WESTERN MICHIGAN GOLF COURSE SUPERINTENDENTS ASSOCIATION

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Western Views

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PRESIDENTS MESSAGE

Kurt A. Thuemmel C.G.C.S.

Now that the Monsoons of September are over, we can hopefully return to the task of maintaining Golf Courses and possibly return to or plan Fall projects. Or can we? With the amount of rainfall that we have received, coupled with the time of year, soil conditions may not dry adequately for many of us who were planning on rebuilding that particluar Green or Tee. Unless, of course, October and November are unusually dry with mild temperatures. I hope the weather experts are right when they say that a weather pattern of this nature will only occur once every 500 years.

Because of the efforts of many people, Golf Day was a smashing success this year at Muskegon C.C. with nearly $7000 raised for turfgrass research. Thank yous go to Fred Pastoor, this year's host, for providing an outstanding Golf Course, and of course the beautiful weather. Thank you, also, to Chris Fochtman and Fred for organizing this event and to the many vendors for their support of this annual event. If you haven't participated in Golf Day, you should consider attending in the future. Not only is it a worthwile cause, but it is also well organized, and I think everyone has a good time.

Have a good winter!

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GOLF DAY 1986

Muskegon Country Club was the site of this year's Golf Day. Our host superintendent, Fred Pastoor, had the golf course in perfect condition, plus he coordinated every aspect of the day without a flaw. Fred worked very hard and deserves a lot of credit for the success of this 7th annual turf research fund raising event. Along with his brother Steve, assistant manager at the club who set up all the clubhouse arrangements and fine food for our buffet lunch, sausage and cheese at the turn, hors d'oeuvres and dinner, this brother act pulled off our most successful Golf Day ever. We were also blessed with perfect weather, sunny, calm and 70 degrees. According to the thermometer outside of Mike Sruba's pro shop, it was 75 degrees, but his thermometer conveniently reads 75 degrees wherever the needle points.

Spring Lake Country Club also served our day well as the alternate club and allowed our 8:30 shotgun players to play their course in the afternoon and use their locker room facilities before returning to Muskegon Country Club for the remainder of the Golf Day festivities.

Our day includes many opportunities to win prizes or gift certificates. The main event for this day was a 2 best of 4 full handicap ball. Two teams tied for first place with a score of 119 and each team member won a $45.00 gift certificate. They were Dick Stebbins, Mike Benham, Joe Ricker and Jim Bogart; Mac Oliver, Ken Yonker, Don Pimley, and John Pearsall. The third place team who shot a score of 121 and won a $30.00 gift certificate per man were Dave Kasprzycki, Willie Stevens, Cal Rydjord and Dick Rogers. Tim John, Dave John, Jim Roschek and Evan Siefert shot 122 to win 4th place and a $25.00 gift certificate. 5th place went to the team of Fred LaFontaine, Dave Greener, Dave Burham and Jeff Kerr who scored 123 and $20.00 gift certificate per man.

There were also individual event winners. Carl Munson hit the longest drive on #1 and won a $75.00 gift certificate. Tom Miknavich hit the closest shot on #5 and won a set of Palmer Graphite Woods. Tim John won closest to the pin on #11 and got a rain suit for his fine shot. Mike Johnson won our final closest to the pin on #15 and received a golf bag. Paul Sutter hit the longest drive on #16 and he, too, won a $75.00 gift certificate.

Miller West ran their traditional $5000.00 Hole-in-One event on the 7th hole. Last year, as you may remember, there was a winner, which was great, but it was not to be this year. Millers also ran its circle game, pay $5.00 and hit your ball in a 20 foot circle and win a $20.00 bill; hit it in the six foot circle and get a hundred dollars back. There were nine $20.00 winners this year. (Just a note, one player either thought that $5.00 was too much to spend or that he didn't have a good shot in him, but this golfer should have thought less and paid the five bucks, because he hit his shot four inches from the hole and kissed $100.00 good-bye.) Thanks to Miller West who raised $730.00 and added a lot of fun to the day.

TCI provided beer and pop for all of our Golf Day participants at Muskegon Country Club and thanks to Kelly Hiemstra and Phyllis Cliff for operating their cart all day long.

Spartan Distributors' Jim Inman and Mel Rotman had a busy day, and by the looks of things they also had alot of fun as they operated their own beer and pop cart at Spring Lake Country Club that afternooon and then returned to Muskegon Country Club and sold raffle tickets. Two participants won $100.00 on a drawing . When the dust had finally settled, Spartan Distributors had raised $965.00. Nice Job!

Between Boylan Sales and Bales Golf Cart we had 17 additional golf carts donated to Muskegon Country Club and Golf Day. We appreciate their fine joint effort.

Dave Phillips, Jim Bogart and Bob Kelly did a great job in manning the registration table. Their performance is so critical to getting our participants off on the right foot and we are grateful to them.

The following companies also made important contributions, which allowed us to give many fine prizes - both golf event prizes and door prizes: Benham Chemicals, Century Rain Aid, D & C Distributors, Mark De Vries Architect, Ellis Sales, Grand Rapids Tree, LESCO, Lawn Equipment Corporation, Matthews & Associates, J. Mollema & Son, Parmenter & Andre, Raymer Wells & Pumps, Scotts Proturf, Soderstrom Irrigation, Standard Sand and Turfgrass, Inc.

Thanks to our 212 Golf Day participants, Muskegon Country Club and our contributors, we were able to raise almost $6700.00 for turf research. This research not only helps us in our jobs, but gives our golfers playing conditions that are now and ever improving.

Chris Fochtman
Golf Day Co-Chairman

LIQUID FERTILIZER ON THE GOLF COURSE FRIEND OR FOE

by
Goris B. Passchier
Senior Turf Specialist, J. Mollema and Son, Inc.

The question posed by the title of this article is in response to an earlier article by James H. Boyce, *Foliar Feeding, Friend or Foe?.* In the article by Boyce, liquid fertilizer and foliar feeding are used in such a way that a person could assume that all liquid fertilizer is foliar and that all fertilizer in a liquid form is going to result in dead turf. In this article I will show a brief history of liquid fertilizer, define what liquid fertilizer is and show you liquid fertilizer can be one of the best tools that you use to grow turf.

