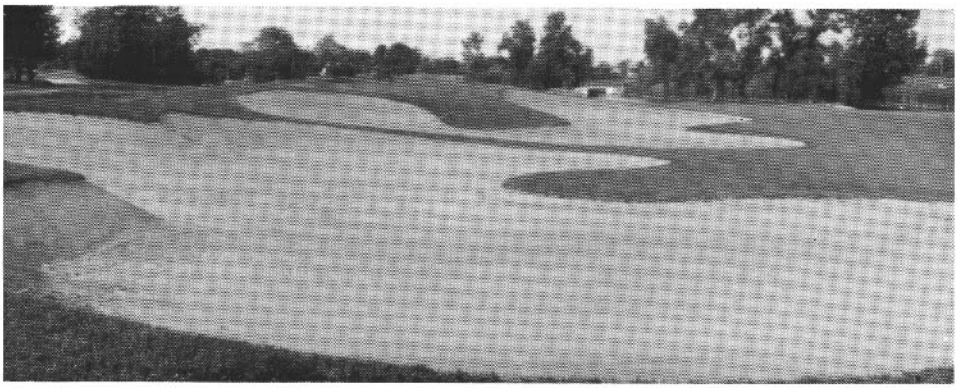


developed through unique bunkering design and construction. Proper bunker design will meet criteria of playability, fairness, flexibility, aesthetics, and practicality.

When modernizing the bunker locations on an existing golf course, each golf hole needs to be studied and compared. Similar to new course construction, each hole is designed with variety, but has some unique features that unifies the total golf course.

In any and all bunker design and construction, whether it is new or remodeling work, the ideal solution is taking natural design concepts that were suggested over 200 years ago, and recreating them today for everyone's enjoyment.

"There is nothing so important as the book can be."

Maxwell Perkins

THE SUPERINTENDENT'S LIBRARY: The Top Shelf

By Mike Semler

Editor's Note: The credibility of any author who is writing on a particular subject springs from his interest and expertise on that subject. Couple those things with the proper kind of research and review and you will have a written piece like each of those Mike Semler is presenting in the next three issues of THE GRASSROOTS. His interest in the written word is one I observed in the time Mike was on my staff, and it has continued in subsequent years. Bookstores and libraries are among his favorite places, and his own personal turf library reflects his view and gives credence to his three-part series. Additionally, he has sought the advice and suggestions of professors at the UW—Madison involved in plant and soil sciences, as well as input from many of his colleagues.

Mike and I have played the book-choice game over the years. I knew he was the right person for this task from the answer he gave to my question, "If you were stranded on a desert island in the middle of the ocean and could have only one book, which one would you choose?" Semler's reply was, "A book entitled — HOW TO BUILD A RAFT, naturally!"

Enjoy these definitive reviews and recommendations. "There's something special about people who are interested in the printed word," Nathan Pine once said. "They are a species all their own — learned, kind, knowledgeable and human." Who could disagree?

MSM

The amount of information pertaining to golf course management that a Superintendent must have at his disposal at any given moment can be insurmountable. Since we must have an understanding of many different areas dealing with turfgrass management, we could be lost without some sort of help. One of the best means of having information at the Superintendent's fingertips is through his reference library. The need for one is undebatable!

Many of you probably have a library already, or have one started in some type of fashion, or maybe not! What I would like to do in the next three articles is give some ideas on what books I feel are worthy of our libraries. In this article I will give the books I feel every one of us should have. This priority, or top shelf, will have some of the best, in-depth texts which I consider invaluable to us as reference materials. The second article will deal with some worthy additions to the top shelf, if they can be afforded or are desired. The third will give some welcome additions, but on a lighter note.

Obviously, this list could never include all possible selections, nor could it be totally encompassing. Owning and purchasing a book is quite personal and will depend on what you like and what information you are looking for. Everybody has their favorites, and you have my apologies if your favorite isn't on the list. However, if you are in the market for a book to start your library or are looking for another good reference source, maybe we can get you started on your search with these ideas.

