WESTERN VIEWS

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PRESIDENT'S MESSAGE
Roger Barton

In the past thirty years that I've been in the golf business, I have never seen a drought this bad. This is truly the year of the hand watering hose and the irrigation key, and I think we all understand what that means. In the Grand Rapids area we got relief from the drought on July 17, and now we have a new set of problems; high humidity and disease. That is all part of the life of a golf superintendent.

I'm looking forward to hosting the Golf Day at Blythefield Country Club, and I know Keith Paterson is looking forward to co-hosting it at Kent Country Club. Remember, if you want to play Kent C.C., sign up for the morning shotgun at Blythefield. The board of directors has been very generous here at Blythefield C.C., and is donating the green fees and golf carts on Golf Day. This will give W.M.G.C.S.A. more to donate to the Michgian Turf Foundation.

Chris Fochtman, C.G.C.S. Golf Day Chairman, is working hard, so let's have a good turnout and a fun day.

I would like to thank Charles Richardson and his club, Berrien Hills C.C., for hosting our June meeting. The golf course was in fine shape and we had a great dinner. See you at Golf Day!

Sincerely,

Roger Barton

Meeting Schedule

August 29 - Golf Day, Blythefield C.C.
September 20 - Annual Meeting, Sunnybrook C.C.
October 4 - Gull Lake C.C.
November 4 - Fall Party, Walnut Hills C.C.

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WOMEN ARE LEADING THE WAY AS U.S. GOLF POPULATION CONTINUES TO RISE

More Americans are playing golf than ever before, and women are taking up the game in unprecedented numbers.

The latest study by the National Golf Foundation, *Golf Participation in The United States, 1988 Edition,* shows the number of golfers in the country rose in 1987 from 20.2 to 21.7 million. . .a 7.4% increase.

It also shows that the percentage of females among new golfers has nearly doubled since 1983 when the NGF issued its first golf participation report. That year, women accounted for just 21% of those taking up the game. Of the two million who played golf for the first time in 1987, some 854,000 or 41% were women.

"Many women, particularly those in their twenties and thirties, are discovering the game of golf," says NGF President and CEO David B. Hueber. They are attracted to the game for several reasons: It's a sport which offers socialization as well as challenge; it also can be combined with business in a relaxing setting; and it is enjoyable at any level of play.

"If women continue to begin playing golf in the same numbers as they have in our recent surveys, the total numbers of golfers in the U.S. will grow faster than previously projected," Hueber says. "And this increased demand will further widen the gap between golf course supply and demand, thus highlighting even more the need to accelerate the rate of new golf course construction."

Hueber noted that the potential shortage of golf facilities is one of the key agenda items for Golf Summit 88, scheduled for the Marriott at Sawgrass resort hotel November 15-17. More than 350 industry leaders will be discussing, among other things, how to deal with a U.S. golf population that is expected to skyrocket to 30 million by the Year 2000.

The report shows California currently leads the nation with 2.5 million golfers, followed by New York State (1.5 million); Michigan and Illinois (1.3 million each); and Texas and Ohio (1.2 million each). Florida, which has led the last three years in the creation of new golf courses, became the seventh state to eclipse the million golfer mark. There are now 1.03 million golfers in the Sunshine State compared to 923,594 in 1986. Florida and California are joined by five other million-golfer states, including Texas (1.2 million); Ohio (1.2 million); Michigan (1.3 million); Illinois (1.3 million); and New York (1.5 million).

The NGF report also tracks participation rates, i.e. the percentage of golfers in the country has remained relatively stable, at between 9% and 10%. (The current national participation rate is 9.7%.) However, these participation rates vary from state to state.

For instance, Wisconsin leads the nation in participation, with 15.9 percent of the citizens in the Badger state being golfers. Mississippi has the lowest participation rate with only 3.6 percent of its population playing golf.

Although the number of golfers in the country has increased, the study shows that the average number of rounds played dipped from 20.1 to 19.4 in 1987. NGF researchers feel the decrease is an indication that, while there may be more golfers today, they are playing less frequently. This drop in frequency is most likely the result of overcrowding at many of the nation's golf courses, a condition that is being brought on by a recent slowdown in the construction of new golf courses.