Liquid fertilizer was first used in ancient Greece in the form of organic liquid manure. In 1721 Matthew Tindale was granted a patent to manufacture a prepared solution from chalk and sea water. Sir James of Ireland marketed liquid chemicle fertilizer in 30 gallon casks by 1840. During the early 1900's synthetic ammonia was developed

from nitrogen and hydrogen by E.I. DuPont de Nemours and Allied Chemical. In 1923 DuPont introduced a urea-ammonia water solution. Since 1923 we continue to make progress in the form of urea formaldehyde solutions and highly concentrated slurries that can be used on your golf course.

What is the definition of liquid fertilizer? Liquid fertiliizer is any plant nutrient that can be delivered to the plant in a liquid form. We can also take it a step further and divide liquid fertilizer into two forms. These two forms are solutions and supensions. A solution has most of the plant nutrients dissolved and a suspension has some nutrients dissolved and some are in suspension.

An example of a solution for turf can be a 14-0-7. Usually a solution has no more than 25% nutrients by weight. A solutiion is easy to handle and easy to store since you usually do not need agitation to keep the analysis accurate. The disadvantage is that the analysis remains low.

A suspension formulation for turf might be a 25-5-15. As you can see, a suspension analysis can be as high as a granular analysis. A suspension fertilizer can use less expensive raw materials, has less of a problem with salt outs, doesn't take as long to mix and shipping cost per plant nutrient is less. The disadvantage at this time is that your storage tank must have some nutrients from settling out.

Some of the common plant nutrients that are used in liquid fertilizer are ammonium nitrate, urea, ammonium sulfate, ammonium polyphosphate, potassium chloride, potassium hydroxide, potassium nitrate, methylene diureas, methylol and some insoluble methylol ureas.

Why and how can you use liquid fertilizer on your golf course? The method of application of liquid fertilizer with your boom sprayer is the most accurate method of putting down your N,P,K. Each droplet in the solution Contains the accurate amount of N,P,K. There is no segregation like in some granular fertilizers. Most bagged granular fertilizers have little segregation of N,P,K, but the nutrients will shift by weight each time the bag is handled. Farm fertilizer blends that are bought in bulk from a farm elevator have the greatest chance of segregation since the speader usually bounces down the road to your course, thus shifting the nutrients by weight.

Overlapping with granular fertilizer also changes the analysis that you are trying to put down. As the industry continues to change we also are rewarded with better spreading equipment like the Vicon spreader in which the overlapping becomes less of a problem.

Liquid fertilizer will also increase your efficiency when applying fungicides on your greens. Most liquid fertilizer is compatible with most fungicides, but you should always do your own jar test. At a 1/4 lb. N per thousand sq. ft. every 10 to 14 days you can grow an excellent putting surface without worry about picking up the fertilizer because you're cutting your greens so close. Most fungicide only requires 3 minutes of drying period before being effective, so if you wanted to water in your fertilizer after three minutes you would not have to worry about your fungicide. You also help bring the fertilizer off the leaf to the roots and soil.

To use liquid fertilizer on your golf course you must consider some important issues. Let's discuss two formulas for turf. The first formulation is a 12-0-9 with 75% NITRO 26 (a very low free urea slow release liquid UF nitrogen) and 50% of the potash being salt free. The second formulation of 12-0-9 has all urea nitrogen and all the potash is from potassuim chloride (muriate).

The next question we have to ask is where can I use the 12-0-9 with the slow release UF? You can use the formula on greens, tees and fairways. The N rate can be anywhere from 1/8 lb to 1 lb of N per 1000/ sq. ft. **WHAT DETERMINES THE SUCCESS OF USING THE FORMULATION ON GREENS IS THE AMOUNT OF WATER USED TO APPLY THE PRODUCT.** The formula 12-0-9 with all urea and muriate can be put down as safely as the slow release formula but will require a lot more water and has other effects as to much growth and high salt content.

I have not found any research on liquid fertilizer on greens, but Iowa State has done research on tip burn and turf loss on Kentucky bluegrass. Experience from the field shows the following rates of spray solution with our previous formulas.

12-0-9 slow release N low salt K Greens

N/1000 sq. ft.	H20/1000 sq. ft.
1/4N	2 gal.
1/3N	2-2 1/2 gal.

Fairways (not bent)

1/2N	1 gal.
1/N	2 gal.

12-0-9 all urea all muriate Greens

N/1000 sq. ft.	H20/1000 sq. ft.
1/4N	4 gal.
1/3N	6 gal.

Fairways (not bent)

1/2N	2 gal.
1/N	4 gal.

What determines whether a turf is foliar fed or roor fed?

If you are spraying with a flat fan nozzle at less than 1 gal/1000 sq. ft. with a quick nitrate and urea nitrogen, it will probably be foliar feed. If you are using a formula like 12-0-9 slow release at 1 gal/1000, only 2 or 3% will be foliar feed. When you use a flood jet or raindrop nozzle at more than 1 gal/1000, it will more than likely be washed off the plant to the soil and root system.

One last questioh should be addressed, and that is - can continuous use of liquid fertilizer be harmful to your turf? If you chose to feed your turf at 1/16 lb. of soluble quick acting foliar applied N, you might starve your turf, but I have yet to see dead turf from a liquid program with good turf formulations as previously discussed. Whether the nitrogen is in granular or liqid, as long as the majority goes to the soil and roots I don't think the plant will care.

The two keys to knowing whether liquid fetilizer is for your course is to know your nitrogen and potash source and know the amount of water required for your formulation to get the liquid off the leaf to the roots and soil.

In the next decade I believe liquid fetilizer will have a great impact on the golf industry. I hope this article will help you make the decision to take a strong look at this effective method of growing green healthy turf for your golfer.

BALL UP A TREE

JACKSON, MI -- Sharp Park Golf Course, Saturday, Sept. 6, 1986. At approximately 7 p.m., Lou Griffith, Rick Prus, and Thelma Bell Ganong put "the wood on the ball" on number 9 tee. Lou's orange XL came to rest adjacent to number one green. As many of us know, there are large, old trees in that vicinity. In and around those trees are, as nature intended, squirrels. As our threesome approached the area, planning 3 marvelous recovery shots, Lou let out a shout, "That squirrel's got my ball!"