One of the first and most important books to be included in our library would be a text on soils. One of the better ones in print today is:

An Introduction to Soils and Plant Growth
Authors: Donahue, Miller and Shickluna
5th edition, 1983. Cost — $35.00

An excellent general text encompassing all of the important aspects of soil science, including; morphology, classification, fertility, weathering, management and more. A must-have book for all of us since our job requires that we deal with and properly manage the soil.

Dr. James Beard has been writing books on turf management for many years. His newest one:

Turf Management for Golf Courses
Author: Dr. James B. Beard
1982. Cost — $45.00

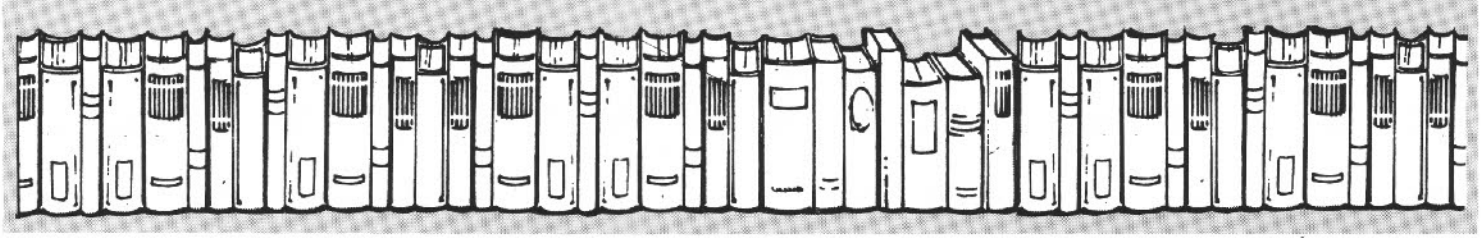
is as complete a book as you will find on Golf Course Management. It covers all topics including: design principles, disease identification and control, herbicides, insecticides, seeding guides, turfgrass species identification, nutrients and deficiency symptoms. . .the list goes on and on. Another must because of it's intent to cover all aspects of golf course management, something not found in many texts because of the specialized nature of our job.

Another good turf management book:

Turfgrass: Science and Culture
Author: Dr. James B. Beard
1972. Cost — $31.00

is designed as a guide in the proper selection and cultural practices of turfgrass for specific uses. It emphasizes principles and methods of operation in turfgrass cultures. It is worthy of the top shelf because of its intent to cover all turf management practices, including golf turf.

In general, disease and insects can make or break a season. Control must begin with identification



because without proper identification, control measures can be expensive and/or ineffective. Therefore a necessity for any library is:

The Compendium for Turfgrass Diseases
By the American Phytopathological Society
Author: Richard Smiley
1986. Cost — $20.00

which gives up-to-date names, morphology, identifying characteristics and some good pictures. It also includes cultural and chemical control measures and environmental factors influencing the diseases. One of the best, up-to-date books dedicated solely to turfgrass diseases.

Along with proper disease identification is proper insect identification. The causal organism must be known before control measures can be instituted correctly and economically. For turf insect identification:

Destructive Insects of Turf
Author: Dr. Harry Niemczyk
1983. Cost — $15.00

is a good text with excellent color photos of each pest, resulting damage and identifying characteristics. Also included are the life cycles and timing schedules for chemical application.

A good general insect book which covers almost all plant materials and the insects which affect them is:

The Gardeners Bug Book
Author: Cynthia Westcott
1973. Cost — $20.00

A funny name, but a good host index which lists the host and the known insect pests which attack them. This index makes the book a worthwhile addition. Some good pictures and control measures. It is generally a weak turf insect book, but is very strong in other areas, including trees, shrubs, flowers, fruit and vegetables.

In addition to managing turfgrass, we are becoming more aware of proper management of our trees and shrubs. They are an integral part of the game itself and proper selection and care is essential. A comprehensive book:

The Manual of Woody Landscape Plants
Author: Michael Dirr
1983. Cost — $25.00

covers extensive identifying characteristics, proper site location and cultural management, growth habit, diseases and insects, propagation, cultivars and much more. It has a limited number of useful pictures. However, if you want to get information on a particular species of woody ornamental, chances are this book has it!

