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WTA "HITS THE ROAD"

Thomas Harrison presenting keys to Dr. Worf.

The Wisconsin Turfgrass Association presented the keys to a 1984 Chevrolet half ton pickup truck to University of Wisconsin turfgrass research staff members on May 14th. The vehicle will be used by UW personnel in their travel to all areas of Wisconsin where research plots are located and to visit individuals in the field that might need their assistance.

Access to a vehicle designated only for turf research and extension work will overcome a significant transportation problem of past years. The WTA has retained ownership of the truck so the control of availability remains in the hands of the staff needing it the most. The normal situation for support groups like the Wisconsin Turfgrass Association has been to make such a vehicle an outright gift. WTA Board members felt a break in this tradition was beneficial from not only the availability standpoint, but also in eliminating the bureaucratic problems associated with a motorpool vehicle. It also gave the WTA the opportunity to maintain the truck in a manner consistent with its status as a long term investment.

Many WGCSA members are also members of the Wisconsin Turfgrass Association. It is a real compliment for everyone involved in the WTA that the Association was able to put a truck on the road after only four years of existence. At least as significant as this fact is that the truck purchase did not jeopardize grants to UW staff members for research. A $5000 grant was given to Dr. Gayle Worf for turf pathology research in 1984. Dr. Dan Mahr received a grant of $3100 for turf entomology work. Dr. Bob Newman requested a modest amount of money for turfgrass seed purchases, and this request was met.

Few could dispute that the ownership is a major goal accomplished and that the truck fill a significant void. Now that it is in hand, the WTA will be able to expand its efforts to help with turfgrass research investigations in Wisconsin. What's next? Become a member and be a part of that decision-making!

ASPA CONVENTION SCHEDULED FOR JULY 24-26

Wisconsin has the distinct honor of hosting the 1984 Summer Convention and Field Days of the American Sod Producers Association (ASPA). The event is scheduled for July 24 — July 26 at the Olympia Resort in Oconomowoc. Members of the Wisconsin Sod Producers Association are serving as meeting organizers and hosts.

Sod producers from all over North America and several overseas nations will meet to hold their annual meeting, tour the Ransomes factory in Johnson Creek, tour three sod farms in Wisconsin, and to view exhibits set up by manufacturers and distributors. There will also be social activities to round out the event.

ASPA officials have emphasized that both members and non-members are welcome to attend the event, and should feel free to bring spouses and children as well. Although WGCSA members will not have to worry about any housing accommodations, registration information is available from ASPA Headquarters at 4415 West Harrison, Hillside, IL 60162. They also point out that individuals may register on-site for the entire Convention or any of the separate and individual activities. Those preregistrations received prior to July 2 will enjoy some discounted fees.

Early responses and the large numbers of inquiries received by the ASPA lead officials to believe that the Wisconsin meeting will break all previous records for both registrants and for exhibiting companies.

The Wisconsin Golf Course Superintendents Associations wishes the Sod Producers the best of luck in their convention and hopes that this major meeting of the turfgrass industry will soon return to the Badger State.

WGCSA AUGUST MEETING
Stevens Point Country Club
Stevens Point
August 13

An Architect's Opinion

Multiple Tees for Everyone

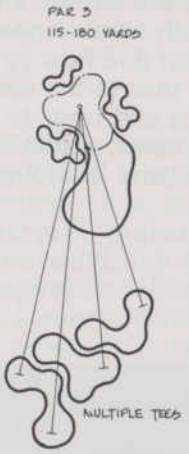
By Bob Lohmann

A well-designed golf hole is playable by all classes of golfers, is easily maintained, and is pleasantly attractive to the eye. In our highly geometric and mechanical society, the golf course should provide a desirable diversity of natural landscape. We require diversity in the landscape. If we build a home in the forest, we will clear the backyard; if we build a home in a farmland subdivision, we will surround it with trees and shrubs. When people go to a golf course, it should be scenic and orderly, as well as diverse. The order present in a golf course is the progression from tee to green to succeeding tee. The diversity of the golf course is the different sizes, shapes, and locations of the design elements. This combination of order and natural diversity, if designed and built properly, is what makes a pleasingly scenic golf course.

As in everything, you have to start someplace, and as we all know, a golf hole starts with a tee. In earlier years, the tees were known as "starting boxes." Many people today still refer to them as "tee boxes." As I travel to many courses, especially older models, I see many of the "tee boxes." They are small, square or rectangular, and lack the natural beauty that should be present on a golf course. Not only are they unattractive, but they are hard to maintain as well. Because only one small tee is used, the superintendent is limited to where he can place the tee markers. He never has the opportunity to close off or rest part of the tee to allow the grass to grow properly.

