, geese and professionals pick up a precarious livelihood on them."* (From *The Art of Golf* by Simpson, 1892)

It is not too difficult to find in the writing (sometimes between the lines) the player's feelings toward different kinds of courses. The Scots were never ones, however, for writing in between. If they believed it—they said it. Most of them of course preferred the old "links land" courses. In these last two stories you might get an inclination as to why:

### DUNCAN LIKES THE OLD COURSE

George Duncan was an unusually fine British player of the early rubber-core ball days; his career paralleling in time that of H. Chandler Egan, our American Amateur Champion of

*A pot bunker at St. Andrews, Scotland.*

1904-05. George was not the first, nor certainly the last good player to express a deep respect for the Old Course at St. Andrews. Here is why he liked it.

*"If I am asked which is my favorite course, I give my answer unhesitatingly—the Old Course at St. Andrews. I think it is the best, and if I have to play a match which is really of some importance, that is where I want to play it. St. Andrews has a character and features that you find nowhere else. What I like about it is this, that you may play a very good golf shot there and find yourself in a very bad place. That is the real game of golf. I don't want everything levelled and smoothed away so that by no possible chance can your ball take an unlucky turn in a direction you don't like. People think and talk too much about 'fairness.'"* (From *In Praise of Golf*, Evans and Scott, 1950.)

And finally . . .

**TO SEA OR NOT TO SEA?**

At one time there raged a fierce controversy over the merits and demerits of sea-side links land vs. park or inland golf courses. With the absence of natural sea-side turf in this country, the park course, with its artificial hazards, became the rule. Some imagination in current golf course design is bringing back a few of the elements of older courses that were "naturally designed" on the shore of the British Isles.

Here Robert Hunter, in his book *The Links*, 1926, provides us with some insight and understanding about the two:

*"The essential difference between the best seaside golf and that of the inland variety is that, in the first case, one is battling with nature—as one does in climbing a mountain or in sailing a boat—while in the other, one is faced with problems of human origin. No matter with what heights he is faced or with what winds assailed, the sportsman in battling with nature makes no complaint. But immediately when he is faced with problems of human origin, he feels justified, if he finds them too difficult, in turning upon their creator with murder in his heart.*

*"Golf course architects have built many holes that are deserving of censure, but what would we think if they were to offer us some of the problems frequently met with on the links? As instances: not three yards square of level land; blind tee shots and blind seconds (there are 12 blind approaches on one sea-side course); bunkers 'just where a good tee shot should be placed'; ridges in front of a green forcing certain shots into a hazard; and so on. It is not advisable to start with a one-shot hole, and yet this was done until recently at Muirfield. It would be accounted absurd to ask a golfer, starting from any tee and especially the first, to knock a ball along the ground with a putter for 50 yards in order to have a chance to play his second to the green—and yet that is usually our introduction to the exquisite North Berwick! What architect would not struggle hard to avoid having an out-of-bounds paralleling the first hole? Yet both at Prestwick and Hoylake we are faced with that. Blind one-shot holes are most undesirable, and yet the Maiden at Sandwich was sacrificed under protest, and who would dare lay his hands on the Sandy Parlour at Deal?*

*"So goes golf on the links—those sacred bits of God's earth—where men have battled for generations, like the sailor or the mountaineer, with what nature has placed before them."*

But in this country, to heck with nature and tradition—right men? What superintendent would dare not manicure his course? What blasphemy!

USGA GREEN SECTION RECORD
MAY 1972

# TURF TWISTERS

## HELP

**Question:** I've been asked about the mercury pollution problem that I may have caused when using mercury base fungicides. Have you any information that might help? (Maryland)

**Answer:** Work that has been done in Canada and the United States shows that with the exceptions of very poorly drained soils, mercury applied to the soil has remained in the soil and after 30 years none has been deeper than 18 inches. Keep in mind that agricultural uses of mercury are not the major pollutants. In 1970 the agricultural industry only used 2.9 per cent of all the mercury consumed.

## THE (SALTED) GRASS PLANT

**Question:** What can one do to nullify the effect of salts on turf flooded by salty water? (New York)

**Answer:** Some seaside courses occasionally experience salt water flooding from the ocean. The degree of injury depends on the time of year that the flooding occurs, and how long the flood water remains on the turf. If flooded during the growing season, the kill is greater and more severe; if the flooding occurs during the winter season, while the turf is dormant, or if it doesn't remain too long, then the kill usually is not as severe.

The corrective measures that superintendents attempt are:

1) They immediately irrigate with fresh water in the attempt to leach out or dissipate the salt to some degree.

2) They apply ground limestone and gypsum in mixture or separately using each at the rates of 1,000 to 2,000 pounds per acre.

3) In flooded areas, strains of grasses that survive are plugged and planted throughout the area of injury in the attempt to cover it with these strains that apparently have some degree of salt tolerance. These are mostly creeping bentgrass strains although *Puccinellia distans* is probably the most salt-tolerant of all turfgrass plants.

## TO GROW ON BANKS

**Question:** We have a steep bank, one almost too steep to mow safely which is in an out-of-play area but in close proximity to the clubhouse, so we would like to keep it in a grass cover that will not require mowing. Is there any grass that will grow 8 to 10 inches tall, that will grow dense enough to retain the sharp slope and not look unsightly? (Maine)

**Answer:** Try Merion, Pennstar or Fylking bluegrass sod or seed. It will meet all these requirements. The only time that it may be a problem is when it produces seed in May, the seed stalks will grow taller but will eventually taper off again and will hardly be noticeable in the fall. While these grasses grow more than 10 inches long, they lodge (lay over) and so appear to be less than 10 inches tall.