Many of us cannot afford to have an arborist on our staff and therefore we must be able to logically care for plant materials ourself. To help in this care, the book:

Arboriculture: The Care of Trees, Shrubs and Vines in the Landscape
Author: Richard Harris
1983. Cost — $40.00

is better than most. It provides a comprehensive coverage of: site planning and preparation, fertilizer and water requirements, pruning guidelines, diseases, insects, chemical and cultural control, and more. This is the how-to book in arboriculture for the do-it-yourself Superintendent.

A manual put out by the University of Wisconsin Extension Service:

The Urban Phytonarian Handbook
Editor: Christen D. Merck
Published by: The Agricultural Bulletin
Madison, WI
1983. Cost — $30.00

is designed to help evaluate and treat all types of unhealthy plants. Disease, insect, nutritional, environmental, diagnostic and remedy information make up the bulk of the material. The topics are far ranging, but do include ornamentals, turf, flowers and more. It is an extensive guide to many of the pests found in Wisconsin and its agricultural community.

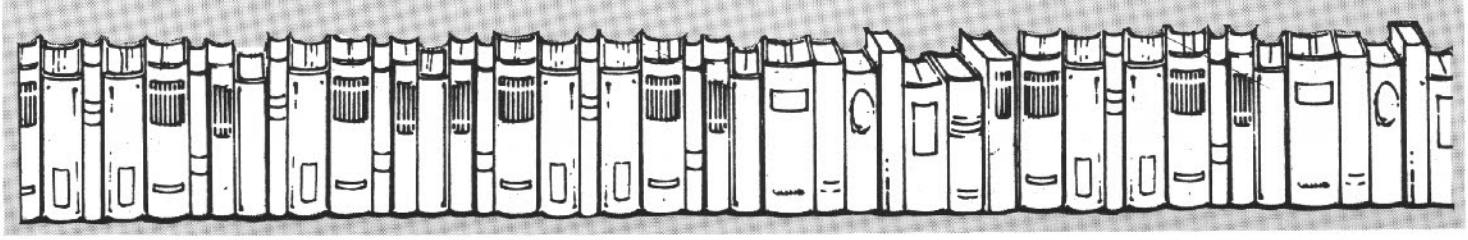
Since we manage golf courses, our management practices directly affect the game and its quality. It is imperative, then, that we have an understanding of the rules. Therefore, a book on the rules of golf is also essential. The USGA's concise book on *"The Rules of Golf"* is quite sufficient for our purpose and costs about one dollar.

Another necessary addition, one which I think is unquestionable in its merits and priceless to anyone, is a dictionary. It doesn't matter about cost or size, but rather something you are comfortable with. The ability to spell and communicate correctly, and use proper words is essential to anyone, and we are no exception to that rule.

One of the last items to be included on the top shelf of our library is a subscription to our National magazine, Golf Course Management. At a cost of 30 dollars per year, it is invaluable for finding out what is going on in the industry and keeping in touch with our peers. Also included in this would be subscriptions to: Weeds, Trees and Turf, and Grounds Maintenance. They are supplied upon request and free of charge. Once again, keeping up with the industry is essential and this is just one more way.

The amount of printed material available to us concerning golf course management is formidable. To try and review all of it without the possibility of overlooking some good books would be impossible. However, in these articles I hope to enlighten you to some excellent possible additions to your library.

Author's Note: My thanks to: Randy Smith, Dr. James Love, Dr. Phil Pellitteri, Dr. Dan Mahr, Dr. Ed Hasselkus, Dr. Gayle Worf, Dr. Robert Newman and Monroe Miller for their help and suggestions.



PROPER PRUNING TECHNIQUES HELP KEEP PLANTS HEALTHY

By Larry Lennert

The grass is always greener on the other side, and sometimes, the trees and shrubs on the other side look a lot nicer too.

You can help improve the health and attractiveness of the trees and shrubs on your course by timely and proper pruning.

There are many different reasons to prune. Control of plant size, increasing vigor and density, increasing flower and fruit production, and formalizing plants such as hedges can all be achieved with proper pruning.