Having heard (and made) many excuses prior to fluffed second shots, my reflex thought was, "Oh, sure!" But lo and behold, yon squirrel was on a dead run to the base of one of the aforementioned large, old trees. Up he went, orange XL protruding from his snout. He proceeded to gambol and scamper back and forth at least 30 feet overhead, on occasion traveling to the small branches at the tree line, where we hoped he'd decide to drop the ball, thereby improving Lou's lie. Not so — after 2 or 3 minutes of teasing, the critter stopped to regrip the ball, and continued his ballet. He finally tucked the ball in a crotch of the tree, then looked down and gave us earthbound mortals a superior, "So there, too!" stare.

Without a cherry-picker it was definitely an unplayable lie, and Lou opted not to take a stroke for the snitched ball.

Investigation the following day found the ball visible from number one green, and let the record show that the ball was not lodged there by an errant tee shot; rather, it was stored there by a squirrel.

If there are any morals to this true tale, they are: 1) keep the ball out in the short grass, 2) don't play an orange ball when squirrels are gearing up for the winter, and 3) stay away from squirrels with an overbite.

Credit: Thelma Bell Ganong

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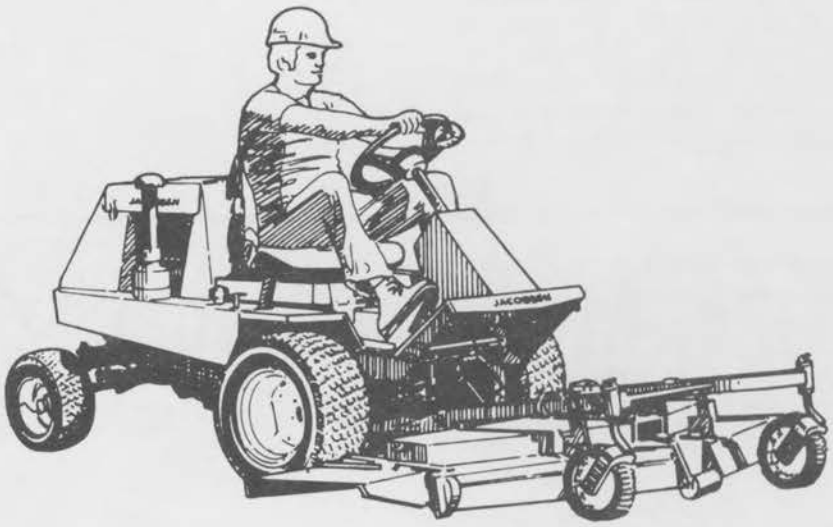

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ROY PECK'S RETIREMENT PARTY

A surprise retirement party for Roy Peck was held at Gull Lake View Country Club on Friday, October 24. Over one hundred people attended the dinner to honor Roy and his wife Sharon. Those in attendance included family, neighbors, old friends, hunting buddies, and his former Green chairman, Glenn Smith.

A bronzed picture, taken at a party commemorating Roy's 40 years of service was presented to him by Cecil Kerr. The picture was taken last year at the Kalamazoo Country Club. Everyone had a great time in helping Roy celebrate his distinguished career at Kalamazoo. Thanks should go to Cecil Kerr, Bill Madigan, and Charlie Scott for their efforts in organizing the evening.

Congratulations Roy for a remarkable 41 years.

POTASSIUM COMBATS SOIL COMPACTION

Adding potassium to the soil seems to help a plant overcome the effects of soil compaction, according to studies at the University of Wisconsin. Researchers there were evaluating interactions between soil fertility and compaction caused by heavy axle loads. It is too early for scientists to make specific fertilizer recommendation based on this finding, however.

Soil compaction reduces the amount of oxygen in the soil. The plant needs this oxygen to help it take up nutrients, says Richard Wolkowski, University of Wisconsin soil scientist. Adding potassium fertilizer to the soil increases the level of this nutrient available, thus increasing the potassium uptake by the plant, he says. The benefit is not enough to entirely wipe out the effects of compaction, but it produces a better crop than can normally grow in compacted soil, he says.

Wolkowski and co-workers Larry Bundy and Birl Lowery found corn yield increases as the amount of potassium increased up to 200 to 300 pounds per acre. They saw no further increases when the potassium level went above 300 pounds per acre.

Corn plants fertilized with potassium in highly compacted soil grew about 10 inches taller than corn in the same soil without potassium. Increasing the amount of nitrogen and phosphorus in the soil made little difference, however. The soil scientists are unable to explain the reason behind this finding.

Also, they add, it will take several more years of research before they will be able to make specific recommendations as to how much potassium should be added to relieve a given amount of compaction.

Credit: Divot News
So. Calif. GCSA, April 1986

LITTLE KNOWN FACTS ABOUT GOLF COURSES

Ecologically, the golf course provides some pretty fantastic help to man kind, in addition to just giving him a place to exercise and enjoy life, for example:

An average 18-hole golf course, approximately 150 acres, can produce enough pure oxygen through photosynthesis for at least 100,000 people for the entire year. On a smaller scale, that means a well maintained lawn 50 by 50 feet liberates enough oxygen to meet the needs of a family of four, day after day.

The same average golf course of 150 acres can effortlessly absorb 12 million gallons of water during a three inch rainfall.

Grass also provides a cooling effect. A 2000 square foot plot releases as much as 120 gallons of water through a method called evapotranspiration. This release of water reduces the heat factor. Grass absorbs only 50-60 percent of the incoming solar radiation, while buildings and pavement absorb 90 percent.

Grass and tree leaves also help cleanse the atmosphere because of their ability to trap dust particles through static electricity of dense foliage. Rain then washes the particles into the soil.

Golf course superintendents must contend with a lot of numbers every day, for example:

Active chemical ingredients and other items are often times measured in something called parts per million. In more common terms one part per million would be: one inch in sixteen miles, one minute in two years, one penny in $10,000.00, one large mouthful of food when compared with food a person eats in a lifetime, or one drop of scotch in 16 gallons of water.

How about those spike marks that supposedly ruin so many great possible scores? Consider this — The average golf shoe has twelve spikes and the USGA has computed that a player averages 28 paces per green. 28 paces times 24 spikes means 672 spike marks per player, per green, 672 spike marks times 18 greens equals 12,096 spike marks per round. If there were 200 rounds played each day, that's 2,419,200 spike marks daily or more than 72 million holes each month. What's a superintendent to do?