The tees on the older courses have become surrounded by older trees that are large, full, shade giving, and air blocking. No one enjoys removing trees, especially an older specimen. But the lack of air circulation and sunlight make it extremely difficult to grow grass on a small tee that is watered at night and walked on and cut up all day.

The tees begin to show wear about midway through the season, and if they are too small, the continued beating creates an eyesore that never has a chance to recover until fall when the golfing season is over. At this time, if the tee is only resurfaced and not enlarged, the problem reoccurs the following season. If a country club would spend the time and money to enlarge the tees properly, or better yet to design and build additional tees, the wear problem would be alleviated. If properly planned and

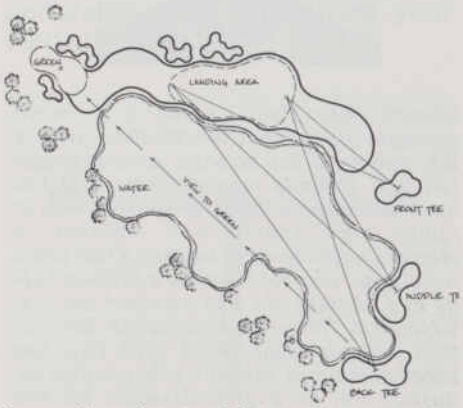


executed, the design of the golf hole could be improved at the same time. With the addition of multiple tees, the golf hole can vary in length and also in the line of the attack. With the new golf equipment and the better caliber of golf being played, shorter golf courses must change from being a challenge of length to being a challenge of shot making.

The good golf course is challenging and fair for all golfers and not always penal to the higher handicapper. The new tees should be placed relative to the location of the fairway hazards and landing areas. The tee locations are based upon the length of the golfers' tee shot. A suggested range would be as follows:

back tee	225 to 275 yards
middle tee	175 to 225 yards
front tee	125 to 175 yards

Usually the tees would be placed so the fairway hazards come into play for tee shots landing in the latter part of each tee range. It is impractical and impossible to set up each hole the same for each golfer from each tee. But with the use of multiple



tees, the shorter hitters are provided a fair and reasonable length golf course.

Each tee should be built large enough to allow for two and possibly three sets of tee markers to be placed on it. Depending on the wind direction and velocity, the pin placement on the green and the caliber of golfer on the tee, the markers can be set up to create a difficult or easy golf hole.

Many clubs contend that because of the limited amount of play on their courses, the tees do not need to be very large. But in the last ten years, even though the U.S. population has grown by only 10.5 percent, the number of frequent golfers has risen to 30 percent. Combining the probability of an increased amount of golfers and the possibility of creating a variety of golf shots from a single hole, multiple tees are a much needed improvement for all courses.

New larger multiple tees, if constructed properly, will fit naturally into the site and alleviate the eyesore of a small, square, continuously worn-out tee. Just as the entrance road gives a first impression when arriving at the country club, the tees should set the stage for each golf hole.

The design of tees, especially size and location, is as important as the construction techniques. Proper time allotted for both will reward you with tees that are unique and natural, that blend pleasantly into the golf course, and that improve the playability of the golf hole.

Editor's note: Paul Zwaska is a recent graduate from the UW—Madison with a B.S. degree in soil science, specializing in turf and grounds management. Paul has been interested in weather since he was in junior high school and majored in meteorology in his first two and a half years in college. It continues to be a favorite hobby and interest. He was awarded the first Wisconsin Turfgrass Association Scholarship this past year. Since 1979, Paul has been working in the turf and grounds industry, first as a groundskeeper for two large apartment complexes and more recently he has been working under GCS Randy Smith at Nakoma Golf Course for two years. He is a native of Madison and is currently seeking employment as an assistant superintendent of grounds at a stadium or golf course.

A Superintendent's Concern

A Golf Course Weather Station: Design and Use

Figure 1.

Weather; people never really stop to think how much it controls almost everything that happens in life. For the golf course superintendent, weather is the main factor in growth and health of his turf. In order to provide the golf turf with the best environment for healthy growth, the golf course superintendent must adjust his cultural practices to fit the type of weather the area has been experiencing. That information is available from the local radio station. The radio stations usually receive their information from the nearest National Weather Service Station, experimental stations, or volunteer observers from around the state. However, the reports are only valid in the small area around the reporting station. These reports are good for a general idea of the weather.

Weather can vary greatly in a small area. For example, at Nakoma Golf Course in Madison, the lower portion of the course is usually anywhere from 2° to 10° cooler than the higher portion of the course in the early morning. The science covering this variance in weather conditions within small areas is called "micrometeorology." Variances in local weather is the reason it is a good idea for golf course superintendents to set up a weather station on the premises of their golf course. It could be as simple as a few thermometers and a rain gauge or a more elaborate set-up. This article will deal with what is needed for a basic station and how to use it.