However, one of the most important reasons to prune is often overlooked. Physical flaws of plants should be corrected as soon as possible. Try to remove all dead and diseased branches. They are unattractive and may allow decay organisms to move into the trunk or main branches. Remove conflicting branches, like double leaders and crossing limbs on trees and shrubs. Crossing branches may rub together and damage the bark, opening pathways for insects and diseases. Remove water sprouts from trees and suckers from the root stocks of grafted plants. They ruin attractive branching patterns and the plant wastes valuable energy to produce this ugly growth.

While there are many different reasons to prune, there is one basic rule of pruning you should always follow. Cut back to a bud, side branch or trunk and never leave a stub. Make your cut about one quarter of an inch above and slanting away from the bud. If you leave a much larger stub, there is a good chance decay will begin and damage the plant. Cutting too close to the bud will cause it to dry out and die.

Although this basic rule of pruning applies to almost all trees and shrubs, there are some special pruning techniques that are used, especially for certain plant types.

The removal of large branches from trees is a three-step process.

First, make an undercut halfway through the branch, several inches from the trunk.

Next, make a cut from top to bottom about two feet from the trunk and drop the branch, removing the major weight.

Finally, make a smooth, flush cut from top to bottom, removing the remainder of the branch.

There is one precaution, however.

Don't cut through the branch collar. The branch "collar" is the enlarged area where the branch attaches to the trunk. Cutting through the branch collar needlessly increases the size of the pruning wound.

In the past, wound dressings were commonly applied to pruning wounds. That has changed.

Tree wound dressings are no longer recommended. Research has shown they are generally ineffective in preventing decay. In fact, heavy applications of wound dressings may actually trap moisture and encourage decay. However, the bare wood of large pruning wounds is often an eye sore and needs to be covered. Use a thin coat of tree paint to cover the wound. This should hide the wound and still allow moisture to escape.

One exception to this non-wound dressing rule is red and black oaks. They are susceptible to oak wilt, a serious disease. The insect that transmits the disease is attracted to the sap that flows from open wounds, so apply a wound dressing to these trees if they are pruned during the growing season.

Renewal pruning is another special technique used for pruning deciduous shrubs (shrubs that lose their leaves each fall). Renewal pruning is the selective removal of the oldest, heaviest canes at the ground line. This technique is used to maintain the size, form and vigor of deciduous shrubs. When you make a cut at the ground line you stimulate buds which develop into new shoots.

Renewal pruning can also be used to rejuvenate old, "leggy" and overgrown shrubs. Remove one third of the oldest, heaviest canes each year for three consecutive years.

Just as important as "why" and "how" to prune, is "when" to prune.

The best time to prune most trees and shrubs is near the end of the dormant season. Pruning wounds heal most quickly in the spring and it's also easier to see what you are doing because the leaves are absent.

There are again, however, a few exceptions.

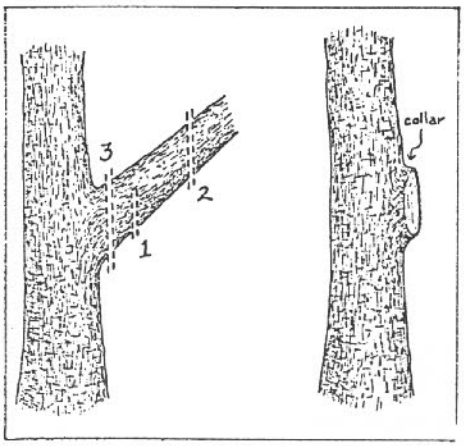
You may want to prune spring flowering shrubs after they bloom so you don't remove any potential flowers. Also, many spring flowering shrubs bloom only on wood from the previous year's growth. Pruning in spring after the bloom gives the plant an entire growing season to produce new wood for next year's bloom.

Most evergreens require little or no pruning but it usually is desirable to limit the size and increase the density of the dwarf mugo pines. Prune these pines in late spring when the new developing buds are in the "candle" stage. Snap off a portion of the candle with your fingers. The buds at the bases of the remaining new needle fasicles will develop into lateral shoots.

