APRIL 1991

LAWN INSTITUTE

Harvests

Volume 38 Number 1

THE HARVEST MIX

"Spring and Summer Lawn Care" is the lead for this issue.

Reviews of a few of the talks presented at Missouri's Thirtieth Turf Conference include : Athletic Field Improvement - Past, Present and Future; Thatch and Pesticide Movement; Into the 1990's - New Cool Season Turf Varieties; Facts and Fallacies About the New Tall Fescues; Water Quality - A Key Issue for the 90's; Turfgrass Industry Then [1960] and Now [1990]; Biostimulators; Weed Control; and Black Layer of Putting Greens.

Dr Joseph Howland's comments to the American Sod Producer's Association were especially timely.

Threshing the Journals includes reviews on Warm Season Grass Weed Control, Cool-Season Grass Weed Control and Insect Control.

Spring and Summer Lawn Care

by Beverly C Roberts

Following winter months of rather drab colors out-of-doors, it is refreshing to think of warm sun, gentle spring rains and the return of greenery to the landscape. Among the first plants to show green leaves are the lawngrasses. They are highly responsive to your early spring efforts. It's as if both lawns and gardeners are ready for a new life style. Lawngrass plants and people awake together to the dawning of a new spring all across the country.

In spring, new tillers [side shoots that form from the base of the grass plant] begin forming deep in the sod. A touch of balmy weather can initiate a chain of events that will thicken up a lawn.

A good healthy lawn will be covered with about 6 grass plants per square inch. This amounts to over 8 million plants for a lawn of 10,000 square feet. That's a lot of plants to care for. On the other hand, if one plant per square foot looks poor, there are sufficient healthy ones to provide good cover-up. Blends of grasses and mixtures of compatible but different grasses help to assure the continued production of a blemish free turf.

Spring Planting

Lawns shouldn't be considered permanent, rather dynamic. Lawns often need to be changed to newer more vigorous types of grasses either by making a new lawn or renovating an older lawn that may be in only fair condition. Lawngrasses are hardy and recuperative, so you are apt to be pleasantly surprised by the recovery good lawngrasses make come warm weather. If planting or renovation is needed this spring, first take a good look at the design of your yard. This is the right time to make changes for a more functional and beautiful yard.

Spring is a good time to introduce newer cultivars that are better adapted to your lawn conditions. This can be done in a good lawn by lightly overseeding with lawn seed. Lawn seed spread at half the normal rate will help thicken thin turf. The seed needs to come into contact with soil in order to germinate.

Seeding rates for new or renovated lawns are based on the fact that about 6 lawngrass plants per square inch are needed in an established lawn. To get 6 established plants, some 12 seeds per square inch are required in the seeding process. Some seeds will be raked in too deep and others are left on the surface. Neither of these are likely to become well established. Birds may eat some seeds and rainfall may wash other seed away. Not all seeds have equal vigor and some may produce weak seedlings that die from damping off diseases. Experience has shown that about 2 seeds need to be planted for every one that develops into the mature lawn. Since lawngrass seed is so inexpensive, these recommended seeding rates prove to be very economical. Use of less than recommended seeding rates will cause the new lawn to be open and weedy and take longer to mature into high quality turf.

Lawngrass seeds are smaller than you might think. Kentucky bluegrasses have more than 1 million seeds per pound; fine fescues have about 500,000 seeds per pound; turf type tall fescues 300,000 and perennial ryegrasses 225,000 seeds per pound. The smallest lawngrass seeds are colonial bentgrass. There are more than 6 million seeds of these in each pound. Lawngrass seed purity should be close to 98 percent and seed germination from 80 to 85 percent. This guarantees good healthy seeds that will produce a lot of vigorous lawngrass plants at a very small cost per plant.

Use mixtures of grasses rather than pure seedings of one cultivar. Mixtures of turfgrass adjust better to a constantly changing environment than pure stands consisting of one type. Mixtures increase hardiness of the sward.

Spring and Summer CONTINUED

Rake

Wintering of lawns leaves undesirable brown vegetation, sticks and other trash within and on the turf. Rake it off in early spring so that the sun will warm the soil.

Spring Feeding

Lawngrasses use nutrients from the soil at rates of three parts nitrogen to one part phosphorus to two parts potassium. Lawn soils that are naturally fertile; i.e., not deficient in any of the major nutrients, can be maintained by making applications of lawn fertilizer with a 3-1-2 ratio. Fertilizers with 6-2-4, 9-3-6, 12-4-8 and similar analyses are available in most locations. Applications at manufacturers recommended rates in early spring and fall in the cool, humid regions will adequately replenish nutrients used during the growing season.

To make certain that your soil is naturally fertile, have a soil test made first thing this spring. Recommendations from this test will help to correct nutrient deficiencies that otherwise you would not be aware of.

At any given time, lawngrasses can use only about one pound of actual available nitrogen per 1000 square feet. This is not very much. For quickly available sources of nitrogen, an application of 10 pounds of fertilizer containing 10 percent nitrogen will supply this amount. For slowly available sources of nitrogen, an application of 10 pounds of fertilizer containing 30 percent nitrogen will supply 3 pounds of nitrogen. The larger amount of nitrogen, only part of which is immediately available, will last longer without over-stimulation of lawngrasses.

Nitrogen is the element which is responsible for encouraging leafiness. Over-feeding can cause lawns to become too leafy and have too few roots. A steady, balanced nutrition means grass plants are not as prone to diseases and stress.

Nitrogen helps make grass green. Iron also brings out the color in grass plants. Nitrogen increases growth rate more than iron. A rapid growth rate results in lush, succulent green foliage. This is replaced with more of the same following clipping, as long as nitrogen lasts and other essential nutrients are available. One other condition is essential - cool weather with lots of sunshine and adequate moisture.

In late spring and summer, as temperatures rise, the lush green turf is not as hardy. Summer growth recession, diseases and even dormancy are more damaging.

Lawn fertilizers containing slow release nitrogen, with or without iron, stimulate the development and maintenance of green, but not lush green lawns that hold well throughout the summer.

Iron can improve lawn color without stimulating growth under most soil conditions. This is especially desirable during warm summer weather. Since only small amounts of iron are required for lawn greening, application rates should closely follow that recommended for product use.

Lime

If you live where soils are acid and lime has not been applied in a couple of years, spread 50 pounds of ground limestone per 1000 square feet with the first signs of green. When in doubt, a soil test will prescribe when to lime and how much to apply.

Spring and Summer CONTINUED

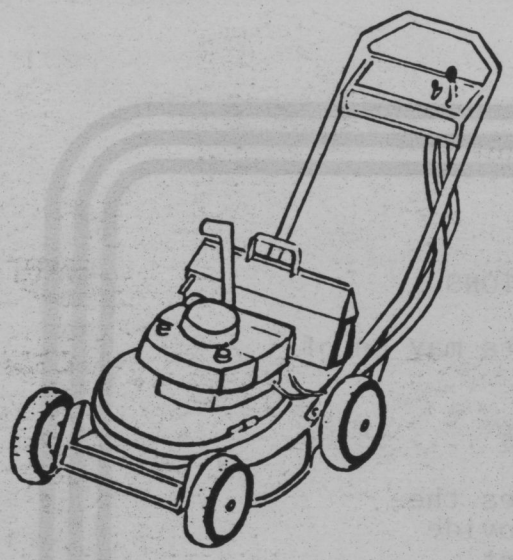
Mowing

Lawngrasses are unique among garden plants because they can withstand some regular removal of foliage and still thrive. Most of us take lawn mowing for granted and may even wish we could forget about this necessary grooming practice. But, the ability of lawn species and specific cultivars to grow well and spread when mown is the result of careful selection and breeding.

You will want to clip the lawn short one time in late winter to remove scorched foliage, so that sunlight will warm the ground early in the spring.

Even though many of the new cultivars tolerate low clipping heights, it's good practice to mow a little higher in the spring to encourage deep root growth. Mowers set to cut from one and one half inches to two inches will provide a well groomed cover and allow for optimum root development.

Roots produced during the spring make lawngrasses more summer hardy because root development is poor during hot weather. Thus, spring roots must be sufficient for both spring and summer needs. A close clipped, shallow rooted lawn in spring will be a shallow rooted difficult to maintain lawn in summer when growth conditions tend to be less favorable.



No Sharp Lawns from Dull Mower Blades

Tests show conclusively that a dull blade reduces lawn quality. A dull blade bruises the grass plant leaf and disease can set in. The bruised tips turn brown so the lawn is less green. Shoot density is also affected.

A sharp blade makes a clean cut and permits vigorous recovery after mowing. Also of importance, twenty two percent more gasoline is used by mowers with dull blades.

Topdressing Lawns

Most of us have felt or noticed an unevenness in the lawn surface from time to time. Perhaps this roughness affects our accuracy in croquet or bocce. In any event, such humps and hollows form even in the best of lawns. Frost heaving during winter months may cause these formations, and the activity of the soil fauna [like earthworms] can create additional roughness.

Perhaps the ultimate in smoothness of turfgrass surface is required on golf greens. In order to maintain these true putting surfaces, the greens are topdressed regularly. Home lawns seldom need regular topdressing; however, at times, a little dressing is needed, for example, over tree roots that corrugate a surface.

Topdressing for lawns should consist of a soil that is as much like the soil in the root zone as possible. If anything, perhaps it should be a little more sandy. It should not be highly organic in nature because lawngrasses build organic matter in the soil much more effectively than it can be added as topdressing. And, of course, it should be as free from weed seed as is possible.

A layer of about one quarter inch brushed or raked into the lawn will help to smooth the surface. Such an application will also help prevent the formation of thatch. Repeat treatments may be required in some instances.