The first task is the selection of a site for the instruments. The best place is an open, grassy area away from trees and buildings where there is good air movement. It is best to keep it near the shop area for easy access and security.

The most basic weather instruments every golf course should have are a maximum and a minimum thermometer. Purchase thermometers with degree scales that are engraved on the thermometer's glass stem because a thermometer with its degree scale on the mounting will eventually become inaccurate due to the thermometer shifting in its metal or plastic mounting. I recommend the #111 Maximum-Minimum thermometers with support and sold by Science Associates (see Fig. 1). The support supplied with the package correctly positions the two thermometers at the proper angle and has the facility to reset the thermometers. The price for this instrument is around $105. The thermometers are built to National Weather Service specifications and are very accurate. The Maximum Thermometer #112 costs about $31 and the Minimum Thermometer #113 costs approximately $25 if purchased individually and without the support.

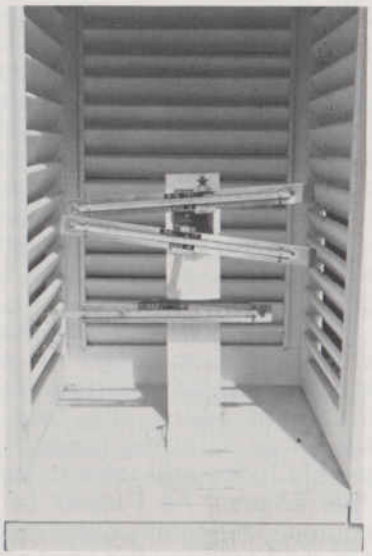


Figure 2. Science Associates #111 Maximum-Minimum Thermometer with Support shown at left and at right properly mounted in an instrument shelter.

A white wooden shelter with louvered sides is recommended for housing the thermometers. The base of the shelter should be about 48 inches from the ground with the door of the shelter facing north. The legs must be anchored to prevent overturning. Science Associates makes instrument shelters. The one illustrated is #176 and is priced around $370. With a little time and effort, a shelter similar to this can be built for much less.

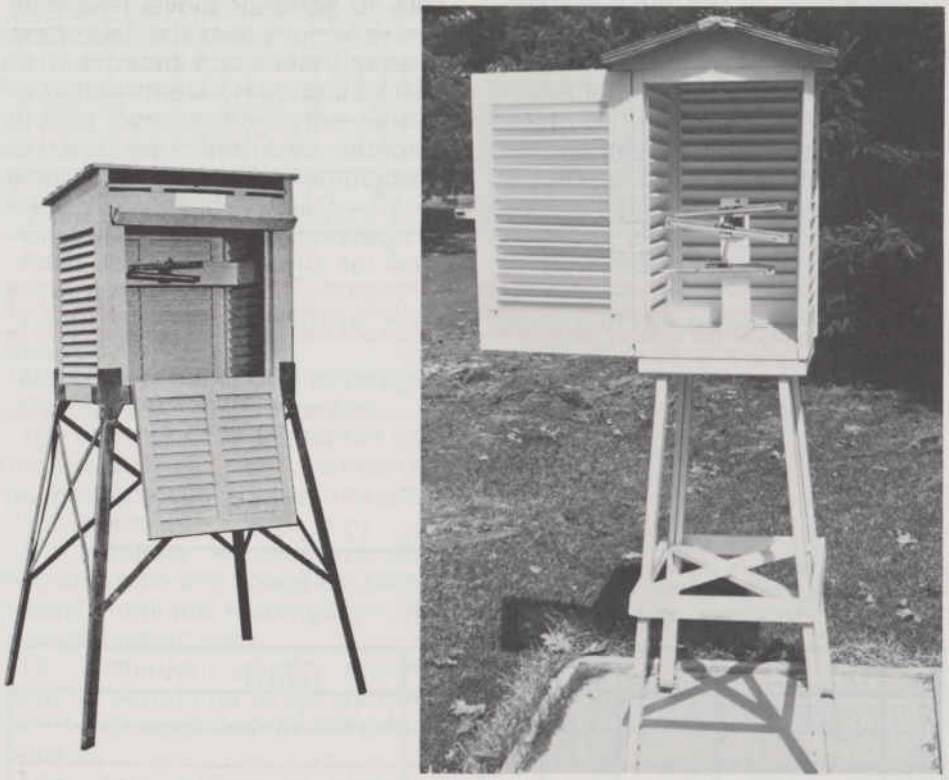


Figure 3. On the left is the #176 Instrument Shelter from The Science Associates, Inc. catalog and a homemade instrument shelter is shown at right.