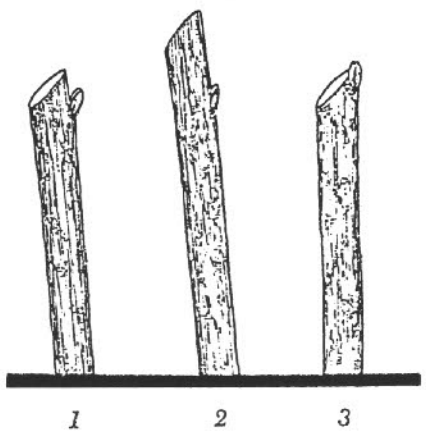
Some trees will bleed sap if they are pruned during the dormant season. Some of these trees include maples, birches and elms. The loss of sap doesn't hurt these trees, but it may be unattractive. You can eliminate this problem by pruning these trees during the growing season.

While there are best times to prune, pruning may be done at any time if necessary.

So remember the old saying, "Prune when the saw is sharp!"



The three step process for removing large branches from trees. 1. Make an undercut halfway through the branch, several inches from the trunk. 2. Make a cut from top to bottom about two feet from the trunk. 3. Make a smooth, flush cut from top to bottom, removing the remainder of the branch. Don't cut through the branch collar.



A good pruning cut and two poor pruning cuts. 1. A good pruning cut is about one quarter of an inch above, and slanting away from the bud. 2. A bad pruning cut leaves a large stub. The stub may decay and spread down the branch. 3. A bad pruning cut too close to the bud. Water evaporates from the cut and the bud may dry out and die.

Editor's Note: It is with pleasure that we introduce another regular feature of THE GRASSROOTS. All of our future issues will have some advice and recommendations concerning "The Other Plants" found on our golf courses. So much of our time, interest and budget are spent on turfgrasses that many of us occasionally neglect the many other landscape plants important to the complete golf course. The author of "The Other Plants" is Larry Lennert. Larry is the Assistant Golf Course Superintendent at North Shore Golf Club in Menasha. He is a 1985 graduate of the University of Wisconsin—Madison and earned degrees in Soil Science (with a specialization in Turf and Grounds Management) and in Horticulture (with a specialization in Ornamental Horticulture). He is particularly qualified to write these columns in a golf course journal because of his interst, knowledge and experience with the very plants this column will look at.

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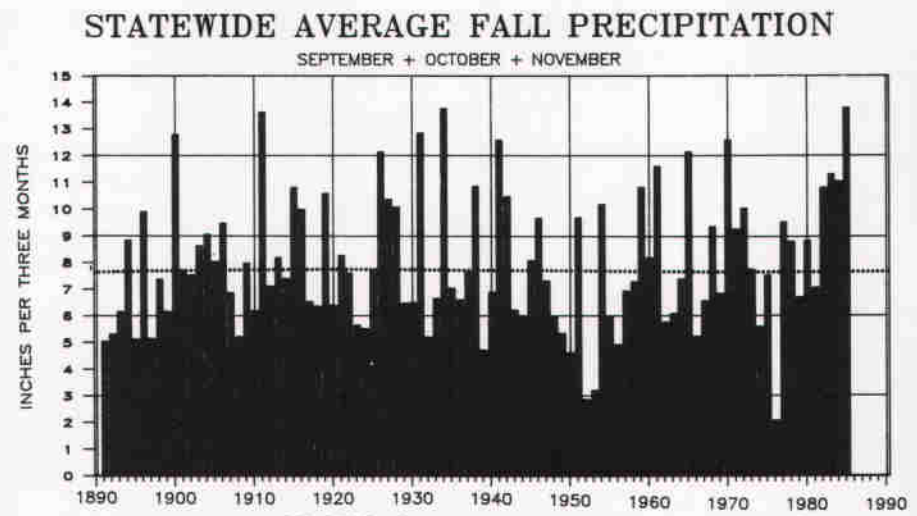
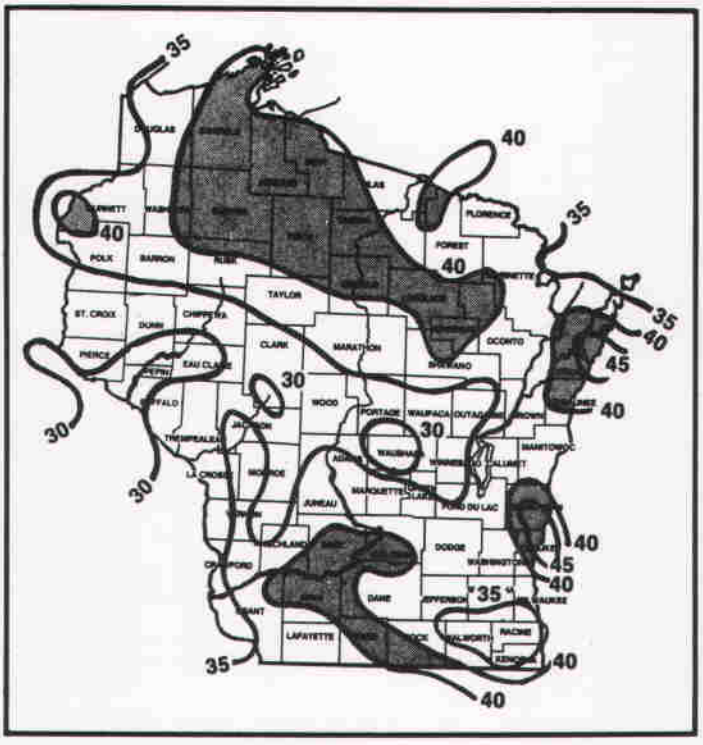
GET YOUR CONSTRUCTION WORK DONE EARLY — THE WEATHER TREND FOR FALL IS WET