Crabgrass Control

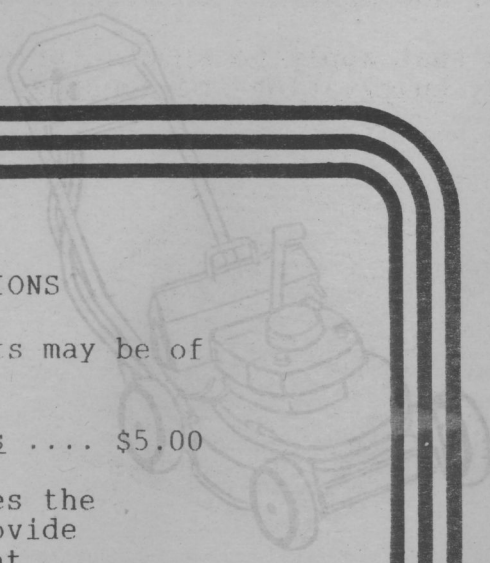
Crabgrass is best controlled with a pre-emergence herbicide. This is applied prior to crabgrass seed germination in mid- to late-spring. Since at the time of application no crabgrass plants are growing, the chemical is active at the soil surface where crabgrass seeds are. Either liquid or solid formulations are effective and the several different active ingredients available are equally good when applied according to directions.

Control of crabgrass after it has become established is not as easy. Liquid formulations are more effective for post-emergence control.

If broadleaf weeds were controlled in the autumn, then there should be little need for use of herbicides in the spring. Practices to bring the lawn to a dense healthy status are more important in keeping any of the pests from getting started.

Vertical Cutting and Aerification

Two special treatments can give the spring lawn a boost. Vertical cutting or thinning to remove thatch is sometimes needed if the undecomposed thatch layer between leaves and soil is more than 1/2 inch thick. If your lawn is trying to grow on compacted soil, aerification or coring can give roots room to grow.



LAWN INSTITUTE PUBLICATIONS

Two recent Lawn Institute booklets may be of interest to readers -

- Lawn and Sports Turf Benefits $5.00

This 32 page booklet describes the many benefits lawngrasses provide to mankind and the environment. [referenced]

- The Lawnscape: Our Most Intimate Experience With Ecology..... $5.00

This new 40 page booklet is an overview of the ecology of lawns.

UNIVERSITY OF MISSOURI TURF CONFERENCE
St Louis, Missouri
December 1990

ATHLETIC FIELD IMPROVEMENT : PAST, PRESENT AND FUTURE

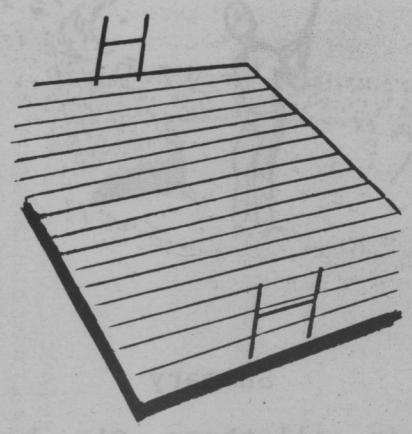
by Dr John Dunn

University of Missouri

Perceptions of acceptable quality turf have changed in the last forty years. There has been a gradual improvement of playing surfaces. In 1950, fertilization was based on recommendations for forage grasses. Now, recommendations for sports turf are based on maintaining proper plant density.

Equipment has evolved to lighter weight types so there is not as much compaction and wear from maintenance practices. Ten years ago traveling sprinklers were the best that were available. Now many are computer controlled.

The 3 C's that apply to sports turf feature - cultivars, cultivation and construction.



Cultivars

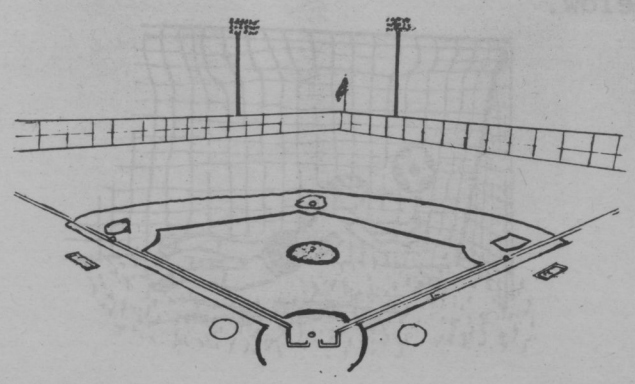
Twenty five years ago perennial ryegrass was available but behaved more like the annual ryes. Even Kentucky bluegrass then was not dependable for athletic turf. The only improved bluegrass was Merion and it had weaknesses.

In the 1980's, Dr Reed Funk and Dr Joe Duich released new ryegrass cultivars that were more disease resistant, had better traffic tolerance and better overall quality.

In the National tests today there are over 80 ryegrass cultivars and experimentals, some of which have germplasm from southern states. Many have endophytes which protect the grass from insects. This has been a big advance. Perennial ryegrass is an improved plant for athletic field management. It can help repair fields between games and is wear resistant.

Kentucky bluegrasses have been improved and there are over 120 entries in the National Trials. There is good potential for bluegrass. In the late 1970's it made pretty good turf. Mixed with perennial ryegrass, turf could be reestablished between games. Bluegrasses have underground rhizomes so recuperative capabilities are excellent.

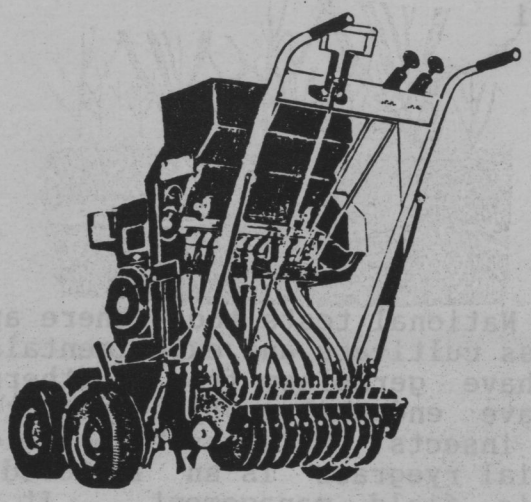
Tall fescues are coming into the picture. In 1979 Dr Fund released Rebel which produced three times the tillers as Kentucky-31. It recovers more rapidly and could be used as athletic field turf. Today there are more improved cultivars. Tall fescues are best used for athletic fields with moderate wear. More improvements are coming.



Cultivation

Slit seeders are a great tool for athletic field managers in renovation and thickening injured turf.

The most important cultivating tool is the aerifier which evolved through the golf course industry. A hydraulically operated machine goes to a pretty good depth and helps relieve compaction. It can be used 5-6 times during the season and topdressing can be applied along with this procedure. It breaks up ununiform layers of soil giving channels for water movement.



Construction

The thinking about soil vs sand has evolved through the years. In early sports fields, silt and loam soil might be piled up and then graded providing little drainage. When fine textured soil was at the top, moisture was held at the top by cohesion and adhesion. The soil has to become saturated before the water moves down into the coarser material below. There are a lot of these "old soil" fields. The question is, what to do with them ?

There are several systems used now. The Cambridge System involves intersecting bands/slits are made and filled with sand so that excess moisture is carried down to drain pipes below.

In 1950, Professor Musser surveyed superintendents in Pennsylvania re: sand vs soil as topdressing. The thinking then was that to add some sand would improve topdressing. Actually it has been found that depending on the soil, the addition of sand can be disastrous.

Sands consist of different particle sizes and are very tricky to work with. Mixing should be done away from the site. If two sands that are fairly uniform are used with silt/loam soil, at 30 % the rate of water infiltration into the soil might be good, but at 40 %, water infiltration might almost be stopped. An improper mix might cause more compaction than soil without added sand.

Particle sizes [and the resulting number of particles in a specific amount] need to be considered. There is great variation in the sizes of sand. Silt and clay particles are extremely small. If not in the correct mix, pore spaces can be clogged resulting in compaction.

Summary

Perceptions in all three C's have changed through the last forty years. In addition, studies have shown that hard and rough playing surfaces can contribute to player injuries. As a result, safety and liability are added concerns. As a result of current research, future fields will have better traffic/wear tolerance and less compaction. Improved equipment and better use of the equipment; improved construction technology; and improved cultivars will lead to improved sports fields.

Thatch & Pesticide Movement

by Dr Roscoe Randall

University of Illinois

In Illinois, thatch is often found as thick as 2 1/4 inches. Attempts have been made to dethatch lawns with 2 " deposits, so much that the thatch comes up off the soil. It is in well cared for lawns that thatch is found.

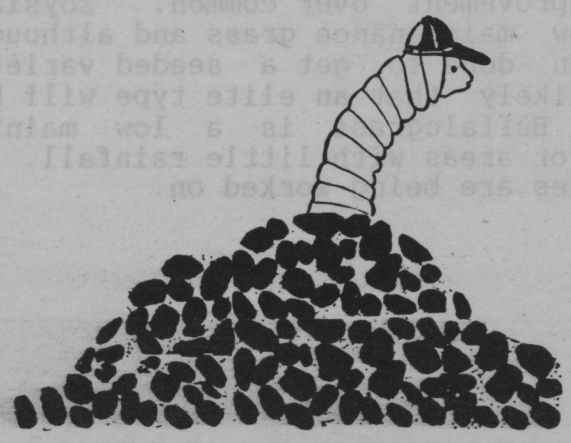
Maybe we created this problem. People have written "thatch is normal", "some thatch is good". Intense cultural practices increase thatch so more is seen when fertilizer is used and more when soils are acid.

To decrease thatch, machines such as dethatchers and aerifiers are used for physical removal.

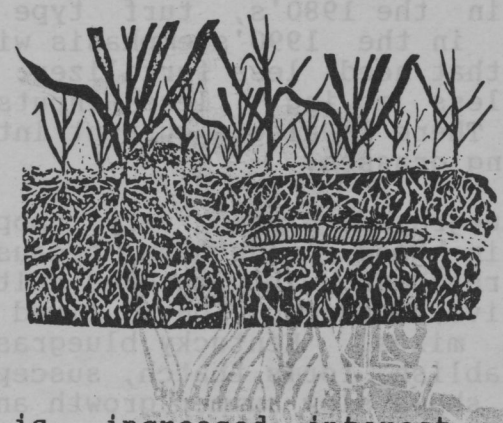
Studies on thatch and related cultural practices have been conducted in Michigan. Height of cut, removing clippings or return, various rates of nitrogen, annual dethatching or none and all combinations of the above were studied. There were no differences and no thatch. Ten years later, there was still no thatch. Thatch has been found in borders and walkways where a high rate of chlordane was being used. THATCH IS NOT NORMAL.