Golf Participation in the United States is updated each year by the National Golf Foundation. It is based on surveys completed in January and published each spring. A nonprofit golf research and market development organization, the NGF is supported by more than 5,000 members of the golf industry. Included are golf course architects and builders; national and state golf associations; course owners and operators; sponsor companies; individuals; and the major golf companies.

HONORING HAROLD PECK

On Friday, June 17, 1988 Battle Creek Country Club held a dinner to honor their retiring superintendent, Harold Peck. The dinner was attended by members, family, fellow superintendents and dignitaries in the turf industry. The following article reviews Harold's distinguished career.

Though Harold has been Grounds Superintendent at the Battle Creek Country Club for 41 years, he remembers with clarity the first day in his new home at the club, October 23, 1922. His father, Andy Peck, Greens Superintendent, was planting elm trees at No. 1 tee and at the practice tee. The family moved into a home just north of the old club house.

Says Harold, "My boyhood was spent playing with my brothers on the golf course and in the woods in back of the course. Summers we'd go swimming and fishing nearly every day, but we'd also help with the garden, take care of our chickens and help Dad milk the cows."

As the five Peck boys grew older, they all helped their father on the course, taking particular delight in driving the club's 1928 Model A Ford pick-up truck, which Andy used on the grounds.

When Harold was fourteen, he went to work doing odd jobs for two club members — Dr. Sleight and Dr. Mustard. He remembers being paid twenty-five cents an hour.

Harold graduated from Lakeview High School in 1941 and immediately went to work at Clark Equipment Company. During World War II, he worked part-time for his father at the golf course "because help was hard to find."

In 1946 Harold was hired as assistant to his father and in November, 1947, when Andy Peck passed away, Harold was named Golf Course Superintendent.

Harold recalls that in the early days the fairways and tees were mowed only once a week, and the greens were mowed four times a week. He recounts with pride rebuilding every tee on the course, building new sand traps and increasing course fertilization, weed and disease control, plus installing a modern, automated watering system which his son, Marty, helped engineer. Among "the toughest jobs" Harold has supervised on the course were filling and reconstructing of numbers 6, 13, 9, 10 and 14 fairways, along with construction of a pond and rebuilding the creek.

"Through the years,"Harold recalls, "I have cut down about 800 elm trees, most of which my dad had planted, but I have planted over 2,000 new trees."

Harold Peck and his father, Andy, have played an integral and important role in the development of the B.C.C.C., going back to 1919 when the course was moved from Leila Arboretum to its present location. Andy helped construct the "new" golf course, and Harold has carried on the family tradition of course maintenance and construction.

Of this long association by father and son, Harold says, "The transition that has taken place from the old course to the present, over 69 years, has resulted in a beautiful golf course that we all can be proud of." He continues, "My position had been very enjoyable as I've been able to do things I've taken pride in, plus keep up the home that we raised our family in."

Harold and his wife, Jayne, who were married in 1944, have two grown children, Andrea and Marty. In retirement Harold wants to continue work on his garden, fish and hunt, and spend time visiting his daughter in New York and his son in Wisconsin.

We the members of the Battle Creek Country Club wish you and Jayne a happy and healty retirement!

IN JAPAN, OBSESSION WITH GOLF CAN COST INVESTORS MILLIONS

Earlier this year an avid golfer reportedly offered $3.57 million to buy a membership at the exclusive Koganei Country Club. But, in an indication of the fanatical attachment of the Japanese to the game, no Koganei member was willing, even at the unprecedented sum, to sell.

In this land where open space is scarce and golf is an obsession, country-club memberships are so valued that they have assumed to status of investments, held by businesses as well as individuals and traded like securities through brokers around the country. The talk on the fairways of Japan may just as likely be of profit taking in golf course memberships as bargain hunting on the Tokyo Stock Exchange.