Another important weather instrument for a golf course is the rain gauge. When searching for a site to place the rain gauge, it is critical to keep it away from buildings and trees which could alter the readings on rain and snowfall. The rain gauge I recommend is the Forester Rain Gauge #509 shown below in a picture from the Science Associates Catalog. For about $40 you get good quality and accuracy. The rain gauge support is a handy accessory that should be considered. Do not place the rain gauge any higher than two feet about the ground.

An additional piece of equipment, helpful to a golf course superintendent, is a wind speed and direction indicator. The stronger the wind, the higher the evapotranspiration rate of the turf. Therefore, a sunny, windy day can dry out a green or fairway faster than a sunny, calm day. Once a good set of records of winds, temperature, and sky conditions are compiled, you can predict at the beginning of the day if you will need to syringe or not. The wind instruments will also help to determine if condition for spraying of pesticides is safe from the threat of spray drift. A good set of wind instruments by Science Associates is the #415-1 Downeaster Combination Wind Set. It sells for approximately $250. Set the anemometer/wind vane apparatus on a sturdy mast, perferably on a hill, above your course's trees.

Figure 5. The anemometer/wind vane apparatus should be mounted on a mast and should be located away from or above any trees or other obstacles in the area.

Another optional instrument would be a barometer. I prefer a recording barometer because it illustrates what has been going on rather than a standard barometer with a dial. A recording barometer utilizes a seven-day chart that rotates on a drum while an indicator arm scribes a line on a graduated chart indicating the barometric pressure. This will help to associate the pressure tendency with different types of weather. Science Associates makes a very good recording barometer at a low price. It is the Electric Magni-Barograph #351(1) priced around $255.

Figure 4. Forester Rain Gauge #509. Collection apparatus is pictured on the left. On the right is the collection cylinder which sits inside the larger collection can. Source: Science Associates Inc. catalog.

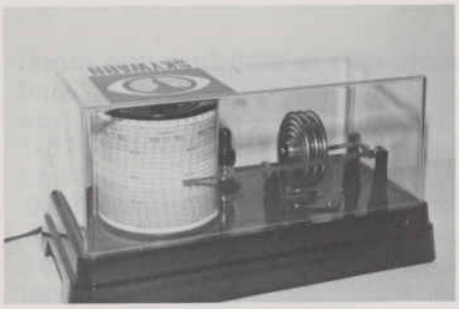


Figure 6. The #351(1) Electric Magni-Barograph scribes a permanent record of the barometeric pressure on seven-day chart.

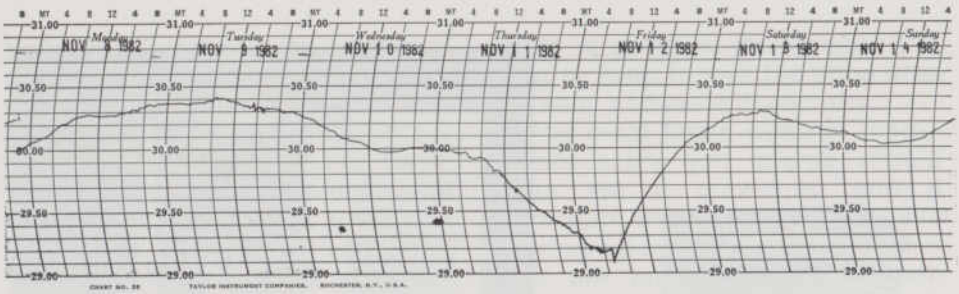


Figure 7. An actual chart taken from a recording barometer. The dive and then rapid rise again in the pressure indicates the passing of a storm system. The erratic changes of pressure observed at the base of the dive in pressure early that Friday morning was due to thunderstorms that moved through the area.

For those who like the automatic digital readout type of equipment the HeathKit Company of Benton Harbor, Michigan, supplies some very reliable electronic weather instruments. One of these is a computerized weather instrument called the Digital Weather Computer. It is almost an all-in-one operation and is an accurate and convenient piece of equipment for the extremely busy superintendent. This instrument measures indoor and outdoor temperature, the maximum and minimum temperature, the current wind chill factor, instantaneous wind speed and direction, the average wind speed and the peak gust, the current barometric pressure and whether it is rising or falling and by how much since the computer was last cleared. Finally, it also keeps the current time and date that the maximum temperature and wind gust occurred and when the minimum temperature was recorded. I highly recommend this piece of equipment. The price of the HeathKit Digital Weather Computer #IDW-4001, fully assembled and tested is about $590. For the person with even the slightest electronics experience, it is available in a ready-to-assemble kit complete with easy to follow instruments. Kit ID-4001 sells for approximately $400.

These are some of the instruments available to equip a golf course weather station. There are other instruments that can be added to measure such things as dew point and humidity, but I feel what I have described are the bare essentials.

Once the station is set up, some type of daily log to record weather observations is needed. A sample log is shown in Figure 8.