In research plots where chlordane and dieldrin were used, thatch was found, but none found in the check plots. There were no earthworms in the treated plots. It takes 2 1/2 ppm chlordane to kill grubs. 12,000 ppm was found in the thatch and not enough below the thatch to kill grubs. Grubs became resistant to chlordane. When insoluble material is put on thatch, it collects in the thatch.

In 1986-7, Dan Potter at the University of Kentucky studied earthworms. Earthworms devoured thatch but thatch stayed where there were no earthworms.



There are insecticides available that are not toxic to earthworms. November through April is the key time for earthworm activity.



There is increased interest in putting something down through thatch to kill grubs. The chemical isn't needed 5 " down; it is needed right below the soil surface. If there is 2 " of thatch, not a lot of chemical will go through unless it is very soluble. The rest ties up in the thatch.

To a 3 " depth, an acre of soil weighs 1 million pounds. Chemicals are put on in very small amounts compared to this. One pound/acre is 1 ppm in the soil (to a 3 inch depth). A lethal dose of chlordane is 2 1/2 ppm. If treating grubs, the key is to use a lethal dose in the area where the grubs are.

Need to think about where you want the insecticide. The only time you want to put it through thatch is August through October when grubs are at soil surface. An injector to jam granules down into soil 5-6 " isn't needed because grubs are at the soil surface. Annual white grubs have only 1 hatching a year. Sometimes this happens at a different time, ex 3 weeks early, and seems like more than 1 generation per year.

Dethatching, aerification and liming may create a good favorable environment for earthworms. Decay goes on all the time. The earthworm is the chief feeder on thatch. Five or more ppm chlordane will kill earthworms. Even when plots are plowed up, 3 years later plots reestablish themselves and there is still lingering chlordane.

Into the 1990's ...

New Cool Season Turf Varieties

by Dr G Pepin

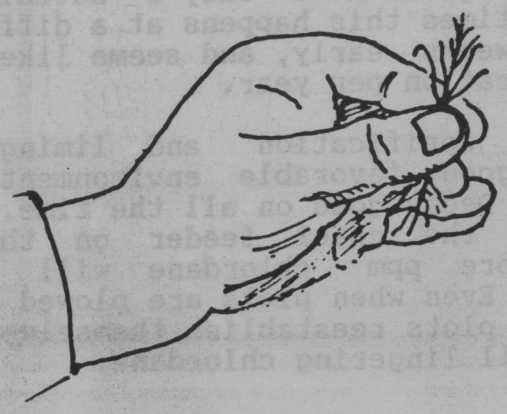
Pickseed West Inc

The impact of the turf industry is greater than at any other time: increased golf course construction, strong sod market, leisure time increasing worldwide, and strong export market.

Turf breeding has developed through the years. In the 1960's focus was on Kentucky bluegrasses; in the 1970's, perennial ryegrasses; in the 1980's, turf type tall fescues; and in the 1990's emphasis will be on grasses that need less fertilizer, less irrigation, less mowing - less inputs for management. There is also a current interest in low growing grasses.

Kentucky bluegrasses are very popular, especially in sod production because of underground rhizomes. The improved cultivars are attractive, tough, long lived and excellent in mixes. Kentucky bluegrass is: slow to establish, forms thatch, susceptible to disease, shows slow summer growth and not well adapted to poor soils. Breeding of Kentucky bluegrass is different than other grasses. Many cultivars are from old selections. The seed is apomictic - asexual propagules - and hard to hybridize. Chemical engineering will be needed to make further improvements. There have been no big breakthroughs in 10 years. Bluegrasses have a high chromosome number so if crossed, thousands of plants have to be screened.

Perennial ryegrass was the grass of the 70's and as a result of that work there are many new varieties. Perennial ryegrass is rapid to establish and used in overseeding. It also has excellent color and quality, excellent wear tolerance, attractive texture and density, good heat and drought tolerances and produces no thatch. It is a bunch grass and is very aggressive in mixtures. Perennial ryegrass is not shade tolerant. Many varieties from Europe are not heat and drought tolerant. Kentucky bluegrass and perennial ryegrass make the best mixture for sports turf in the northern United States. Breeders are now looking at low growth characteristics. Endophytes in perennial ryegrass produce a substance toxic to surface feeding insects. This amounts to a benefit for turfgrass but the same endophyte produces summer decline in cattle. This is not a good characteristic for pasture grass. Endophytes are not necessary in seed for overseeding and it is a hazard when the straw is marketed overseas for animals. Millions of pounds of perennial ryegrass are used for overseeding. Endophyte containing cultivars are good for permanent turf.



Turf type tall fescues are very drought and heat tolerant, have excellent wear tolerance after establishment, good low fertilizer tolerance, shade tolerant, have good color retention under drought conditions, do not produce thatch. Turf type tall fescues do not mix well with other species, have poor low fertilizer winter color, and not tolerant of low mowing. These grasses were developed from Kentucky - 31. Now there is a tremendous difference in height among the varieties from standard to "dwarf".

Fine fescues are sometimes confused with fine leaved tall fescues but these are different. Fine fescues include creeping, Chewings, hard and sheep fescues. These are low maintenance type grasses and are well adapted to many areas. They are shade tolerant and not as good in sunny locations in hot weather. These are being promoted more and more.

There are new varieties of bentgrass. Penncross has remained the standard all over the world. Strides have been made in heat and drought tolerant bentgrasses. Some are being bred for more southerly regions.

Work is being done on seeded warm season grasses. Sahara and Cheyenne seeded bermudagrasses are now available. These show some improvement over common. Zoysia is a good low maintenance grass and although work has been done to get a seeded variety, it isn't likely that an elite type will be seen soon. Buffalograss is a low maintenance grass for areas with little rainfall. Seeded varieties are being worked on.

FACTS & FALLACIES ABOUT THE NEW TALL FESCUES

by Dr G Pepin

Pickseed West, Inc

Much research has been conducted on turf type tall fescues in the last 10 years. There has been some confusion about terms such as "dwarf" and "semi-dwarf" types. A strong increase in the use of turf type tall fescues in golf course construction, as sod for leisure time activities and a strong export market have all stimulated interest in these grasses.

Adaptation of turf type tall fescue is especially good in the transition zone. Strengths of this turf include: good heat and drought tolerances, excellent wear tolerance once established, good low fertilizer tolerance, good color retention under drought, adaptation to diverse soil conditions and not a heavy thatch producer. Weaknesses include: coarser leaves, less tolerant of low mowing, and mixes poorly with other species.

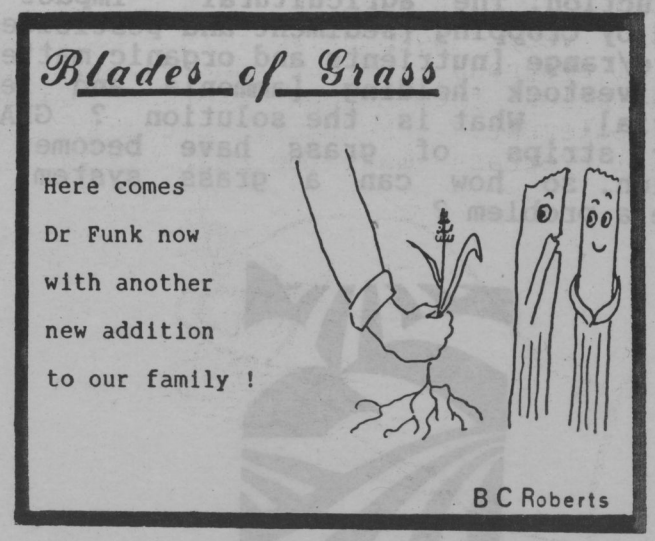
K-31 selected from a Kentucky farm in the year 1931 has been the standard. A remarkable grass, yes, but very coarse and now presents a bad name for the turf types. New types show dramatic improvement. There are standard height varieties, and low growing "dwarfs" with a tremendous difference between the two. New varieties are more dense, finer and good seed producers. The dwarfs are of high quality, dark green, lower growing in Spring, finer, deep rooted and heat & drought tolerant. There are different heights among the dwarfs. Some are moderate in height [semi-dwarf], and there are even differences in height among the dwarfs,so the terminology is confusing. The buyer has to be careful in ordering.

Dr Funk [Rutgers University] has worked on obtaining lower growing types. Individually spaced selections are planted in the fall. In summer, individual characteristics are noted and second selections are made. Dwarfs have been selected for several years and interbred. Unsuitable plants are discarded. Plants to save are dug and put 12 to a block. When harvested, the seed is put into plots in a nursery. Evaluations show differences. The material is evaluated for several years with recurrent selection. Material from the crosses is recycled and used the next year. Seed production is very important to look at. Newer types often have as good or better seed production characteristics than older ones.

Under heavy traffic, turf type tall fescue can wear out and doesn't fill in. When mixed with some Kentucky bluegrass, which has rhizomes, turf is improved. Five to ten percent broad bladed, non-aggressive Kentucky bluegrass is recommended.

One problem with lower growing turf type tall fescues is that trace amounts of annual ryegrass can look like off-types of the fescue. Most turf type tall fescue is grown on old ryegrass fields, so it is not uncommon to get some rye contamination the first year.

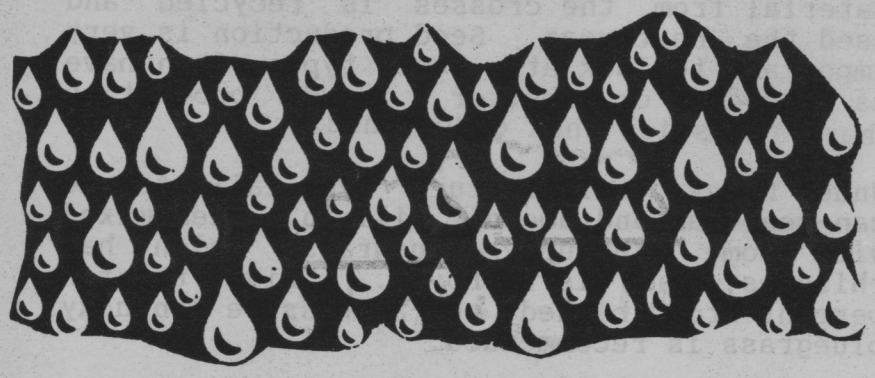
Low growing turf type tall fescues have good roots. They do have a little more tendency to become diseased. Because they are slower growing, they grow out of disease infection more slowly.