"It's like the stock market, except instead of buying and selling stocks, people are buying and selling golf memberships," said Sadao Ushijima, director of Kanto Golf Membership Brokerage Corp. in Tokyo, one of more than 500 such brokers around the city who have handled golf-membership trades over the years.

Just like the stock market, too, the market in golf memberships has hit its high this year. Prices for memberships peaked in February, reaching $3.5 million at Koganei, which is one of Tokyo's most exclusive clubs, and $80,000 to $1 million at others. Since September 1986 there have been cases in which prices have doubled within a two-month period.

The prices also reflect the popularity of the sport in Japan, where more than 10 percent of the population is said to play. It is not uncommon to see businessmen, waiting on subway platforms, practice their swings with invisible clubs. There are 1441 golf courses in the country, with more than 100 under construction.

The sport is popular in the United States, too, but there are about nine times the courses — more than 13,000 — and memberships, while valued, are handled through the clubs at prices far below the Japanese level.

According to Alfred M. Carracia, President of The Golfers Association of America in Hollywood, Florida, members in some of the most exclusive U.S. clubs, which make up the majority memberships, cost $3,000 to $5,000 and yearly dues are around $1,500.

In Japan, however, even non-golfers and businesses have been buying memberships since the prices began to climb — "strictly for investment purposes," Ushijima said.

The economic slowdown in Japan has reduced the need for investment in plant and equipment or new enterprises, and so businesses are speculating in golf course memberships. It is part of a phenomenon here known as "zaitech," or "the money game."

The phrase is borrowed from the English expression "high-tech" and refers to Japanese businesses trying to make money in ways unrelated to their industries by investing, for instance, in securities, in real estate and even in golf-course memberships.

When companies use their memberships, it often is to entertain clients. The game is used — much as in the United States — to get to know business associates.

Country clubs usually limit memberships to a few hundred people, and they may refuse membership if the applicant does not meet certain qualificaitons. The brokers, who charge a 2% commission for each transaction, serve as intermediaries and determine whether a prospective buyer qualifies. But having the money, as the newspaper Tokyo Shimbun puts it "primes the pump."

Few of Japan's golf courses are public, so many golfers get little chance to play.

CREDIT: Greensworld, Hoosier Turfgrass Assn., June 1988

TEMPERATURE FOR WORLD RISES SHARPLY IN THE 1980'S

Some scientists maintain that they are finally seeing results of greenhouse effect

Average global temperatures in the 1980's are the highest measured since reliable records were first kept over 130 years ago, according to reports now coming in from scientists around the world.

Temperatures have been rising more or less steadily for much of the last century. But, its the view of some scientists, a sharper rise detected in the 1980's is the most persuasive evidence yet that carbon dioxide and other industrial gases are tapping heat in the atmosphere and warming the earth as if it were a greenhouse.

In interviews, meteorologists and others engaged in plotting global climate trends were cautious about blaming the greenhouse effect for the recent sharp increase, saying mathematical modes of the phenomenon project much sharper increases than have so far occured.

But several agreed that if the pattern persisted into the next decade, it would almost certainly mean that an era of global warming, caused by humans and certain to affect them in major ways, has begun.

How hot is the world now? The scientists do not offer a straightforward response, saying that the vast amount of data is still being studied and that comparisons cannot be precise. But the data gathered by American, British and Soviet scientific teams generally show a faster warming so far in the 1980's than in the century before. And most of the readings agree that the three or four warmest years on record occurred in this decade.

One of the scientists, Dr. James E. Hansen of the National Aeronautics and Space Studies in Manhattan, said he used the 30-year period 1950-1980, when the average global temperature was 59 degrees Fahrenheit, as a base to determine temperature variations. He said his readings showed that the average global temperature rose about as much since the base period as it did from the 1880's to the base period — about half a degree in both cases. He stressed that these were estimates and that it would take millions of measurements to reach an accurate global average.

Mathematical models project that at the current rate of buildup of the gases thought to cause the greenhouse effect, the average global temperature will rise from the 59-degree base by 3 to 9 degrees Fahrenheit by about 2030, with increases substantially greater at higher latitudes, but lower increses near the Equator.