DATE Wednesday, July 17, 1979

SURFACE WEATHER OBSERVATIONS

TIME	SKY CONDITIONS	WEATHER	PRESS.	TEMP.	WINDS	REMARKS
0600	CLEAR 0/10	Haze	29.83	68	SW 6	Light Dew
0800	CLEAR 1/10	Haze	29.83	72	SW 8	
1000	P. CLDY 3/10	Haze	29.80	79	WSW 12	
1200	P. CLDY 3/10		29.79	85	SW 13	
1400	P. SUNNY 6/10		29.53	92	SW 17	Pressure Falling Rapidly / Dark to NW
1500	OVERCAST	T-storm	29.41	83	WSW 18	Rain Began 1450 / Wind Gusts to 48
1600	M. CLDY 9/10	Rain Shower	29.57	80	WNW 16	Pea Size Hail From 1505 to 1510 Pressure Rising Rapidly
1700	P. CLDY 5/10		29.64	78	NW 16	Rain Ended 1635
1800	P. CLDY 3/10		29.70	77	NW 12	

	N.W.S.	GOLF COURSE
MAXIMUM TEMPERATURE	91	93
MINIMUM TEMPERATURE	66	66
MEAN TEMPERATURE	79	80
24 HOUR PRECIPITATION ENDING AT 7AM	0.0	0.0
24 HOUR SNOWFALL ENDING AT 7AM	—	—
TOTAL SNOWFALL FOR SEASON TO DATE	—	—
TOTAL PRECIPITATION FOR MONTH TO DATE	1.37	1.02
TOTAL PRECIPITATION FOR YEAR TO DATE	16.07	17.01

COMMENTS Pythium spotted on practice tee and left Front of 14 green. Brown Patch observed on 1, 7, and 15 greens.

Figure 8. A sample daily weather log.

Many of the categories on the log are self-explanatory, however a few may need some clarification. Sky conditions are recorded by taking into consideration the whole sky, not just the area directly above, and judging the amount of cloud coverage in tenths.

Clear = 0/10 to 2/10 coverage

Partly cloudy = 3/10 to 5/10 coverage

Partly sunny = 6/10 to 8/10 coverage

Mostly cloudy = 9/10 coverage

Overcast = 10/10 coverage.

The weather column records any precipitation or weather phenomenon occurring at the time of the observation.

The pressure, temperature, and wind direction and speed are taken directly from the readings on the weather instruments.

The remarks column reports anything pertaining to the weather that is not recorded in the other columns.

The next section is climatological information. One column is for the National Weather Service readings and the other for the golf course's data. This allows a comparison between the golf course's weather station and the closest official weather station. The National Weather Service's climatological data for each day is listed in the newspaper.

The final section is for comments on any problems that showed up that day on the golf course's turf or ornamental plantings.

This is a rather extensive log, but it shows what kind of information can be gathered with a few instruments. Most superintendents will probably want a more simplified log.

A very good book on the basics of Wisconsin's weather called *Wisconsin Weather*, by Richard S. Palm and Anthony R. deSouza (2nd ed., Burgess Publishing Co., Minneapolis, MN, 1983), is excellent background reading for the beginning weather observer. The first three chapters explain the basics of weather. Chapter four gives an overview of Wisconsin's weather month by month. Chapter five deals with weather forecasting. Chapter six contains up-to-date summaries of weather variables (precipitation and temperature averages and extremes) for 147 stations throughout the state.

By correlating weather records with turf reactions to the weather, a superintendent can improve his or her understanding of the course's turf—its weak points and its strong points. With this information, preventative measures can be taken before the turf or ornamental plantings begin to suffer.

Below are the addresses of the companies mentioned. I have found them to be very responsive and reliable.

Heath Company
Benton Harbor, MI 49022

Science Associates, Inc.
P.O. Box 230
Princeton, NJ 08540

WGCSA SEPTEMBER MEETING
Milwaukee Country Club
Milwaukee
September 17

QUIT-QUI-OC HOSTS EXCELLENT MEETING

We couldn't have ordered a more beautiful summer day than the one we were given for our June meeting at Quit-Qui-Oc in Elkhart Lake. Paul Muller had the golf course in beautiful condition and WGCSA members had the opportunity to play around several new water hazards, compliments of heavy weekend rains. Tom Wiese, Golf Pro and Manager of Quit-Qui-Oc had some fun events for the golf participants. The winners were as follows:

Closest to the Pin — #34		Dick Evenson	
Longest Drive — #8		John Krutilla	
CLosest to the Pin — #12		Roy Zehren	
Longest Putt — #18		Steve Blendell	
Best 2 of 4 Man Best Ball Event			
1st	124 — 16 Under	Al Vrana	
		Chad Ball	
		Jim Belfield	
		Steve Blendell	
2nd	125 — 15 Under	Gary Monfre	
		Dewey Laak	
		Mike Lees	
		Ron Grunewald	
3rd	126 — 14 Under	Rod Johnson	Roger Bell
		Paul Muller	Pat Norton

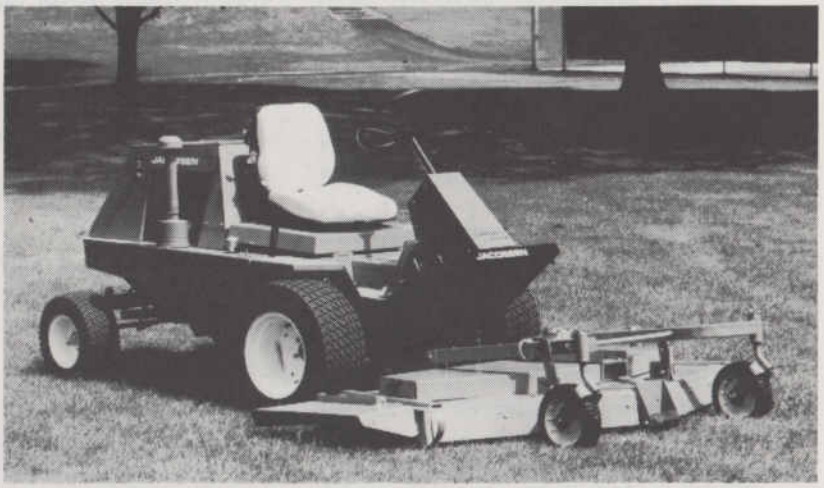
The speaker for the meeting was Dr. David Roberts. Dave, a Plant Pathologist from Michigan State University, updated WGCSA members on the bacterial wilt problem. He was a grad student under Dr. Joe Vargas and his Ph.D. thesis was a study of bacterial wilt on Toronto C-15 Bentgrass — a very thorough and definitive study of the problem. The bottom line of Dr. Robert's remarks is that the problem is potentially serious and devastating for the turf industry and it is not receiving the proper attention nor concern it should be from research or research funding. We all have an obligation to encourage, even insist, on monies from appropriate funding groups to further the research needed for bacterial diseases.

Dr. Roberts was treated to some real Wisconsin hospitality during his two day visit to the Badger State. Jerry Kershasky met him at Mitchell Field and had arrangements made for a tour of County Stadium and of the Milorganite manufacturing facility at Jones Island. After the meeting, they returned to Milwaukee where Dave spent the night. On Tuesday, he was given a tour of Milwaukee Country Club by Dan Quast before returning to East Lansing. We like to think another one of the highlights of his trip here was a donation of $400 from WGCSA members for his research program.

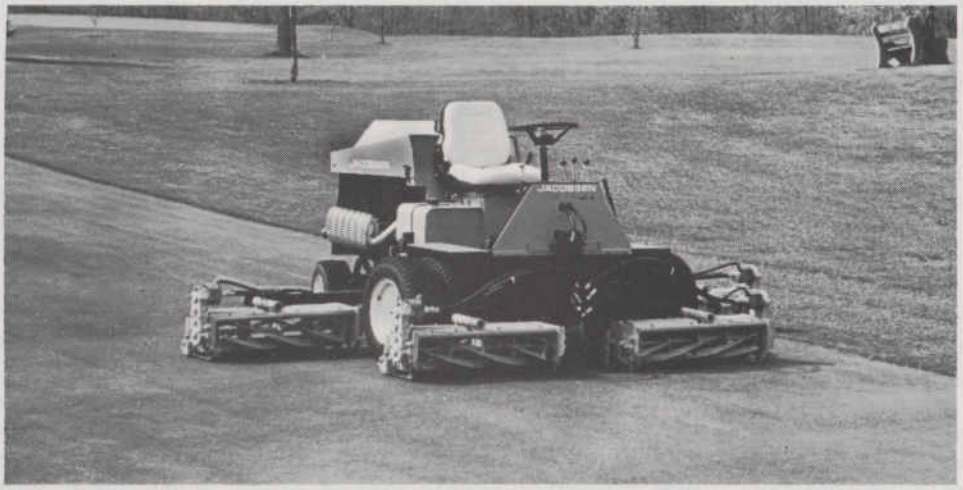
All in all, it was another great meeting.

JACOBSEN
TEXTRON

TRIM KING



TURFCAT II



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Editor's note: Michael R. Semler is currently the Assistant Golf Course Superintendent at Blackhawk Country Club in Madison. He is a 1983 graduate of the University of Wisconsin — Madison with a B.S. degree in Soil Science with a specialty in Turfgrass Management. In addition to working at Blackhawk Country Club for two years, he was a member of the golf course staff at Hartford Country Club for the previous five years. Mike, a 10 handicap golfer, was also a member of the Evans Scholars Fraternity for four years.