Have you noticed the golf courses becoming more and more crowded? How about this food for thought, and the need for more golf courses - Population experts report it took one million years for the earth's population to reach the billion mark, but ony 130 years for the second billion, 30 years for the third billion and as of March, 1976, we welcomed our fourth billion human to this planet. (If all of us wear golf spikes at one time we may be in real trouble, even without a putter!)

Credit: Golf Course Superintendent Association of America

EFFECTIVE COMMUNICATION TO CLUB MEMBERS CONCERNING THE USE OF PESTICIDES ON THE GOLF COURSE

by
Bruce R. Williams
Bob O'Link G.C., Highland Park, Illinois

Each year we place an article in our club newsletter concerning the use of pesticides on the golf course. This article is useful and informative to our membership. It certainly helps to have our members keep an open mind on the issue of pesticide usage due to the negative image presented by many of the media. By showing our members that we can use pesticides in a safe manner and in an Integrated Pest Management Program we can minimize the number of complaints and negative comments that might arise. The article follows.

In order to maintain the high quality of turfgrass on our golf course it is necessary to use a variety of pesticides throughout the year. Herbicides are used to control weeds, fungicides control turfgrass diseases, and insecticides control potential damage to turfgrass and ornamentals by the adult and larval stages of certain insects. Without the use of pesticides it would be very difficult to sustain the quality of playing conditions we are accustomed to.

At Bob O'Link we use the philosophy of Integrated Pest Management when applying pesticides. Basically, this is the use of various cultural practices to insure the health of plants combined with the frugal use of pesticides on a preventative basis. All of the pesticides used on the golf course are available as well to homeowners (at local stores) and are not on the restricted use list of the Environmental Protection Agency. It is a requirement of the state and federal government that our staff members are licensed to handle and apply pesticides. Intensive training is required as well as a 1/2 day of testing every 5 years.

Examinations are given in categories of: a) turfgrass, b) ornamental and landscape plants, c) aquatic vegetation and d) mosquito abatement.

Our goal is to use pesticides in a safe and effective manner without endangering our applicators, our golfers, or the environment. Each year we ask your cooperation with the following:

1. Caddies must wear shoes at all times to prevent skin contact of recently applied pesticides.
2. The practice of cleaning the golf ball with the tongue is not adviseable and could cause potential health problems.

A list of pesticides used on the golf course is available from our Golf Course Superintendent Bruce Williams. We appreciate your cooperation with our efforts to provide the best possible playing conditions for our members.

Credit: The Bullsheet

EMPLOYEE MOTIVATION

by
Charles Brasington, Jr., Golf Superintendent
Tiger Point Golf and Country Club

Does money have any bearing on how hard you work? Sure it does. It plays a key role in everyone's motivation. However, money or pay is only one influence on our incentive to work harder. Other influences are: having a positive environment; creation of interest; praise for jobs well done; and the feeling of being important.

Since most of you reading this article are managers of a golf Facility, you are, more than likely, self-motivators simply by the position you hold. Unfortunately, our employees are not always motivated. Therefore, we, as managers, must constantly search for ways to keep them happy with their jobs and themselves.

One of the first things I did when I took over as a manager was to clean up the crew quarters as well as the entire operations center. Later, the company bought first class uniforms. The idea was to create a healthy, positive environment.

After a good environment is established, you must get your employees interested in their job. One way we can interest the crew is by educating them on what end product we are after, how to get there, and encourage them to give ideas of their own. Then when someone does have a good idea, use it and it will send the morale sky high. Rotation of jobs is another useful tool in keeping interest high. This will add some variety to their daily routines.

According to Haimann and Hilgert, authors of the book *Supervision,* the feeling of being important and receiving praise for a job well done ranks higher than pay. On crew morale the posting of letters or articles with positive comments concerning the golf course or club in the crew quarters is a way we can praise our crews, as well as giving "pep talks."

Most, if not all, of the more successful business organizations have an employee of the month. Golf businesses can implement this idea at no cost. This can be done by installing drink machines and using the profit as an award each month to the Employee of the Month.

The most important aspect I've learned as a manager of people is to screen out people with negative attitudes during the interview. If there are employees with bad attitudes, try to work out the problems with them and if all else fails, terminate them. One negative person can grow

into ten negative people.

Remember, if your club cannot pay enough money to motivate your employees, create a good environment, praise the crew for their performance, when due, and make them feel important. Positive actions create positive results.

Credit: Florida Green

EXTENDING THE USE OF SOD

By Henry Thomas Wilkinson
Dept. of Plant Pathology, U. of I.

During the past decade, public awareness and concern of the esthetics and the quality of the environment has increased dramatically. Education, modern communications, and inflation have spawned consumers who demand great quality of merchandise and service for their invested dollars. More dollars are invested now than ever before in the maintenance of turfgrass. The consumer is demanding high quality turf based on investment rather than on biology. For example, demands for high quality sod to be established and maintained on marginal agricultural soils have increased with renewed interest in urban development. The demand has been met by hundreds of companies specializing in lawn establishment and/or maintenance. Because the consumer is now paying for services that were previously not done or accomplished by himself, his expectations have increased: the lawn should be lush, green and carpet-thick all season long.

Intensively managed turfgrass is greatly predisposed to a miriad of problems including stress and disease. It is my belief that if the grass plants were managed as opposed to managing the consumer, fewer catastrophic diseases would occur in turfgrass lawns. Sodded lawns seem to have more problems than seeded lawns, but the development of disease in sodded lawns is a result of, rather than the cause of aberrant grass growth. The pathogens that attack a sodded lawn will also attack a seeded lawn. Proper establishment of sod is a key in extending its use to meet consumer demands. Fusarium blight syndrome, yellow patch and yellow ring are diseases associated with the lower crown and roots of the grass plant. Heat and drought stresses are damaging to sod when they affect the crowns and roots of the grass plant. The susceptibility of grass to the aforementioned problems results from the conditions under which the sod is forced to grow, not on the quality of the sod when it is initially transplanted. I believe that if the growth and vigor of grass roots, rhizomes and crowns in sod are managed properly, the successful use of sod can be accomplished with lasting results.

There are three basic phases of establishing a sodded turf: sod production, sod bed preparation, and post transplant management. There are variables in each of the three phases that will enhance the successful establishment of sod.