Dr. Hansen said the temperature was increasing in this decade even as natural factors were keeping surface temperature lower than they might have been. These factors, he said, are relatively low radition from the sun and high volcanic activity, which produces particles that tend to filter out some solar radiation.

As the earth warms, experts predict major changes in climatic patterns and a gradual rise in sea levels as the warming oceans expand and polar ice melts. Coastal flooding, dust bowls, sharply reduced crops, and dying forests could result in some regions. On the other hand, some relatively barer areas might become farmlands.

Tom Wigley, director of the Climatic Research Unit at the University of the East Anglia in Britain, said that his data, taken from stations on the ocean as well as on land, found that 1987 was "the warmest year on record" and that the three warmest years in the record were 1987, 1983 and 1981.

He said in a telephone interview that, while some of his data supported the predictions of the greenhouse models, others did not. For one thing, he said, the temperature

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WORLD TEMPERATURE *(Continued from Page 7)*

levels in the higher latitudes of the Northern Hemisphere did not rise as fast as the models predicted.

'HARD TO DENY'

But he said that if "the next 10 years are as warm or warmer, it would be very hard to deny the green house effect," adding, "It is very hard to deny now."

"Chances are the greenhouse effect is not as strong as some people say, but you can't say it isn't happening at all," he said.

Both Dr. Wigley and Dr. Hansen said temperatures taken by Soviet scientists were similar to theirs.

Temperatures in the United States in this century did not rise as fast as global temperatures. Several explanations are possible, including a different climate circulation over the country and pollution particles that block radiation. Still, measurements by the National Atmospheric Administration show that the last few years were substantially warmer than any year since the 1950s in the United States.

Thomas Karl, research meteorologist for the center, said that 1986 and 1987 "were both unusually warm" in this country with an average of 54 degrees Fahrenheit for both years.

"Our data are not inconsistent with the greenhouse effect", Mr. Karl said, but "I am more cautious than others. I found you can get in a heap of trouble if you lok at a climate time series and draw an inference. You can get swings that last for 10 or 20 years.

GRADUAL RISE SINCE 1800'S

Global temperatures had already shown a gradual rise since the late 1800's. The century-long warming trend is still considered a "real mystery", although the greenhouse effect is probably part of the answer, said Alan Hecht, director of the National Climate Program, A Federal office.

Dr. Hecht noted that the earth was now in the later stages of an interglacial period, meaning the temperatures should be growing colder as a new ice age approached.

He said the amount of carbon dioxide in the atmosphere has risen from 280 parts per million to 340 parts per million over the last century, probably because of the burning of the fossil fuels and the destruction of forests whose trees use carbon dioxide.

A LAG IN TEMPERATURE RISE

Given that increase of carbon dioxide, global temperatures should have increased by almost 2 degrees Fahrenheit over the century, under the assumptions of most of the models. But in fact they increased only 1

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WORLD TEMPERATURE *(Continued from Page 8)*

degree, said Michael E. Schlesinger, associate professor of atmospheric sciences at Oregon State University.

One possible explanation, he said, is that "the models are more sensitive than nature." A more likely explanation, however, is a lag between the emission effect because much of the extra heat is stored in the oceans rather than moving immediately to the atmosphere.

Dr. Schlesinger said testing the greenhouse models required not just taking readings of globel temperatures, but also plotting their geographical distribution. He said that he and colleagues were doing that now and that the results were, so far, mixed.

Meanwhile, human activity is sending carbon dioxide and other gases that trap radiation from the sun, including chlorofluorocarbons, methane and nitrous oxides, into the atmosphere at faster rates. If the models are correct, that means that global temperatures will rise sharply. Chlorofluorocarbons are also believed to be destroying the stratospheric ozone that shields the earth's surface from ultraviolet radiation from the sun.

Michael Oppenheimer, an atmospheric physicist with the Enviromental Defense Fund, a group based in New York, said, "If the last few years are taken seriously it means the world is now warming very rapidly and, at the beginning of the next century, the climate warming will be the major enviromental problem of the globe."