KEEPING OUR HEADS HIGH!

By Michael Semler

At the 1983 International Turfgrass Conference, I heard Michigan Congressman Guy Vander Yagt give his keynote address at the opening ceremonies. He really caught my attention when he said, "golf course superintendents were environmentalists and ecologists before the rest of the country even knew the words existed, let alone knew what they mean." After hearing this, I thought about what he had said and realized that we, as golf course superintendents, have nothing to lower our heads about when confronted by people who feel golf courses are a waste of good land. After more thought, I had compiled a pretty good sized list of the ways which golf courses are environmentally sound and are a benefit to both golfers and nongolfers. What follows are some of the ideas which give us a strong argument in favor of golf courses as well as some things we can do to be more environmentally efficient.

The most obvious reason for supporting golf courses is because it is an area for recreation and relaxation for millions of golf enthusiasts around the world. Whether it is with our family or our friends, the golf course is a place to take time and enjoy the surrounding beauty which we superintendents provide. As urban sprawl continues, I tend to think of a golf course as a tranquil oasis in a desert of concrete and asphalt. Everyone is struck by some awe when they pass by a golf course, amidst its' neighbors of cement buildings, and admire the carpet of green grass and the majestic trees. The exodus of urban dwellers to parks, forests and golf courses on the weekend helps support the idea of a tranquil oasis and the necessity for these areas.

At Blackhawk Country Club, my present employer, we try to provide our members with a wide variety of plant materials. Such plant genus' as Oak, Spruce, Fir and Maple are typically used on most golf courses. What we try to do is plant some of the less common species, and possibly some of the more expensive species, of each group. For example, instead of planting all Red or Pin Oak, we plant four or five different species of Oak, including White, Bur, Chestnut and English Oak. With this plant material variety, we get explosions of various colors, fruits, shapes and sizes throughout the entire golfing season. Not only does this variety give a year-round display, but it helps to attract many species of birds and animals which may otherwise avoid the area. All of this adds beauty and mystique to the course in the eyes of the golfer and helps add to the enjoyment and relaxation.

The enjoyment a golf course provides as an area of recreation will only directly benefit golfers. So what about the nongolfer who may only catch a moments glance and a moments awe? How else does this person, as well as everyone else, benefit from the presence of a golf course?

Probably one of the biggest benefits we all receive from a golf course is from the conversion of carbon dioxide to oxygen through photosynthesis. We all require oxygen, and the average 18 hole golf course, approximately 150 acres, can provide enough oxygen to sustain life for 10,350 people daily. This is a substantially larger amount than that provided by a parking lot or a building.

In additon to the liberation of oxygen, turfgrasses have a temperature regulating effect. Grass cools the air around itself by releasing water through transpiration, an energy transferring operation that cools the grass leaf surface and dissipates concentrated heat. It is essentially a natural air conditioner. Not only does the grass leaf cool itself and the air nearby, but it only absorbs 50 — 60 percent of the total incoming solar radiation, while pavement and buildings can absorb up to 90 percent. This reduces the amount of heat absorbed by the plant, and along with the release of heat through transpiration, provides an environment which is cooler than that near pavement or buildings.

The plant materials superintendents maintain, namely grass and trees, also act as air purifiers. Their vast leaf surfaces adsorb and filter out large amounts of soot, dust and other annoying particles. Turf and trees help slow down air movement and help these particles settle out. These particles are then attracted and held on the leaf surfaces by static electricity, and washed harmlessly into the soil by rainfall.

Green leaves also trap many of our gaseous air pollutants such as sulfer dioxide, ozone and peroxyacetyl nitrate. Plants are injured when they take in too much of these pollutants, but they continue to absorb these toxic gases as long as functioning tissue remains. The ability of plants to remove air pollutants is one of the important reasons for preserving greenbelts in our cities and towns. Another air pollutant, hydrogen fluoride, can cause injury to crops in minute concentrations of 0.1 part in one billion, but grasses can accumulate several thousand times that amount without injury.

Urbanization creates large areas which are impervious to the infiltration of water. The extensive root system of healthy turfgrass opens channels in the soil to help the percolation of water into deeper soils. This deep percolation helps to replenish valuable underground water supplies. During a 3-inch rainfall, the average 150 acre course can absorb 12 million gallons of water. Only a virgin forest is more absorbent than healthy turf.