Select Soil Type

The sod producer or farmer can select the soil type upon which to raise the sod from seed. Usually the best mineral and peat soils are selected. As research continues to examine the intricacies of interfacing a sod with a sod bed soil, we will learn more about the impact of different soils used to grow sod and the performance of that sod on different sod bed soils. The blend of grass cultivars used to produce the sod should be selected carefully for the conditions under which the sod will be grown. The cultivar blend comprising the sod is the only variable in sod establishment that, once selected, cannot be changed without starting the process of sod establishment anew.

The chemical program for sod production and the age of marketed sod are also very important variables in sod production. For example, excessive nitrogen, phosphorus, and potassium applied to grass can produce excessive thatch and a weakened root system in less than two years. The longer sod is grown under a high management program, the more tenuous is its ability to establish after transplanting.

Sod Bed Preparation

The second phase, sod bed preparation, too often is neglected, yet the sod bed is the soil which must support the vital roots, rhizomes, and crowns for the duration of the turfgrass' survival. While not easily changed, the soil type is the most critical variable. Some changes can be effected, but this is very costly.

It is important to understand exactly what the soild type is. Knowing the soil type will greatly facilitate deciding which cultivation method(s) to employ and how to manage appropriate soil moisture for the turfgrass rooting. The texture, structure and porosity of a soil will each greatly affect the rooting of sod. Heterogeneous textures with some structure usually have sufficient porosity for movement of moisture and oxygen into soil, therby attracting deep root penetration. Such a soil need only be prepared for sod by leveling to insure good sod-soil contact. Finer textured

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soils often lack particle heterogeneity, have poor structure and very small pores. Such soils hold excessive water, which is unavailable to the grass, little oxygen, and often a high level of resistance to sod-root penetration.

To manage this soil type, carefully planned cultivation and fertilization practices must be used. Appropriate cultivation can create large soil pores, thereby increasing availability of water and oxygen for root growth. The poorer the soil, the more carefully planned the establishment of sod must be.

The nutritional status of the sod bed soil is also important to consider prior to transplanting the sod. Generally, we recommend that fertilizer if needed should be incorporated into the sod bed soil and not applied to the sod after it is transplanted. The rate and type of fertilizer should be based on a soil analysis. A key in establishing sod is to encourage the grass plants in the sod to develop roots that penetrate the soil profile. Sod beds are usually devoid of vegetation or covered with a dead turf. While not conclusively tested, a dead turf layer under transplanted sod merely compounds the difficulty of sod establishment. The dead layer interferes with oxygen and water movement and extends the distance sod roots must grow to reach soil where nutrients can be assimilated. The dead turfgrass could also be a source for many facultative parasites which, when presented a grass plant experiencing difficulty in rooting, would attack and further weaken the grass.

Transplant Management

The third phase of sod establishment, post transplant management, has been divided into critical management (8 weeks) and long term management (► 8 weeks). During the first 8 weeks following the transplanting of sod, soil moisture and heat, and sod to soil contact are critical. Research to determine the best guidelines for managing these variables is ongoing at the University of Illinois, but based on our preliminary results, the greatest sod rooting occurs when sod is laid onto moistened soil and then topically watered on a daily basis. This program will minimize heat stress and dessication of the sod and encourage newly forming roots to penetrate the sod bed. No fertilizer should be applied to the turf after it is transplanted or before it has successfully rooted.

Another practice that has proven very useful is to roll the transplanted sod with a light roller (200-300 lbs.) between 24 and 48 hours after transplanting. The time delay between transplanting sod and rolling allows the sod and soil moisture levels to equilibriate, thereby creating a uniform soil profile for rooting. You can imagine the impact a layer of dead soil would have on attempts to create a uniform soil profile.

There are three basic management concerns in long term management: nutrient status, cultural practices, and pest control. The scope of this paper will not permit me to discuss these at any length. The approaches, methods, and materials used in turf management differ from location to location and between operators. I would suggest, however, that the grass plant has evolved with a more predictable set of requirements for growth. As I alluded to earlier, it is the crown, roots, and rhizomes i.e., the subterranean tissues, that are vital for longevity and quality of turfgrass.

I will close by suggesting that if long term management

practices are directed at promoting root and rhizome development and directed less at shoot and leaf growth and quality, the sod will be more resistant to stress, grow longer, and still maintain reasonable quality.

GOLF'S LEADERS TO TURN INFORMATION INTO ACTION FOLLOWING GOLF SUMMIT '86

RYE, NY -- The first *Golf Summit* closed with a call for turning information into actions as golf approaches its third major growth boom of this century. The conferees all agreed that growth will be driven by accurate, updated research; aggressive marketing of the game and its benefits; and maximum utilization of the resources available to the game.

Golf Summit '86, held at Westchester Country Club October 8 - 10, was the first-ever gathering of golf's leaders and decision-makers. The nearly 250 in attendance were presented with research findings on the state of the game by leading experts and exchanged ideas on what to do with that information. They also discussed the issues of utilizing media resources to "grow the game," and the needed planned development of golf courses in the U.S.

"We are extremely proud to have been able to offer the game's decision-makers a forum to discuss the issues facing golf, and to provide them for the first time with data that will help each of them and the industry as a whole," said David B. Hueber, president and CEO of the National Golf Foundation, sponsor of *Golf Summit '86*.

Third Golf Boom Projected

Dr. John Rooney of Oklahoma State University projected that golf was poised for the third major boom of this century, with demand for golf rising due to increased leisure time, growth in the age and occupational groups that play the game most, increased mobility, and regional population growth trends. He stressed, however, that golf is a supply driven activity, with a strong relationship between participation and the availability of public facilities.

Dr. Joseph Beditz, vice president of research for the NGF, told the *Golf Summit* that growth in the number of rounds played annually could be immediately realized by targeting the infrequent golfer, who accounts for 49% of all golfers. If the infrequent golfer (who plays less than 8 rounds per year) would play four more rounds annually, it would represent an 8% increase, generating one-half billion dollars for the entire golf industry.

Golfer values and golfer market segments were addressed by Kay Wall of Simmon Market Research Bureau and Allan Beyer, vice president of Audits and Surveys, Inc.l

"Golfers tend to be sports junkies, active in other sports," said Wall. "They are frequently politically active, and many of them have a zest for life and a desire to touch and experience things that make them consumers of quality, not quantity."

According to Beyer, segmenting golfers enables us to better understand and target their needs. "This helps us better explain demand, consumer needs, and can aid in developing a marketing strategy to reach these golfers. The activity and responsiveness of the golf consumer is the energy which drives the golf market."