WATER QUALITY
A Key Issue for the 90's

by Dr Thomas Watschke
Pennsylvania State University

Water quantity and quality are issues for now and the future. In the Northeast, 80 % of the water consumed is from ground water. With population increases, concerns about water increase have surfaced. The more impervious surfaces that are built, the less infiltration is possible. If runoff can be trapped and treated it might help the shortfall but the quality of runoff water is poor. Runoff quality declines as there is an increase in impervious surfaces where water can pick up pollutants.



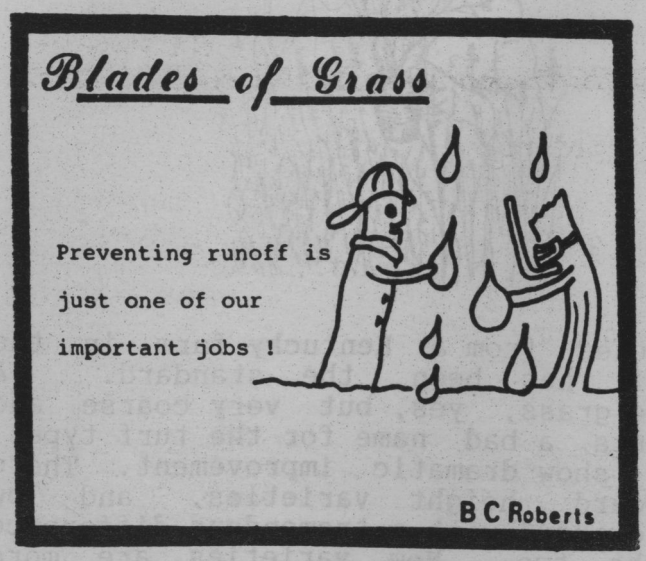
A further complication is caused by the media and various environmental groups that publish articles not well documented and often false. The political environment promotes these types of articles. If there are facts, they will be used by politicians, but a database of facts is needed or incomplete/false information will be used.

Non-point pollution comes from agriculture, urban lands, mining, silvaculture, and construction. The agricultural impact is caused by cropping [sediment and pesticides], pasture/range [nutrients and organic matter], and livestock holding [ammonia and fecal bacteria]. What is the solution ? GRASS. Buffer strips of grass have become the solution, so how can a grass system now become a problem ?

There are 129 "priority" urban pollutants now listed by EPA including pesticides, metals, inorganics, and organics. The urban impact from impervious fractions is from air pollution fallout, auto related deposition, street litter, animal wastes and from transport systems including catch basins, combined sewers and leaky sewer pipes. Accumulation in catch basins concentrates pollutants. Urban impact from pervious fractions is from septic systems [prior to 1975 no percolation data was required]. Thus, poorly maintained and malfunctioning systems and landscape areas accumulate nutrients, pesticides and sedimentation from construction sites. We need to know more specifically the impact from residential, commercial, golf course and park sites. In rural areas, many pollute their own wells.

The benefits of turfgrass in terms of water quality are wide and comprehensive.

The Turfgrass Industry profile shows 25-30 million acres of turf. Five hundred thousand are employed in the industry. A growth from 1965 at $4.3 billion to 1982 to $25 billion is significant.

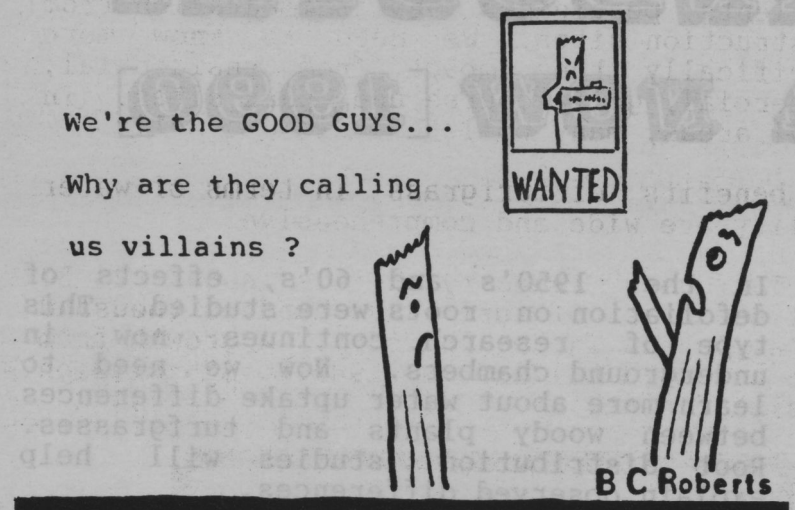


Non-agricultural [urban] application of nutrients and pesticides are common and likely to increase. A home is a major investment and hopefully it will appreciate. Most homeowners sense that the value is impacted by the landscape.

Turfgrass effects [benefits]: soil surface protection, soil structure development, increase of infiltration capacity, reduced runoff rates and elimination of erosion. There need to be cultural inputs and chemical inputs to get these benefits.

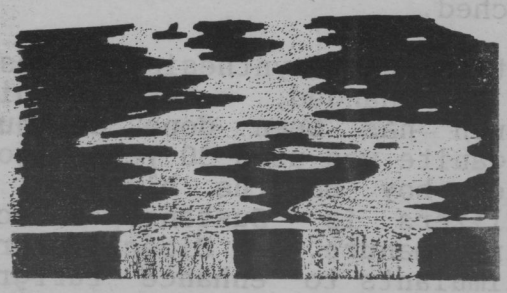
Issues about turfgrass are emotional. The visibility of applicators is an affront to some. The public is uneducated about benefits of turf and about chemicals. The media focuses attention on things to sell newspapers which mostly are downers. The bulk of society depends on newspapers for their education. Many articles are filled with misinformation and 30% of the time the source is unknown.

Blades of Grass



Public perceptions:

- After a storm, water is seen running off in the gutter. Where is this from ? The lawn ? No. Impervious surfaces like roofs. Only 1-2 % of the water landing on grass runs off.

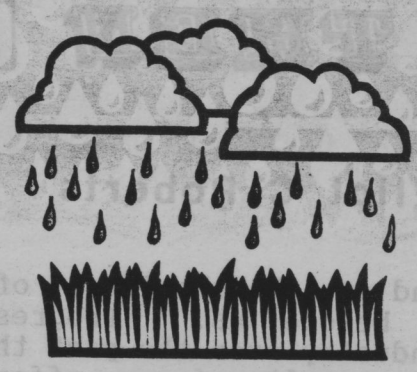


- Lawns may be striped from fertilizer application because it is thought that when it rains it will spread out evenly. Wrong. Fertilizer doesn't move when it rains and stripes result.

"

Pennsylvania State University research has had the objective: "To asses the hydrologic and water quality impacts of turfgrass establishment methods and nutrients/pesticide applications."

Sodded and seeded plots on a slope were established in 1985. Six inches of water an hour had to be added in order to collect any runoff in the catch basins. Seventy percent of runoff samples had no level of anything in them that was applied to the turf. Where there were detectable levels, they were below drinking water standard levels and these were driven by 6 inches of water and collected no deeper than 6 inches below the surface. There was never any runoff from a natural storm. Reduced runoff rates were associated with dense, high quality turf.



Plots planted with sod had improved surface soil structure and protection. Plots seeded didn't have as much protection. Findings are not what might be expected in a silty clay loam soil, but in the real world the majority of infiltration occurs in macropores [from earthworm activity]. In sand culture, infiltration rate can decrease as roots fill in macropores as there is little biodegradation in sand.

When fertilizer nutrients were applied, leachate nitrate levels were never more than drinking water standards. Whatever is put on turf in standard rates is used by the grass or lost in volatility or microbial degradation. Very little has been found in runoff or leachate.

ROBERTS RECOGNIZED

FOR THIRTY YEARS SERVICE

Dr John Dunn, Professor of Turfgrass Science at The University of Missouri [R] presents Dr Eliot Roberts of The Lawn Institute a plaque from The Missouri Valley Turfgrass Association recognizing thirty years of service to the Association. Dr Roberts, who was a speaker at the first Missouri Turf Conference in 1960, spoke at the 1990 Conference on technical advances in the past 30 years.

TURFGRASS INDUSTRY

THEN [1960] & NOW [1990]

by Dr Eliot C Roberts

We all stand on the shoulders of those who have gone before us. Progress in the Turfgrass Industry over the past thirty years has been the result of many efforts in many parts of the world by many groups and individuals and is evident in 12 categories:

1. Following World War II, weed control chemicals started to be developed and today there is no excuse for weeds in fine turf.

2. A great deal has been learned about susceptibility and proneness of turf to diseases and insects and about biological balance in the turf system.

3. One of the first plantings of Merion bluegrass was in a park in Milwaukee. This was the beginning of new generations of turfgrasses. The new improved turf type tall fescues don't even look like they are related to Kentucky - 31. All species will continue to improve in the future. Buffalograss is being improved as a result of more concern about water use. It will not likely be feasible in the cool, humid regions. The National Trials give us a look at grasses in various areas under stress and differences show we have come a long way. There are some 300 varieties now marketed.

4. In the 1950's and 60's, effects of defoliation on roots were studied. This type of research continues now in underground chambers. Now we need to learn more about water uptake differences between woody plants and turfgrasses. Root distribution studies will help explain observed differences.

5. Clippings - Don't Bag It. We all have responsibility for grasscycling, making constructive use of the organic waste component of the turf commodity.

6. New equipment for soil cultivation has become high-tech. The old West Point aerifier has been replaced and improved but the surface has hardly been scratched.