An average three-month state rainfall of 13.8 inches gave Wisconsin its wettest autumn season in 95 years.

— Graph from state climatologist Douglas Clark

1985 rainfall



Wisconsin's average statewide precipitation in 1985 was 36.99 inches, much wetter than the statewide average of 31.27 inches (since 1931). The gradient map above shows rainfall ranges for 1985. The total of Lafayette County, for example, was between 35 and 40 inches. The shaded areas show parts of the state with more than 40 inches of rainfall for the year. Western Wisconsin was drier than most of the state, with three pockets where rainfall was 30 inches or less — one centered in Waushara County, a second in Clark County, and a third in Pepin, Buffalo, Eau Claire and Dunn counties. The two wettest pockets in the state, with more than 45 inches of rainfall, were on the Lake Michigan shore — one at Sturgeon Bay in Door County and the second in Ozaukee and Sheboygan counties.

— Map by Douglas Clark

State Climatologist Douglas Clark has reported that last fall was the wettest in Wisconsin in the 95 years official records of statewide rainfall have been kept. Looking back into the record book revealed that the fall of 1985 rainfall total was the largest since 1881, an extraordinary year with fall precipitation approaching 17 inches.

Last fall's statewide average rainfall was 13.8 inches; normal autumn rainfall is 7.67 inches. It was the fourth fall in a row with above normal precipitation. In addition to that, the four-year average rainfall has been increasing the past nine years. This pattern of wet, consecutive autumns is a pattern not seen since the 1880s, according to Clark. It will require some review of past years since the National Weather Service uses 30 year averages to define "normal" precipitation.

The question most Wisconsin Golf Course Superintendents have in mind is, "Are we in for another wet fall this year?" There are two ways to forecast that. One is the probability of this autumn being above normal. The average value is the best guess at the succeeding year. When you look at patterns of changing rainfall from year to year over a long period of time, cycles of greater or less precipitation emerge, and these cycles can be used to make a forecast. Clark believes we may indeed be getting into a seasonal pattern that looks more like the 1880s than anything we've experienced in the 100 years since then. There is danger in using the recent record to predict the future because the atmosphere may be entering a new regime. You may end up extrapolating from a record of "recent" years that doesn't apply to the new pattern.

I have a few construction projects planned for 1986, and the chance for a new pattern in the weather notwithstanding, I think we'll do our best to wrap them up by Labor Day.