Chairman and CEO of Market Facts, Inc., Verne Churchill introduced the *Golf Summit* to the profile of the non-golfer and ex-golfer. "The greatest barriers these people have to playing the game are not enough time due to work, and their commitment to family," he said. "Those who are likely to try golf express a desire for a friend or relative to take them out to play, as well as reduced fees at courses for beginners, free lessons, more information on the health benefits of the game, and a beginner's day at local courses."

"Tell them golf is fun!"

The Golf Marketing Panel at *Golf Summit '86* agreed that the best way of attracting new players to the game is to show the game as being "fun". Vince Alfonso, PGA professional at the Rail Golf Course, said a good start would be for professionals and course staff to be warm, welcoming and accessible when new players arrive.

"The perception that golf costs too much to play is inaccurate," said Sandy Burns, Executive Vice President of American Golf Corporation. "It is the industry's job to get the word out that golf is one of the best values for the recreational dollar today."

PGA Master/Professional and noted author Dr. Gary Wiren, pointed out that some of the obstacles to taking up the game could be overcome with more low cost golf courses, courses that are aesthetic, but fun to play, and a general philosophy that golf can be an enjoyable game for all ages. "Whenever we get together in the name of golf, we should be having fun," he said.

"The myths that golf is a game for the rich, overweight and gray-haired should be dispelled by evidence that PGA Tour players are concentrating on getting into better shape," offered Al Barkow, publisher of Golf Illustrated. "The media is featuring younger players and stressing that it is a game for everyone of all ages."

Curt Walker, executive director of the Golf Course Association, recommended that advertising should start promoting the emotional and feeling side of golf. "The bonding and friendship that occur on a golf course are more important than a perfect swing," he said.

Golf Summit '86 featured speaker at lunch was PGA Tour Commissioner Deane Beman, who called on all *Golf Summit* Participants to work together to establish a positive direction of growth for golf. He stressed that the industry will have to rely more heavily on research to provide direction in the future, and that targeted activity should be directed at the "baby boomers" who could be a key to future growth. He pointed to the establishment of Family Golf Centers to encourage participation among young adults and juniors.

Renewed Interest Means More Golf on TV and in Print

The most distinguished panel of media experts ever assembled in golf discussed the future of the game on television and in print. Moderated by ABC Sports commentator Jack Whitaker, the panel included: Peter Lund, CBS Sports president; Dennis Swanson, ABC Sports president; Arthur Watson, NBC Sports president; Roger Werner, ESPN; Don Ohlmeyer, president of Ohlmeyer Communications; Bill Davis, chairman of Golf Digest; Peter Bonanni, publisher of GOLF magazine; and Tim Smith and Terry Hanson of the PGA Tour.

The panel agreed that there is more golf on television and more coverage in the print media because the public has renewed its interest in the game. More exposure, they said, will mean more fans and participants.

"Golf is not saturated on TV," said Don Ohlmeyer, who created the Skins Game and produced many tournaments for ESPN and NBC. "Golf has a hardcore audience, but events like the Skins Game have attracted larger audiences - and lots of women. Remember, that's what made Monday Night Football so successful."

CBS Sports President Peter Lund noted that ratings of golf telecasts have continued to climb over recent years, "but golf is viable without huge ratings because we're reaching that valuable audience of males 35-49 and 55 and over."

"TV helps sell magazines," added Golf Digest Chairman Bill Davis. "The strength of the print media is that we can take all the time we need to tell the story in-depth."

Davis pointed out that newsstand sales of Golf Digest currently surpass that of Sports Illustrated. "That ought to tell you something about interest in golf."

"The mission of the golf magazine is to serve the frequent golfer," said GOLF magazine publisher Peter Bonanni. "But we have a family magazine. It's read in the home by spouses and kids . . . and they may become the new recruits to the game."

Members of the panel emphasized the need to humanize the professional players more and to further establish golf as a fun game for everyone to play. The PGA Tour hopes to develop new programming ideas for television that will encourage fans to crossover and become players of the game.

Averting a Crisis in Golf Course Availability

The challenge of building enough golf courses to meet anticipated demand, at the same time keeping the costs down to allow affordable green fees, were two of the main issues the second day of *Golf Summit '86*. The problem was addressed by a panel of experts including members of the NGF's Commission on Public Golf Course Development: Brian Simpson, president of Dunlop Sports; Dick Nugent, former president of the American Society of Golf Course Architects; Jim Colbert, president of Jim Colbert Enterprises and a PGA Tour professional; Angelo Palermo, director of parks and recreation in Ramapo, New York; and William Sherman of the William Sherman Company.

Dr. Robert Adams of the University of New Hampshire preceeded the panel with an overview of what he termed "a coming crisis in golf course availability." Dr. Adams noted three factors that point to a critical problem: the current inadequacy in golf course supply, the recent downturn in public course construction, and the projected significant increases in demand for golf.

Panelists told the *Golf Summit* that low cost, enoyable courses can be built to supply the growing demand, but several considerations must be met: the courses should be shorter, better designed for low maintenance and attractive.

Creative financing for these courses must be outlined and then communicated to developers and communities in need of these courses. Good service to the customer and affordable prices to the market must be top priorities if any golf course is to succeed.

The panel recommended that a central source was needed to identify markets in need of new courses, and to walk developers and municpalities through the process of construction, from concept to completion. The NGF was