7. Nutrition: photosynthesis and respiration haven't changed, but sophisticated research has been done on nutrition. Milorganite was used 30 years ago. Today the new boy on the block of organic fertilizers is Sustane, a composted poultry manure. Bioactivators, and biostimulants to enhance turfgrass are coming onto the scene. It was always thought that a 21-7-14 fertilizer had merit to replace the nutrients used by the plant. More recently, low concentrations of fertilizer have found favor. Stress physiology has shown that small amounts of nitrogen applied more often help increase hardiness.

8. Years ago we knew that bluegrass turf could be grown on asphalt with a system of hydroponics. It is important to know how grass grows as well as how to grow grass. Stress conditions can cause the plant to show us its needs, for example the color of the leaves can indicate too much or too little nitrogen. High potassium can help in some stress conditions; high phosphorus can be detrimental under stress conditions.

9. Water conservation is an important issue today. We need to know more about water relations between turfgrass and other landscape features. Surfactants have been developed to help wet thatch and hydrophobic sands and soils.

10. Everything that is on the face of the earth is represented in a handful of soil. Research in soil science is important and has helped to improve turfgrass culture. A great deal has been learned about how to create a root zone for golf greens with sands, but problems still arise. It is important to understand the function of soil organic matter and soil micro and macro inhabitants to help turf maintenance become easier.

11. Soil testing has come a long way. Thirty years ago much was hocus pocus. In order to understand what soil testing can do for turf managers, it has to be approached from the stand point of analytic chemistry.

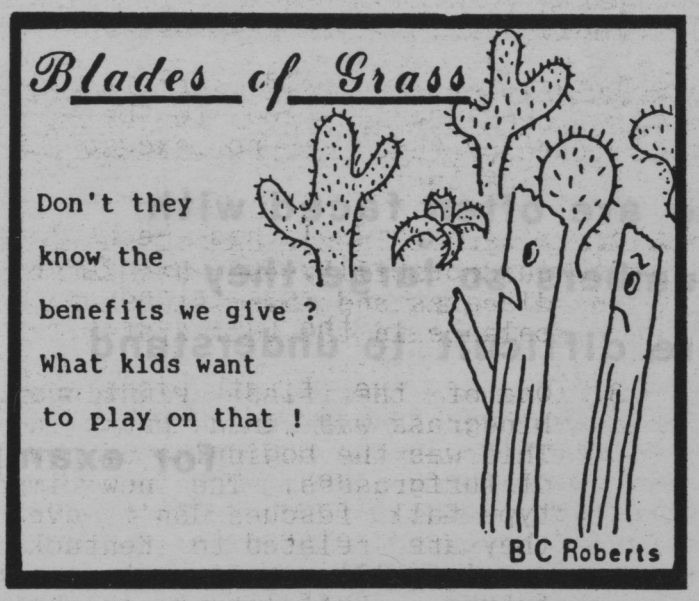
12. Thirty years ago calcium cyanamid scorched earth was the technique for renovation. Today there is glyphosate and slit seeders which simplify the renovation procedure. A whole new realm of chemicals has opened and turf managers often don't know how to operate without them. Thirty years ago dacthal was effective on crabgrass where it was quite dry but the plant escaped the herbicide where it was wet. Integrated pest management has helped in the attainment of excellent results with less chemical.

Today there are organizations concerned about the scientific community and the public is confused. The scare about Alar on apples provides a good example. We need to stay close to overall agricultural science. The Council for Agricultural Science and Technology [CAST] provides excellent information to help us tell our story. We need to be effective in showing the lack of reasonable risk in materials used. More and more cities are looking at ordinances that will restrict the development of golf courses and limit turf. We must do a better job in communications.

There are basic misunderstandings about risk and the quality of life. We often don't consider ourselves politicians, but it is time to be political. Fifteen million dollars a year is spent on turf research which gives us the facts. This information must get into the stream that influences the political process.

Basically the problem concerns numbers of people. As population increases, there will be an increase in the problems we all have to deal with.

The booklet "Lawn and Sports Turf Benefits" documents the many benefits turfgrasses provide for humankind. "The Lawnscape - Our Most Intimate Experience With Ecology" is an overview of the turf system. With "Xeriscaping" coming into the language even in the cool, humid regions, we must show that this desert system is not an answer to regional drought in other areas.



Sports turf has expanded and improved over the last thirty years. In 1960, a booklet "Play Safe" was the first effort nationally to put emphasis on safety. The public is interested in recreation and sports and there will continue to be a place for lawns and sports turf in the future.

BIOSTIMULATORS

by Dr Richard Schmidt

Virginia Polytechnic Institute

A new effort is being directed toward the search for new uses for existing chemicals and the development of new chemicals for turf.

Biostimulators promote plant growth and help condition plants to harsh environments in ways other than those obtained from direct fertilizer response. These provide another tool - an insurance policy.

Most materials are cytokinins or cytokinin-like. They stimulate formation of chloroplasts and help break dormancy in some seed. They enhance flowering in some plants, and help retard onset of senescence so leaves will work longer. Exogenous cytokinin materials are found naturally occurring in seaweed and can be produced synthetically.

Small quantities are used. Some foliar response is noted but growth response is noted mainly in roots.

These materials may become a valuable tool in sod production. Photosynthetic activity of plants has been increased with a number of products. Increase of top growth and root growth has been seen. Sod growers are interested in speeding up production, and in rerooting of transplanted sod. Some treatments involve use of the products alone and some combine the products with iron. Results are more positive for turf grown under stress.

Work still is needed to perfect timing of application and rates. Responses depend on environmental conditions. Some of the materials may help where there is an influence of salts from effluent water used for irrigation. Some materials may help bermudagrass green up earlier, as well as withstand 5 to 6 frosts with less dormancy.

Results will not negate good cultural practices but may be of help where grass is subjected to harsh environments.

We are often faced with numbers so large they are difficult to understand

for example:

a trillion

HOW FAR WOULD A TRILLION DOLLARS GO ?

"For one trillion dollars you could build a $75,000 house, place it on $5,000 worth of land, furnish it with $10,000 worth of furniture, put a $10,000 car in the garage ... and give all this to each and very family in Kansas, Missouri, Nebraska, Oklahoma, Colorado and Iowa.

"Having done this, you would still have enough left to build a $10 million hospital and a $10 million library for each of 250 cities and towns throughout the six-state region.

"After having done all that, you would still have enough money left to build 500 schools at $10 million each for the communities in the region, and still have enough out of the $1 trillion to put aside at 10 % annual interest a sum of money that would pay a salary of $25,000 per year for an army of 10,000 nurses, plus 10,000 teachers, and an annual cash allowance of $5,000 for each and every family throughout that six-state region, not just for one year, but forever.

"And that's only one trillion dollars."

- William Sloane Coffin

WEED CONTROL

by Dr Thomas Watschke

Pennsylvania State University

Herbicidal dependency has increased in the last 20 years. Ability to control weeds is at an all time high.

It is important to make the proper identification of the weed. Many take the fast track from ID to what to spray. Time should be taken to see how and why the weeds got there. Why was there a space to begin with ? Assess cultural practices before deciding to spray.

Many weeds become chronic because lawn tenders are in a hurry to do something. Compaction of soils and other use related problems of the site may be contributing factors. Figure what can be done to the site to allow the grass to be more competitive and reinvasion of the weed will be reduced. This will greatly improve any weed control strategy.

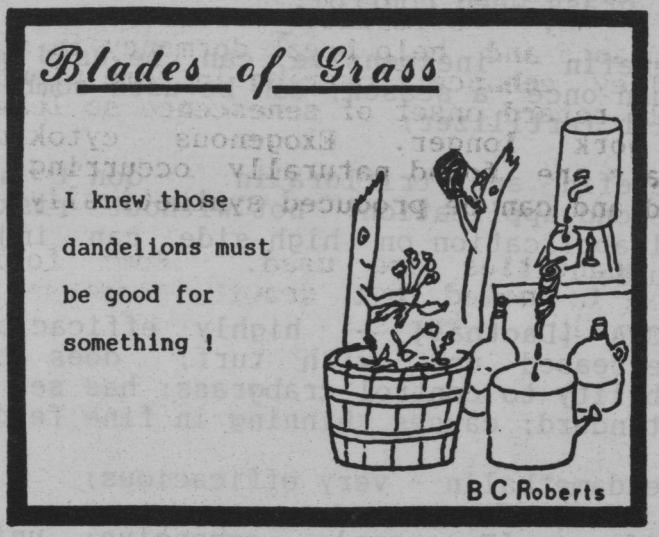
Preventative weed control includes:

- growing the appropriate grass species for the site and use;
- using clean and high quality seed/sod or there will be an opportunity for weeds to enter and more different weeds to control;
- use clean, small grain straw for mulches as some mulches can introduce very tenacious weeds.

Once the site is established, a cultural program to prevent weed infestation is needed. Mowing height will depend on site and use. If mowing is low, roots will be short and more irrigation needed. Plan for fertilization, cultivation, and pesticides to keep turf healthy. Create conditions so grass is more competitive at the expense of weeds by using proper cultural practices. If there is no open space, there will be no weed. When you have to spray, chose the right chemical and apply it correctly.

Annual grass weeds:

- crabgrass, mostly smooth;
- goosegrass - increasing due to pressure put on sites from increased use on facilities causing soil compaction;
- foxtails/barnyard grass - tremendous capability to reproduce; rarely a problem in established turf but can invade seeding areas in summer plantings; when seeding is done in fall, foxtail will die with freezing.



Annual grass facts:

- reproduce by seed; germination predominantly in spring [goosegrass can germinate through the season];
- control with pre-emergent herbicide - there are good materials for control [note: in the next 2-5 years there should be no reason to have annual grass weed problems, but increasing rhetoric by EPA re: indiscriminate use of any pesticide as a threat to the environment may impact on use of pre-emergent types of herbicides as preventatives - no chemical allowed until a weed is observed];
- new chemicals are more likely to be post-emergent; some products have both pre and post-emergent capabilities that target grass weeds as they germinate all summer - this may be a viable strategy if pre-emergents are eliminated.