One of the major problems of our nations waters today is sediment pollution. In some areas, erosion of topsoil is occurring at a

faster rate than it can be produced. But the amount of soil eroding from turf is so small as to be nonexistent. This is also important because phosphorus — the element which nourishes algae growth and speeds up the process of lake eutrophication — enters water attached to soil particles. Thus turf does an amazing job of reducing the amount of phosphorus entering water through erosion and helps prevent the accelerated eutrophication of lakes.

Obviously, the most natural or environmentally sound action would have been to leave the land designated for a golf course in its "natural" state. However, we know the possibility of this occurring is very slim. As a golf lover, and hopefully a future superintendent, I consider a golf course the next best thing to the natural state.

As superintendents, we have the possibilities to manage our courses in a very resourceful and environmentally safe way. We are constantly reminded of the harmonious relationship we tend to between the golf course and the environment it is in. The environment affects the game as much as the superintendents' management practices do, and may be more. But also, the environment is the key factor in determining our management of the course.

There are thousands of ways in which superintendents can, and do, act resourcefully and environmentally safe. In my mind, one of the most important actions we can take is using the research and extension programs related to turf which are available from our colleges and universities across the nation and throughout the world. For example, through research we have found out that we can reduce the amount of fertilizer applied to annual bluegrass fairways, and still keep the turf healthy, beautiful and under good playing conditions. We have reduced expensive fertilizer costs and more likely, reduced maintenance, irrigation and pesticide needs. Isn't this an environmentally sound practice?

Reducing fertilizer amounts is only one of thousands of ideas obtainble from research. What about research in developing turf cultivars for disease resistance, wearability and drought tolerance. Or the most effective pesticides or pesticide programs available. The list is endless and only a fool would ignore this information since the research can save money and can help produce a more environmentally sound golf course while maintaining or increasing playing quality.

We can all relate to the problem fall poses on the golf course — fallen leaves everywhere and what to do with them. At Blackhawk Country Club, we do as many golf courses do to handle the situation, and this is to mulch them in the rough areas. Since it is necessary to remove the leaves from fairways, greens and tees for playability reasons, a 3-bladed rotary mower is used to chop the leaf material into small particles, once it is blown off of these playing surfaces. By grinding up the leaves, they are more easily decomposed and the nutrients present are returned to the soil. By returning the nutrients which were taken up and used to produce leaves, we may help produce stronger and healthier trees and turf. If the leaves are left to lay, they cause problems for the players. If they are picked up and hauled away, machinery, fuel and labor costs are increased. Not to mention the fact that once hauled off the course, how do you dispose of them. Landfill sites are precious and costly. Composting is possible, save for the odor, the large pile and the space necessary to store them. However, an environmentally sound action that we can take is to return to the soil what has been taken out.

Pruning trees is usually done on a routine basis. It is beneficial because it produces a desirable form of a particular tree or shrub. But what do we do with the twigs and branches which are removed. Again, landfill storage can be questionable, yet we must do something with it or else we would become buried in decaying brush. A solution is to chip the smaller branches into a groundcover material and use the larger pieces as firewood. Since we can use this mulch as a groundcover in plant beds and selected areas on the course, we can return to the soil what has been taken out by the plant. By doing this, we are acting in an environmentally and economically safe means.

Golf courses require large amounts of fertilizer products to keep the turf healthy. There are many fertilizer types on the market, put out by a multitude of companies, with just about any type of formulation desired. However, one fertilizer type, namely, Milorganite, is especially useful for our purpose of being environmentalists.

Milorganite is produced by the Milwaukee Metropolitan Sewerage District, MMSD, and rightly so since it is produced from sewage sludge. MMSD produces and sell about 60,000 — 65,000 tons of Milorganite annually. Golf course superintendents readily use this quantity because of its desirable characteristics. But many of us do not realize the significance of this. We apply Milorganite to benefit our turf, and in the process we are benefiting our society by saving tax money and preserving environmental quality. Because if it were not through our harmless spreading of Milorganite, sewage sludge, on our turf areas, MMSD would have to first find a landfill site suitable for sludge disposal which is close to Milwaukee and secondly haul the sludge to this sight, all the while trying to be as cost effective as it is to produce Milorganite. It is cheaper to produce Milorganite and spread it safely on our golf courses than it is to haul to landfill areas. Once again, we are environmentalists.

Every winter, almost all golf courses do some type of maintenance work on their equipment. The extent and type of procedures done are not of critical importance at this time. It is important to realize that the maintenance performed is done to help the machine operate properly and efficiently, and hopefully extend its life. This is a good practice since it can save resources by reducing new equipment needs and save the need for new materials to make them, reduce fuel consumption and hopefully save headaches in the summer from broken down equipment. But we can go one step further. Instead of discarding old, worn-out bedknives and other metal products in the garbage, why not turn them into a scrap metal dealer where they can be recycled and reused. Dirty engine oil, old tires and many other petroleum