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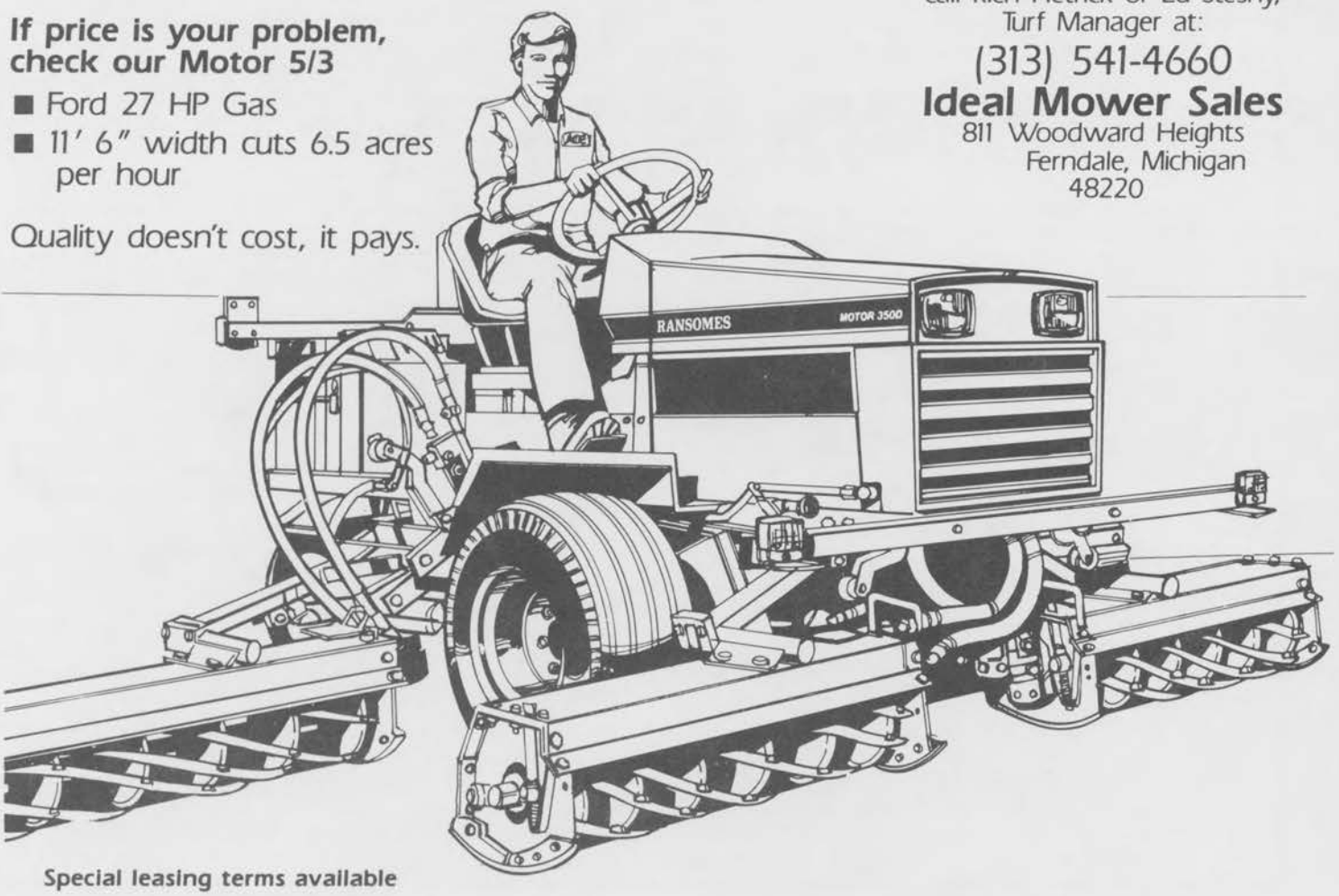

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identified as the organization to take a leadership role in this capacity.

As the *Golf Summit* moved from addressing the issues, the next two speakers translated into actions what challenges lie ahead. John Seel, senior associate with the Naisbitt Group, presented an analysis of trends in the U.S. and how they would affect golf. His presentation, "Golf Megatrends", reminded those in attendance that for research to be an important tool in providing direction to an industry, it must be continually updated and reworked to reflect the changes in society.

"The problem with the future is it isn't what it used to be," he said. "Choices made in the future will not be based upon the present."

Baby boomers, he stated, are well suited to golf, and find it socially compatible with their lifestyles. The proximity of their recreation to their work will be important, and he recommended that developers consider constructing golf courses in and around office parks.

To position golf in the future, Seel recommended that it be conveyed to the public as the center of recreation - the lifetime sport.

Industry communication specialist Scott Miller challenged the *Golf Summit* participants to continue efforts to clearly identify groups to target in marketing golf. "Once you understand which groups offer the game the best potential for growth, then plan a marketing streategy that will reach and appeal to that population."

As you begin to prepare our plans to meet a potential golf boom in this country," Miller said , " take a lesson from politics. Politics does one thing well - it listens. They try to hear and understand and establish a dialog. The NGF is doing that here with the *Golf Summit*. Those efforts should continue."

Golf Summit '86 concluded with an action panel featuring 17 leaders and decision-makers from among the *Golf Summit* participants. Some of the ideas and recommendations offered at this gathering included: development of an information package for golf course developers, targeting communities that need public courses and communicating the possibilities and benefits to adding new facilities; including women when targeting marketing campaigns; providing more education on good management to the course operator; and utilizing existing media and advertising recourses to promote golf as an enjoyable, lifetime sport for all people.

The National Golf Foundation, sponsor of *Golf Summit '86*, is now in the process of compiling all of the information and ideas brought forth at the *Golf Summit*.

"Our next step is to create an action agenda in conjunction with the other major organizations in golf," said Hueber. "This proposed strategic plan hopefully will initiate the type of cooperation and collective action needed to 'impact golf's growth'. It is essential that *Golf Summit '86* be a beginning - a stepping stone to the great things we hope to accomplish in the future."

TREES THAT TALK

When trees talk to each other, they apparently don't just stand around idly shooting the breeze. There is growing scientific evidence that, far from being helpless giants, trees engage in active, organized warfare against ravenous insects and microorganisms. When they communicate, their conversations invariably center on defensive strategy.

Such recent findings refute the deep-rooted belief that trees and other plants are passing beings. For centuries man assumed that plants were at the mercy of Mother Nature and subject to the whims of the weather, predatory birds and parasites that served to limit the pest population. Although it is true that trees can't run away from their enemies, they aren't helpless victims of insects and other creatures that can freely munch away at them, either.

Field studies conducted at several universities reveal that trees have a kind of neighborhood alert system to warn each other of impending danger. Dr. David Rhoades, an organic chemist and zoologist at the University of Washington in Seattle, was the first to present documented evidence that trees "talk".

"Plant communication was somewhat of a serendipitous discovery," Rhoades admits. "In the last ten years or so, evidence has been building to support the observation that plants produce defensive chemicals in their leaves that increase in direct response to an insect infestation. In 1979 I was studying what happens to willow trees when attacked by tent caterpillars. What we started to find was that not only were attacked trees responding defensively, so were unattacked trees. We got the idea that some sort of communication was going on here and did additional experiments."