WEED CONTROL CONTINUED

Pre-emergent control concepts:

- herbicide timing before germination date; seed germinates when water is imbibed;
- herbicide activation with rainfall or irrigation forms a chemical barrier where weeds may germinate if the product is positioned where it should be;
- herbicide decomposition by light, temperature and moisture can reduce effectiveness;
- herbicide failure can result from the chemical being applied at the wrong time or because it may be too wet.

Annual grass weed control:

- benefin - inexpensive; can be used more than once a season; can be used combined with fertilizer;
- benefin and trifluralin - don't need second application; not without risk as misapplication on high side can injure turf;
- DCPA [Dacthal] - highly efficacious; decreased use with turf; does have ability to control crabgrass; has set the standard; causes thinning in fine fescue;
- pendamethalin - very efficacious;
- siduron [Tupersan]- expensive; unique niche to control annual grasses and not cool season grasses; eliminates grass weeds from seed beds; only chemical that does not have adverse effects on cool season germination and seedlings; effective in hydroseeding and in reestablishing construction sites in summer;
- dithyopyr [Dimension] - good efficacy at low rates; trend for future; good post emergent activity; in 1992 this well be major player in pre-emergence weed control;
- Barricade - good at low rates; flexible formulation;
- Bensulide - sales down; important role for certain purpose; most turf friendly product we have, even on bent as pre-emergent; have to use a lot; don't use more than once in calendar year; causes some rerooting problems.

Pre-emergent considerations:

- timing
- herbicide activation
- photodegradation
- herbicide longevity
- uniform application
- overseeding - check label information

Post-emergents used if pre-emergent failed, or because of timing restraints, or unknown site history.

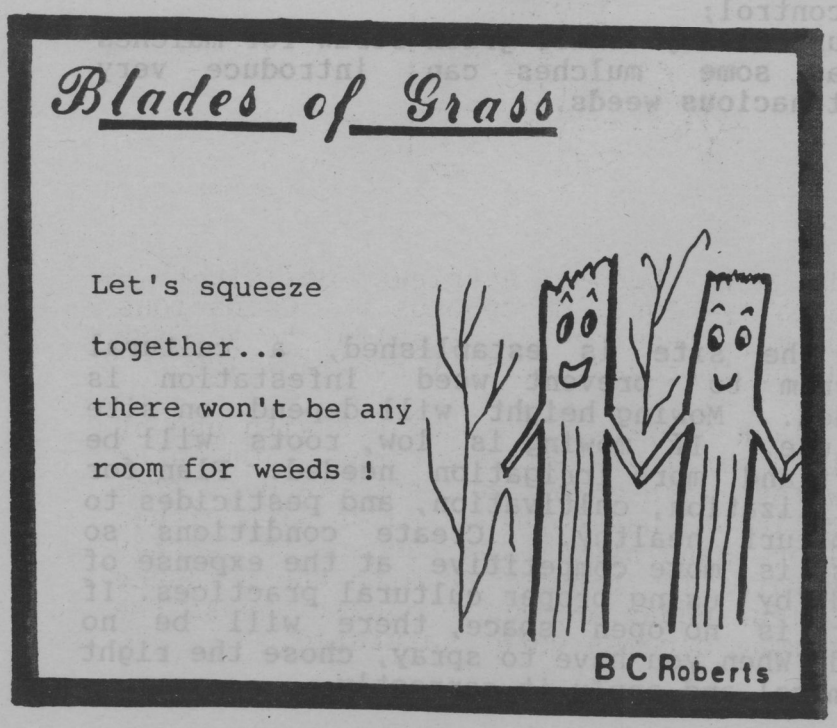
Post-emergent control concepts:

- stage of growth;
- application technique;
- environmental effects on susceptibility of crabgrass to chemicals.

Post-emergents:

- methanearsonates - one application rarely does the job; contact material; cool season grass may be injured if temperature is high at application; DSMA; MSMA; CMA;
- fenoxaprop [Acclaim] - Kentucky bluegrass sensitive especially early; don't mix with urea fertilizer; don't apply beyond 4 tiller stage; don't mow for 36 hours; don't mix with broadleaf herbicide, etc.

Pre-post advantage - single application; reductions in application rates; widens application window.



BLACK LAYER of Putting Greens

by Dr J Vargas

Michigan State University

Of all golf course putting green conditions to be investigated during the past ten years, none has generated more interest or concern for curative measures than the "black layer". Dr Joe Vargas at Michigan State University is an authority in this area and his research results and conclusions are well worthy of note. Consider the following points.

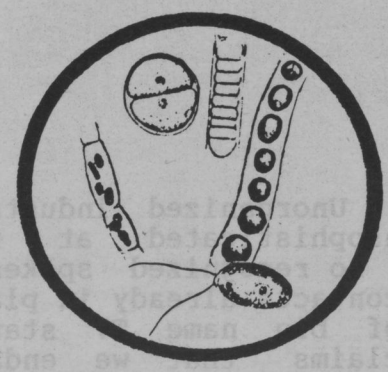
- We need to know more about the practice of sand topdressing of golf greens. Light, frequent applications should not result in the creation of a perched water table or localized dry spots that may require use of wetting agents or nematode problems.

- Natural soil supports good populations of a wide variety of organisms; often sands do not. Sand cultures allow weak pathogens to become stronger. These have been observed, particularly on Toronto creeping bentgrass. A bacterial wilt has been found to plug conductive tissue under some conditions.

- Sands may become nutrient deficient - especially for phosphorus. Calcarious sands may require use of sulfur to acidify some for improved nutrient availability.

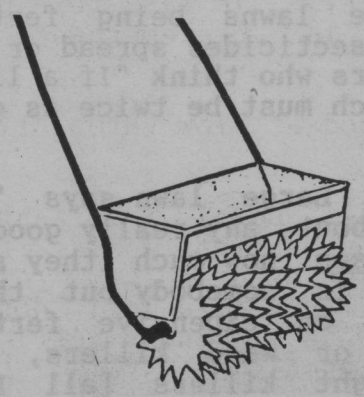
- The black layer is associated with use of sulfur, particularly dry forms. Sulfates in water wash down into the sand. The black layer has nothing to do with either soil or sand as it may occur in either substrate. It has to do with the presence of sulfur under anaerobic conditions as the root zone becomes water saturated.

- Algae use a by-product of sulfur to stimulate their development. Control of algae is helped by getting rid of sulfur.



- Sulfur becomes an oxygen sink. That is, oxygen is tied up in the oxidation of sulfur. Where there is limited oxygen, anaerobic conditions develop. This condition is enhanced by excessive irrigation, heavy rains, traffic that compacts the soil and the presence of sulfur. One inch of rain can take all the oxygen out for a 24 hour period. Sulfur may come from supplemental application, acid rain, irrigation water and overuse of sulfur-coated urea.

- What management practices can help prevent the black layer:
  - aerification;
  - light irrigation;
  - use of nitrate fertilizer - 1/4 to 1/3 of a pound of nitrogen per 1000 square feet per application because of high salt index;
  - avoid applications of sulfur.



A Invitational Talk before the Annual Meeting
American Sod Producers Association
San Antonio, Texas, January 24,1991

Why Environmental Agitators Attack The Lawn Industry

by Dr Joseph Howland

University of Nevada

Why us !

1. So Easy ! Unorganized industry; small companies; unsophisticated at responding effectively - no recognized spokesman with strong media contacts already in place. News media aware of big name TV stars making sensational claims that we endanger the health of children and make front page stories and on the 6 o'clock TV news. TV Commentators know they can rebuild shaky TV ratings by blasting us. We're so easy to attack. Safely ! We are sitting ducks waiting to be shot.

2. So Visible ! Lawns are everywhere, especially showy in elitist areas of every community; everyone is aware [and envious] of greenest, brightest lawns in town. Think how many lawn care and mowing crews are everywhere every day in suburbia. It's a rare house that has no front yard lawn. People visiting from Europe comment on it. They are amazed to find that the real estate salesmen in America have managed to get almost every community zoned to require front yard setbacks of 20-40 feet - "It's so much easier to sell houses on park-like streets". Our product - lawn - is so VERY visible !

3. So Vulnerable ! Easy to claim, convincingly, that the lawn is the LARGEST USER of city water; people are aware of lawn sprinklers left running "uncontrolled", flooding the street, runoff wasted water. And, people see lawns being fertilized, regularly, and insecticides spread or sprayed - often by amateurs who think "If a little is good, twice as much must be twice as good".

4. So Elitist ! Large lawn says "RICH !" And people say about any really good lawn - "But you should see how much they spend on that lawn; there is somebody out there all the time putting on expensive fertilizers [chemicals !] - or weed killers, or bug killers or blight killers [all POWERFUL chemicals]".

5. So Wasteful ! True. Many people don't bother to shut sprinklers off during rains ! Or, "There's always a river of water flowing down into the gutter at the 'Smith' house lawn !" Or, "Why should I worry about trying to save water, taking shorter showers, etc, when people all around here use more water per week to pamper their lawns than I use indoors in a month".

6. So Polluting ! "Heavily sprayed with POWERFUL CHEMICALS - repeated every month or so - nitrogen and phosphorus fertilizers, plus bug killers and weed killers as deadly as the Agent Orange so widely used in Vietnam." That's always the first claim about us by the Hollywood Crowd when it rants and raves on TV. Unfortunately, there has been over-use of pesticides and fertilizers by careless applicators [not all of them the homeowner].

Rule # 1: Every sod grower must practice sound, safe use of these products, practice good ecology - and insist that everyone on the payroll understand why this is critical: jobs are on the line !

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7. So Risky to Kids and Pets ! "Pesticide killer chemicals remain on the grass, poison kids and pests that play on a sprayed lawn." That's the claim, a claim that every Mother buys instantly, unwilling to wait to hear the truth. Remember how Mothers across America stopped their kids from eating apples when CBS and the Hollywood Crowd called them "Kid Killers" ?