.MSM

TURFGRASS INSECTICIDE UPDATES — 1986

By Dr. Daniel L. Mahr
Department of Entomology
University of Wisconsin—Madison

EPA REVIEW OF DIAZINON

The Environmental Protection Agency has initiated a Special Review of the insecticide diazinon (trade names Diazinon, D Z N, Spectracide, etc.). The Special Review was initiated because of large scale mortality of geese on eastern United States golf courses after treatment with diazinon. The bird mortality has been confirmed to have been caused by diazinon. Although the review was initiated because of usage on turfgrass, all usages of the product will be under review.

At this point in time, it appears that at least some usage patterns of diazinon will be affected. A final ruling is expected either late in 1986 or in 1987. It is still legal to use the product in Wisconsin and other states.

Users of diazinon on turfgrass should be certain to apply it by label directions. When making applications for white grubs or other soil insects, make certain to irrigate it into the soil IMMEDIATELY after application.

Some Oftanol Failures Reported in 1985

In some locations in 1985, isofenphos (Oftanol) did not provide adequate control of various white grub species. Mobay has attributed these failures to several possible explanations:

1) improper usage patterns,
2) lower than label rates used,
3) dry weather in some areas, so inadequate rainfall to water material into soil,
4) no irrigation or improper amounts of irrigation applied to water material into soil,
5) rapid decomposition within the soil.

The first four possible explanations are easily understandable and can happen to any product when label instructions are not closely followed. The fifth possibility requires a little additional explanation.

Oftanol is supposed to have one of the longest residual lives of modern turfgrass insecticides. Early studies showed it to be active in the soil and effective for an entire growing season. So, what would be causing rapid decomposition?

In recent years, agricultural chemists and pest control scientists have been studying a natural soil phenomenon called "microbial degradation." In most soils there is a complex community of tiny microorganisms that help recycle soil nutrients. The abundance and species composition varies depending on location, soil type, and other factors. These microorganisms are capable of breaking down various kinds of complex organic molecules. Modern pesticides are man-made organic molecules. Some microorganisms can actually derive nourishment from some types of pesticides, deactivating them in the process.

When such a pesticide is applied to a soil containing degrading microorganisms, these microorganisms suddenly have an abundance of food and their numbers can rapidly increase. With each succeeding application of that same pesticide, its activity may be decreased more and more rapidly, until it eventually becomes completely ineffective.

Although microbial degradation of Oftanol on turfgrass has not yet been confirmed, there is reason to believe it might happen. Such evidence comes from the corn rootworm insecticide Amaze. Amaze contains the same active ingredient as Oftanol (isofenphos). After being on the market only a couple of years, Amaze was removed from usage because of several control failures that have since been attributed to microbial degradation.

We have never recommended the usage of Oftanol in a preventive program for any turfgrass insect pest. Such continued usage can eventually result in the failure of any product. Continue to use Oftanol where it is the best product for your particular situation. However, until we finally know whether or not microbial degradation is possible with this product on turfgrass, use it only when needed, do not use it as a preventive measure, and rotate its usage with other effective products.

WDATCP Cancels All Wisconsin Uses of Miticide Dicofol

All uses of the acaricie (miticide) Kelthane and other products containing the active ingredient dicofol have been cancelled by the Wisconsin Department of Agriculture, Trade, and Consumer Protection. Dicofol is chemically closely related to DDT and contains trace amounts of DDT-related materials as impurities from the manufacturing process. Wisconsin law states that no products containing DDT will be used in the state.

Although widely used for spider mite and gall mite control on trees and shrubs, dicofol has had limited usage on Wisconsin turfgrass. The primary turf usage has been for control of clover mites. Clover mites do not damage turfgrass, but, instead, feed on clover and other broadleaf weeds in turf areas. Clover mites can build up to large numbers and invade homes and offices, creating a nuisance. An approach to solving this nuisance problem is to spray infested turf areas with a registered and effective pesticide, and dicofol has been one of the materials of choice. Effective alternative pesticides for clover mite control in turfgrass areas include diazinon, Dursban, Turcam, and Ficam.

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SOME BAD NEWS ON THE PESTICIDE FRONT

By Thomas R. Parent

It appears the nation's golf courses could lose another valuable and proven pesticide product — diazinon. The Environmental Protection Agency has proposed banning golf course and sod farm applications of this commonly used and effective insecticide.