In the initial study Rhoades paired willow trees into two groups, one for experiment and another control group situated nearby. He infested the experimental trees with tent caterpillars and left the other willows alone. Two weeks later he removed leaves from both the experimental and control trees and fed them to caterpillar larvae in the laboratory. As suspected, the larvae eating leaves from the test trees showed slower growth, indicating the leaves were emitting unappetizing chemicals. But to Rhoades' surprise, larvae dining on the unattacked control leaves developed more slowly, too.

Since the study was conducted with strictest controls, Rhoades wondered whether the attacked trees were somehow warning the neighboring willows to arm themselves by broadcasting monoterpenes, organic chemicals in a vapor state. Either that, Rhoades concluded, or the control trees were detecting pheromones, chemicals secreted by the caterpillars to attract other insects.

To confirm his theory, Rhoades repeated the study, only this time adding a third control group located several miles away from the test site. Again, the larvae feeding on the leaves from both the test and nearby control trees grew at a retarded rate, while those fed leaves from the distant controls grew normally. It was obvious that the neighboring trees had mobilized their defenses.

Meanwhile, scientists elsewhere were producing evidence that corroborated Rhoades' earlier findings.

At Dartmouth College in Hanover, New Hampshire, Jack Schultz, an entomologist, and Ian Baldwin, a biologist, have been working with sugar maple and poplar in a controlled, indoor environment. Instead of subjecting the trees to an insect attack, they mechanically ripped the leaves of test trees, leaving the control group in the same chamber and another control in another chamber, unharmed. A later analysis of the leaves showed that the test group, along with the nearby controls, developed phenolics, noxious compounds disliked by insects. Leaves from the trees in the other room showed no change. Whatever communication went on appeared to be trunk-to-trunk and not through telepathy.

In an article in *Mosaic*, a journal of the National Science Foundation (March/April 1983), Schultz speculates that trees not only signal each other, but leaves on a single tree play a cunning strategy game with predators. Schultz says that by varying chemical compounds from leaf to leaf, trees engage the feeding insect in a deadly "shell game".

The caterpillar is forced to roam about the tree trying to guess which leaves are nourishing and which are noxious, and in doing so, it becomes more conspicuous to hungry birds. The tactic also serves to hamper the development of the caterpillar, since it can't comfortably browse in one spot.

Schultz also notes that caterpillars rarely eat a leaf entirely and wonders whether this half-finished meal is the result of a swift and unsavory chemical change in the leaf. Schultz has been conducting tests on these theories.

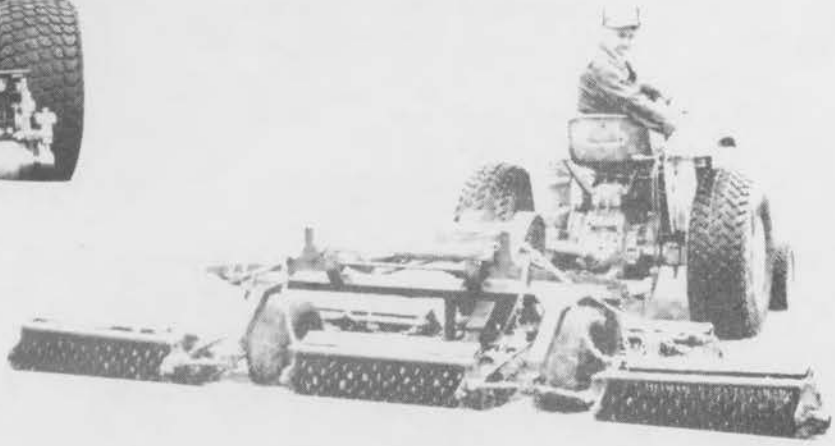
All of these experiements are leading to the conclusion that trees aren't as defenseless as they appear. They have developed a sophisticated chemical arsenal that could make any worm buggy. Some trees give insects indigestion by clogging their systems with gluey tannins, lignins and phenols. At other times, trees concoct phoney amino acids to trick insects into eating defective protein that will stunt their growth. And hypersensitive plant cells have been shown to commit "sacrificial suicide" to set off the chain reaction that starts production of defensive chemicals.

This coordinated activity does not seem farfetched to Rhoades. "There's lots of visible synchronized behavior in plants," he says. "Plants often flower and fruit together. It makes sense that this synchronization involves some communication. It's possible they communicate about other things as well."

Rhoades also points out that synchronized fruiting may be a protective act, whereby the plants saturate the predator with goodies. While a few plants may succumb to the insect banquet, the group itself is able to survive.

One may ask, however, if plants are so smart, why do they fall prey to insect outbreaks? "It takes awhile for plants to get it together to defend themselves," Rhoades explains. "Once they get organized, the insects usually move on." Rhoades speculates that trees appear to acquire short-term immunity from insect predators, such as spruce budworms and larch budmoths. Once the immunity wears off, the trees become vulnerable again to insect invasions. This possibly explains why regional insect outbreaks happen at regular intervals.

This research holds intriguing possibilities for forest management. "One practical application would be to turn the trees on before the outbreak so we can prevent damage," Rhoades says. "One way would be to release these defensive gases in trace quantities to mobilize trees into action."



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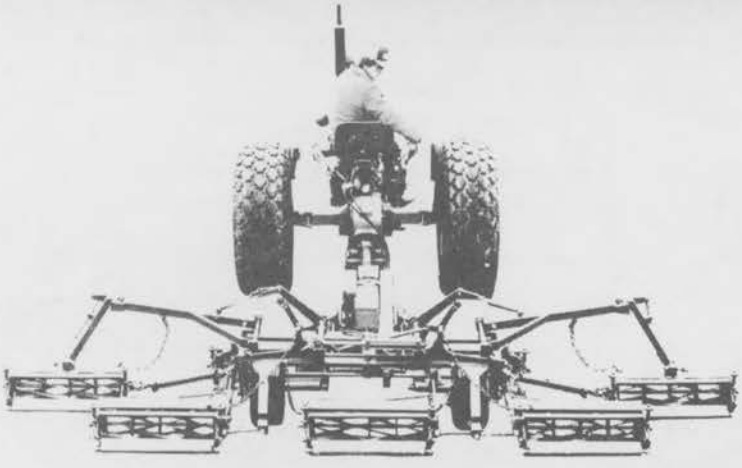

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