8. So Costly ! "Wasteful way to spend money - people should not be allowed to spend their money on lawn care when there are so many homeless in need of that money being wasted" - the usual complaint of liberals; they do not belive democracy is good for people because of its freedom to spend your money as you see fit. They want laws "to protect people from their own stupidity in wanting what we know is not good for them", the opinion of those who like the power to decide for everyone.

FOUR KINDS OF ENVIRONMENTALISTS TODAY:

1. Academic Research Environmentalists - dedicated, disciplined, very wary of agitators because they disregard the truth [always much less glamorous than wreckless wild charges].

2. Political Agitators, some of the best professional protesters, plus amateurs [including the Hollywood and TV Crowd] see "pollution" as the quick route to personal publicity as they move from one TV "cause" to the next as their claims for the first prove false.

3. Confused Voters, wary because "there must be something to it !" if the government allows TV to claim it so. "BIG GREEN" and the "New York Initiative" almost passed last November: the voter wants environmental protection but doesn't know what it involves or what it costs in extra taxes. Meantime, the voter says: "Let's stop polluters whoever they turn out to be". The Hollywood Crowd continues to remind the public that WE are the bad guys.

4. Good Farmers. Farming sensibly, and always with concern for the land. No sod farmer stays in business long if he destroys the land. Nor does he waste money on excess fertilizing or careless use of costly pesticides: it's self preservation to be frugal.

ONLY FOUR CHOICES OPEN TO THE SOD INDUSTRY

1. Do Nothing; hope voter concern for environmental laws will peter out, or that unwillingness to finance huge taxes for BIG GREEN, etc in November elections in California, New York State, etc will hold down the most damaging demands of the Hollywood Ecology Crowd.

Could happen. Would be pleasant end to the nightmare. But realistic ? Hardly.

2. Create Aggressive Positive PR Effort stressing values of lawns to families - dust control; get the kids out of the mud; provide cushioned home outdoor play space in the fresh air; supply fresh oxygen every day while at the same time soaking up the excess carbon dioxide now supposedly building up in the atmosphere; plus natural air conditioner cooling the air substantially.

Yes, PR costs money. But can the Green Industry afford to let the Hollywood Crowd put us out of business ? ASPA needs a national task force to help keep false claims off the national TV networks by being there first always with the truth.

3. Train Green Industry Members how to become effective; highly visible local experts are always ready to provide the media, especially local TV news directors, with exciting news photo stories about various roles that turfgrass plays in the local community.

Yes, easiest for people comfortable with public speaking. But, anyone can feed the interesting truth to the media; all that it takes is establishing that they know who you are and that they can always count on you for a statement and interesting news notes.

Again, yes, it's work. But, do you want to survive ? It's your choice.

4. Beat the Hollywood Ecology Crowd at its own game. Keep close touch with the local legislature - don't let any laws or regulations slip through unnoticed. Get to know the key supporters of the sod industry in your state.

5. If you aren't already on familiar terms now with any key legislator at the State House in your state, phone to ask the Chairman of the house Agricultural Committee for the opportunity to come in to present your problem directly to him.

Ask to be kept posted on any bills likely to affect your sod business. Ask to be allowed to speak at all Committee Hearings on any subject that might be threatening to your future.

Stress that you are a FARMER, operating a highly specialized farm that employs trained agricultural graduates from your state agricultural college. Point out that sod growing creates far more income [and taxes] per acre than any other farm crop. Point out too that your product, lawn grass, helps improve the environment, provides safe outdoor fresh air play space for the whole family. And, stress that you are active in supporting legislators throughout the state, that you are savvy in politics and how the political system works.

LIVE OR DIE ? IT'S UP TO YOU !

Warm Season Grass Weed Control

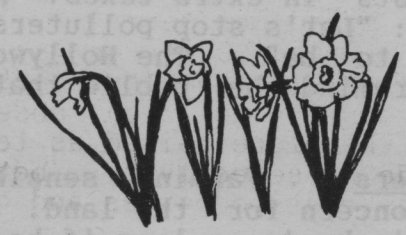
HERBICIDE EFFECTS ON BERMUDAGRASS LAWN RECOVERY AND CRABGRASS CONTROL DURING SPRING ROOT DECLINE IN THE NORTH-SOUTH TRANSITION ZONE

L M Callahan and J W High
Journal American Society Horticultural Science
Volume 115 Number 4
Pages 597-601
1990

Large crabgrass continues to be a serious weed in the transition zone [about latitude 35 degrees North]. Information is available from northern regions and from the deep southern part of the United States, where temperatures are more consistent, on herbicides giving effective crabgrass control. Sharply fluctuating temperatures, distinctive of the transition zone, make it difficult for either cool or warm-season turfgrasses to grow and compete optimally with crabgrass.

Warm-season turfgrasses, in particular, have difficulty recovering during the spring green-up period in the transition zone. Part of the problem can be attributed to spring root die-back or spring root decline. With the advent of spring green-up, roots of warm-season turfgrasses may rapidly senesce and die. New root initiation occurs about one day thereafter from crowns and from nodes of lateral stems. New roots reach 30 centimeters [12 inches] in about 20 days. During spring root growth, warm-season turfgrasses become especially susceptible to root-inhibiting preemergence herbicides commonly applied for annual grass control, causing herbicidal root pruning, often followed by loss of the turfgrass stand.

Research at The University of Tennessee was conducted to determine if relationships exist between field environment and dates of preemergence herbicide applications for large crabgrass control, the spring root decline phenomenon and herbicide phytotoxicity to the bermudagrass. Herbicide treatments in late March generally controlled large crabgrass, reduced total weed competition, and appeared to aid bermudagrass spring growth following winter dormancy. Herbicide injury to Tifgreen bermudagrass roots during spring root decline does occur under practical field conditions and was more severe when bermudagrass spring green-up occurred closer to the herbicide treatment date, as in 1982. Bermudagrass stand density was significantly reduced with the high level of siduron in 1980 and 1981 and with both levels of oxadiazon and siduron in 1982. Bensulide and oxadiazon, at both levels gave 92 to 100 percent crabgrass control during all three treatment years. The high levels of benefin and DCPA in 1980, both levels of benefin and the high level of DCPA in 1981 and both levels of DCPA and the high level of benefin in 1982 gave crabgrass control in excess of 95 percent.



HERBICIDE EFFECTS ON TENSILE STRENGTH AND ROOTING OF CENTIPEDEGRASS SOD

D L Turner, S S Sharpe and R Dickens
HortScience
Volume 25 Number 5
Pages 541-544
1990

In commercial sod production, a weed-free uniform stand of sod is desired. The value and tensile strength of the sod are reduced by weed infestation. Herbicides are generally used for weed control in sod production. The effect of many herbicides on rooting and tensile strength of sod is unknown.

Research has been conducted at The University of Alabama to determine the effects of selected herbicides on tensile strength and rooting ability of common centipedegrass sod. In 1986, sod tensile strength was not affected, but in 1987, the tensile strength of the immature turf was reduced at 8 weeks after treatment by bensulide and imazapyr. Rooting was suppressed most by bensulide, imazapyr, napropamide and sulfometuron at most rates and dates tested. By 8 weeks after treatment, root length, root number and tensile strength of herbicide-treated centipedegrass sod did not differ from that of the untreated sod except for those plots treated with bensulide or imazapyr. Herbicides evaluated were atrazine, atrazine plus tridiphane, bensulide, DCPA, DPX-6316, imazapyr, imazaquin, napropamide, oxadiazon, pendimethalin, sethoxydim, simazine and sulfometuron.

ABSORPTION, TRANSLOCATION, AND METABOLISM OF SETHOXYDIM IN CENTIPEDEGRASS AND GOOSEGRASS

L B McCarty, J M Higgins, F T Corbin and T Whitwell
Journal American Society Horticultural Science
Volume 115 Number 4
Pages 605-607
1990

Sethoxydim is a foliarly applied, systemic herbicide that selectively controls monocotyledonous weed species. Tolerance to sethoxydim has been reported for some monocotyledonous turf species. Red fescue and centipedegrass are tolerant to sethoxydim at amounts as high as 1.12 kilogram per hectare [1.0 pound per acre]. Goosegrass control greater than 90 percent by sethoxydim applied at 0.44 kilogram per hectare [0.39 pound per acre] has been observed. A question is therefore raised as to the basis of herbicide selectivity between the monocotyledons centipedegrass and goosegrass.

Research at Clemson University has been conducted to examine absorption, translocation and metabolism of 14 carbon-sethoxydim in a sethoxydim-tolerant turfgrass species [centipedegrass] and a sethoxydim-sensitive weed species [goosegrass]. The distribution of 14 carbon in treated leaves indicated that similar amounts [about 3 percent] were found in the epicuticular wax fraction of both species after 6 hours. After 2 hours, 16 percent of the applied 14 carbon-sethoxydim was absorbed in the treated leaf by centipedegrass, but only 2 percent was absorbed by goosegrass. After 2 hours, centipedegrass also readily translocated greater amounts of 14 carbon than goosegrass [4.3 percent vs 0.4 percent]. Six hours after treatment, however, no differences were found in amounts absorbed by the treated leaf and translocated to apical and basal leaves. Because sethoxydim-tolerant centipedegrass absorbed and translocated similar amounts of 14 carbon compared to the sethoxydim-sensitive goosegrass, these two mechanisms do not appear to be a means of tolerance.

The major difference found between the two species was in the metabolism of sethoxydim. After 6 hours, 81 to 98 percent of the 14 carbon in goosegrass extracts remained as 14 carbon-sethoxydim. In contrast, only 1 percent of the 14 carbon found in apical leaves, basal leaves and roots of centipedegrass was identified as 14 carbon-sethoxydim. These data indicate that differences in tolerance to sethoxydim between these two species were based on metabolism.

FOLIAR-APPLIED IRON ENHANCES BERMUDAGRASS TOLERANCE TO HERBICIDES

B J Johnson, R N Carrow and T R Murphy
Journal American Society Horticultural Science
Volume 115 Number 3
Pages 422-426
1990

Postemergence herbicides are necessary to control emerged weeds in bermudagrass turf. MSMA has been used for control of large crabgrass, MSMA plus metribuzin has been used on goosegrass, imazaquin or MSMA plus imazaquin on purple nutsedge and 2,4-D plus mecoprop plus dicamba for various broadleaved weeds. Although these herbicides are labeled for bermudagrass, various degrees of turf injury usually occur within a few days following herbicide application. Injury may be expressed as loss of shoot density and/or discoloration.