The reason given by the EPA for considering this ban is concern for wildlife safety. They are not looking at a total ban and would allow continued agricultural use on crops like corn and alfalfa. This action marks a distinct departure from EPA procedures in more recent years. The proposal was announced at the **start** of the special review of the product, instead of after the study, which has been the normal way such considerations have been dealt with previously.

It also is the first time in years the agency has moved to block pesticide uses that **don't** pose clear risks to humans. The agency was moved to action by reports of about 60 cases of bird kills linked to diazinon in 18 states. One incident reportedly linked the death of about 700 Atlantic Brant geese to a diazinon application on a Nassau County, New York golf course.

Ciba-Geigy manufactures the product and is working with the EPA to help sort fact from fiction. A company spokesman said they believe the wildlife problem, if it is indeed a documented problem, can be eliminated by irrigating treated areas with a quarter inch of water immediately after application. This reporter, in casual conversation at several turf conferences, was led to believe the Long Island golf course incident involved a granular application. The EPA, in December of 1985, approved a C-G request that the diazinon label be amended to include the irrigation requirement.

The Golf Course Superintendent is in a difficult position in this situation and others similar to it. First, the EPA admits that in the vast majority of cases the available data does indicate diazinon is a safe product for golf course use. Secondly, although this insecticide is a major product for Ciba-Geigy, the golf course and sod farm use represents only 8% of the approximately 8,000,000 pounds the nation uses each year. We do not have much economic leverage. Fortunately, Ciba-Geigy, in a letter to most golf courses and sod farms, has committed "every scientific resource available to support the continued uses of diazinon on golf courses and sod farms, because we firmly believe that the product can be used without causing significant hazards to birds."

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Health Concerns On The Golf Course

BEE STINGS: TAKE THEM SERIOUSLY

By Cheryl Miller, R.N.

Now that most of Wisconsin's golf courses are open and golf course personnel are working out-of-doors, a word of caution about a common but potentially serious threat to health is in order — insect stings. I read a brief article last year that demonstrates the value of prompt attention. A farm worker was stung by a honeybee on his left ear. Fifteen to 20 minutes later the young man's face itched and became numb. His head, face and nose swelled and turned white. Fortunately, he was taken to the local hospital and treatment there may have saved his life. Insect stings should not be ignored as something only irritating or harmless. The danger, in some cases, is real and can be tragic.

Most allergic reactions in Wisconsin to insect stings occur in August and September, but are not limited to these times. Most susceptible, obviously, are workers who are constantly outside. Here's some background on allergic reactions and what to do about them.

About one in 200 persons is allergic. Proper treatment following a serious allergic reaction can be critical as a victim becomes older. Dr. John W. Yunginger of the Mayo Clinic in Rochester, Minnesota advises that anyone can be an allergic reactor to insect stings. These reactions are nothing to take lightly — nearly 50 people in the United States die every year from insect stings.

Dr. Yunginger started research on this problem in 1974. He began by using a series of bee venom injections to learn how the body produces protective antibodies. Immunotherapy, as this program is called, is about 95% effective for beekeepers and 98% effective for nonbeekeepers. Patients receive tiny doses (less than a microgram) of insect venom. Following a series of shots a patient eventually tolerates 100 micrograms of venom, which is equivalent to stings by two honeybees or 20 yellow jackets. Shots are usually administered once a week for 20 weeks. The treatment, however, can be completed in less time if the patient visits his or her doctor more frequently.

Allergic reactions are classified as local, large local, systemic, and toxic. If you're stung on your finger and it swells but within 20 to 30 minutes the symptoms have subsided, you've experienced a local or normal reaction. If you're stung on your forehead and your eyes swell shut, that's a large local reaction. The symptoms of systemic and toxic reactions are identical. These include wheezing, tightness of the chest, hives, sneezing, runny nose, and watery eyes. This is abnormal, and one sting to the finger can cause some or all of these reactions.

A systemic response is different from a local or large local reaction in that swelling may occur somewhere other than where you are stung. For example, if you're stung on your foot when you ac-