Since postemergence herbicides temporarily discolor bermudagrass, and iron improves greenness, experiments at The University of Georgia have been conducted of Tifway bermudagrass to determine if iron applied with postemergence herbicides would prevent or reduce turf injury. Iron decreased injury and improved quality and color of Tifway bermudagrass in conjunction with herbicide treatment. Turf injury was less for 4 to 18 days after the initial MSMA application when iron was added. Injury was also less from sequential iron treatment with MSMA plus metribuzin [up to 4 days] and MSMA plus imazaquin [from 4 to 10 days] compared to the respective herbicides applied alone. There was no difference in turf injury from iron when imazaquin at 1.3 kilogram per hectare [1.2 pound per acre] was applied as a single treatment. However, turf treated with iron and two applications of imazaquin [9 to 10 day interval] recovered from herbicide injury faster than when treated only with the herbicide.

Iron did not prevent immediate 2,4-D plus mecoprop plus dicamba injury to the bermudagrass but did hasten turf recovery from injury at 26 days after treatment. With a few exceptions, Tifway bermudagrass quality was higher and color improved when iron was added. However, injury expressed as loss of shoot density was not affected by iron and only injury expressed as color loss was improved by iron.

Cool Season Grass Weed Control

COMPARISON OF THREE HERBICIDES FOR SELECTIVE TALL FESCUE CONTROL IN KENTUCKY BLUEGRASS

P H Dernoeden
Agronomy Journal
Volume 82 Number 2
Pages 278-282
1990

Tall fescue is generally considered a weed when growing as clumps in Kentucky bluegrass lawns or sod fields. Isolated clumps can be removed by digging or by spot application of a nonselective herbicide. However, these approaches are impractical if many tall fescue plants are present. Research at The University of Maryland has been conducted to compare the relative safety of chlorsulfuron, diclofop and metsulfuron to Kentucky bluegrass and to determine the amounts of herbicide necessary for selective tall fescue control in Kentucky bluegrass.

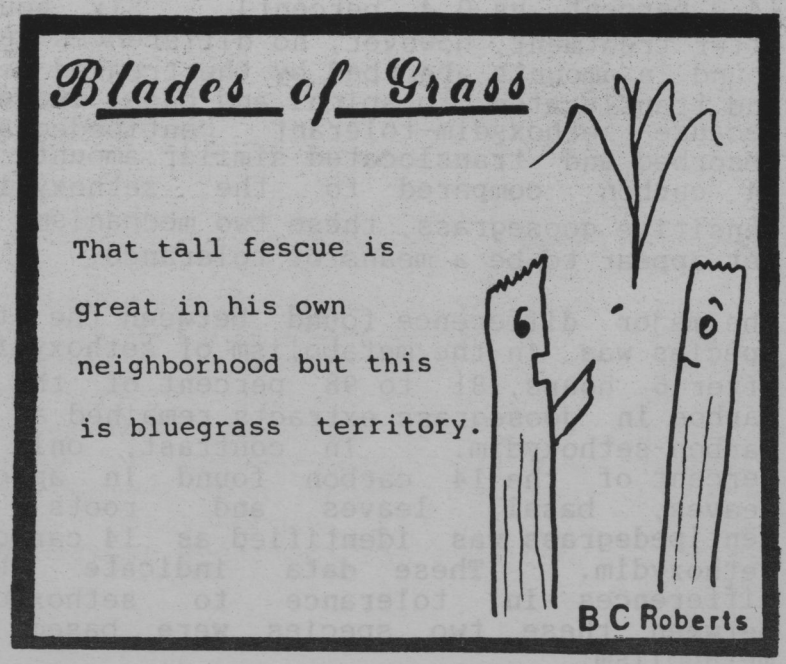
Two applications of diclofop reduced bluegrasss cover and quality for extensive periods and generally provided inferior tall fescue control compared to chlorsulfuron or metsulfuron. Chlorsulfuron applied at 0.07 plus 0.07 or 0.14 plus 0.14 kilogram per hectare [0.06 plus 0.06 or 0.12 plus 0.12 pound per acre] did not reduce bluegrass cover. Single applications of metsulfuron at 0.07 or 0.14 kilogram per hectare [0.06 or 0.12 pound per acre] did not injure Kenblue Kentucky bluegrass; however, both rates injured a Kentucky bluegrass blend, and turf treated twice at the high rate required one year for recovery. Single applications of chlorsulfuron at 0.14 or 0.28 kilogram per hectare [0.12 or 0.24 pound per acre] or metsulfuron at 0.07 or 0.14 kilogram per hectare [0.06 or 0.12 pound per acre] provided over 90 percent control of tall fescue at the Kenblue site. Split applications of 0.07 plus 0.07 or 0.14 plus 0.14 kilogram per hectare [0.06 plus 0.06 or 0.12 plus 0.12 pound per acre] of either chlorsulfuron or metsulfuron provided over 90 percent control of tall fescue at the bluegrass blend site. When compared to untreated turf, chlorsulfuron or split applications of metsulfuron applied in the fall resulted in more bluegrass injury the following summer when turf was subjected to drought stress.

CONTROL OF TALL FESCUE IN KENTUCKY BLUEGRASS TURF WITH SELECTIVE HERBICIDES

M Goatley, A J Powell, W W Witt and M Barrett
HortScience
Volume 25 Number 4
Pages 449-451
1990

Tall fescue is a serious weed contaminant of Kentucky bluegrass turf. The rapid elongation of tall fescue leaves and its clumpy, upright growth habit disrupts the uniformity and overall aesthetic quality of Kentucky bluegrass. Selective tall fescue control would eliminate total turf renovation since Kentucky bluegrass rhizomes could encroach into areas vacated by the tall fescue. Until recently, chemicals for selective control of tall fescue in Kentucky bluegrass were unavailable.

Research at The University of Kentucky has been conducted to determine the appropriate herbicide concentrations and the timing of single and repeated applications of chlorsulfuron, diclofop or sulfometuron to minimize Kentucky bluegrass phytotoxicity and still reduce the tall fescue population. Fall and spring treatments with chlorsulfuron and diclofop provided significant tall fescue control, with slight to moderate initial Kentucky bluegrass phytotoxicity. Fall and spring applications of sulfometuron resulted in excellent tall fescue control, but initial Kentucky bluegrass damage was severe and would be unacceptable for high maintenance turf.



INSECT CONTROL

ADDITIONAL HOST PLANTS OF FOUR SPECIES OF BILLBUG FOUND ON NEW JERSEY TURFGRASSES

J M Johnson-Cicalese and C R Funk
Journal American Society Horticulture Science
Volume 115 Number 4
Pages 608-611
1990

Billbugs are ranked among the most serious turfgrass insect pests. In the northeastern United States, the bluegrass billbug has been considered the only billbug species that damages turfgrass. However, recent pitfall trap collections made in New Jersey turfs found four species of billbug in almost equal abundance: bluegrass billbug, hunting billbug, uneven billbug and little billbug. This finding necessitated a re-examination of billbugs in New Jersey, including work on their biology, the effects of Acremonium endophytes on the four species and an evaluation of the host plant ranges of the four billbugs.

Research at Rutgers University has involved a collection of 4803 adult billgugs from pure stands of various turfgrasses. All four billbug species were found on Kentucky bluegrass, tall fescue and perennial ryegrass. The hunting billbug, bluegrass billbug and little billbug were found on Chewings fescue.

Since the presence of larvae, pupae or teneral adults more accurately indicates the host status of a grass species, immature billbugs were collected from plugs of the various grass species and reared to adults for identification. All four species were reared from immature billbugs found in Kentucky bluegrass turf. Immature hunting billbug, uneven billbug and little billbug were found in tall fescue; hunting billbug and little billbug in perennial ryegrass; and uneven billbug in strong creeping red fescue.

A laboratory experiment was also conducted in which billbug adults were confined in petri dishes with either Kentucky bluegrass, perennial ryegrass, tall fescue or bermudagrass. Only minor differences were found between the four grasses in billbug survival, number of eggs laid and amount of feeding. In general, bermudagrass was the least favored host and the other grasses were equally adequate hosts.

EFFECT OF ACREMONIUM ENDOPHYTES ON FOUR SPECIES OF BILLBUG FOUND ON NEW JERSEY TURFGRASSES

J M Johnson-Cicalese and R H White
Journal American Society Horticultural Science
Volume 115 Number 4
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1990

The recent discovery of endophyte-enhanced turf performance has caused considerable excitement in the turfgrass industry. Enhanced stress tolerance and insect resistance are associated with the presence of Acremonium endophytes. Since the initial findings of endophyte-enhanced resistance to Argentine stem weevel, a serious pasture pest in New Zealand, 11 additional insects have been reported to be affected by endophytes.

Among these insects are the billbugs which are major turfgrass pests. Endophyte-enhanced billbug resistance was first observed in two perennial ryegrass cultivar evaluation trials at Adelphia, New Jersey; grasses with high endophyte had little damage and few billbug larvae, while grasses free of endophyte were generally very susceptible.

Research at Rutgers University has had the objectives of examining the effects of endophytes on four billbug species and to determine if, in addition to endophyte-infected perennial ryegrass, tall fescue also shows enhanced resistance to billbugs.

Billbug adults feeding on potted tall fescue in the laboratory showed significantly greater mortality than billbugs feeding on endophyte-free tall fescue. Little difference was observed in amount of feeding. In petri dish performance tests, billbug adults were given a choice and, again, no significant difference was observed in the amount of feeding on endophyte-free versus endophyte-infected tall fescue tillers. In a third experiment, billbug adults were placed in petri dishes with either tall fescue with or without Acremonium coenophialum or perennial ryegrass with or without Acremonium lolii. Only small differences were seen in number of eggs laid and amount of feeding. Mortality of all four billbug species, however, was greater on both grasses when endophyte-infected.

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