NOT SO FAST

by
Jeff Sobul

Recent trends have sent golf course greens cutting heights down and green speeds up. But somewhere along the way, some people forgot about that little fellow, the grass plant.

Tired of being walked all over, the little green (and sometimes brown) plant started retaliating at the players who wanted those lightning speeds. Unfortunately, the superintendent was pretty much the recipient of abuse from plants and players alike.

The lower you cut turf, the more susceptible it is to disease and stress. Then, by reducing fertilization — as some courses did to improve speed — the plant is denied nutrients needed to sustain healthy growth.

Jim Hippley, superintendent at Salem (Ohio) Golf Club, provides a good example of what many supers face. "We mow at 1/8 of an inch because the membership requests it," he says. "That," he adds, "results in many sleepless nights."

Another Ohioan, John Spodnik at Westfield Country Club, finds himself in a similar situation. He also mows his green at 1/8 of an inch at member request. "The 'hot 100'— June, July and August— puts a strain on the grass," he notes. "Needless to say, the turf manager must perform accordingly at his best. Sometimes that is not good enough."

Are superintendents being forced to worship the almighty stimpmeter? Or are they finding ways to keep the faith without offering sacrificial turfgrass?

Scott Niven at the Stanwich Club in Greenwich, Conn., seems to have found some middle ground. "We used to cut at 1/8 of an inch, nine cuts a week," he notes. "Greens were fast, but deteriorated in quality. Values in excess of 10 on the stimpmeter were too fast to be fair on greens with slopes like mine.

Now we cut $^{9}/_{64}$ of an inch. Greens are a bit slower (8.5-9.5)," he says, "but healthier, better looking and easier to manage."

Sometimes it's situational, with speeds and height varying according to the time of year or occasion. Such is the case at the prestigious Greenbrier in White Sulphur Springs, W. Va.

In the past, executive director of golf and grounds Robert Mitchell has had speeds as high as 12 to 13 on the stimpmeter for the 1979 Ryder Cup matches. For other tournaments, Mitchell keeps greens at around 9.5.

Otherwise, he says, "my opinion is that the guests who come to play the Greenbrier enjoy our courses with a putting speed of 8.5. Thus, I try to keep speeds between eight and nine on our three 18-hole courses."

That means a swing away from scalping. Mitchell believes a 1/8-inch cutting height is too low for bentgrass / poa greens in his region.

I prefer verticutting, top dressing, judicious use of fertilizer and chemicals, and even double cutting," he explains.

Also, recent technological advancements are making their way onto the market. That will improve speed and texture without lowering cutting height. Most notable are the turf groomers.

Jacobson's Turf Groomer was the first to enter the market and was followed shortly therafter by Toro's Grooming Reel and Lesco's Groomer. Since these are pretty new to the market, their collective effect is yet to be felt.

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NOT SO FAST *(Continued from Page 9)*

VARIABLES

Most superintendents will continue to use existing equipment and techniques to manage greens.

Chuck Clark of The Broadmoor in Colorado Springs, notes, however, that adjustments are a constant necessity. Weather conditions, he says, can change stimp readings from morning to afternoon. "When weather conditions don't cooperate, speeds which may begin the day at around nine may end up at 11 before the day is over."

To help keep his greens (and himself) out of stress during uncooperative weather, he has added a syringing system around all the greens to help preserve them with little inconvenience to the golfer.

GOOD INTENTIONS

The original intent of the stimpmeter was to determine consistency of green speed from one green to the next and act accordingly to keep them consistent, thereby introducing skill into holing a putt.

Golf course architect Mike Hurzdan, Ph.D., would like to see skill returned to putting. He finds it ridiculous that the best players in the world would three-and-four putt from 10 or 12 feet, as they did at the 1982 Masters—the year August switched to bentgrass "on slopes designed for Bermuda," he says. "Putting became luck, not skill." Hurzdan points out that Alister MacKenzie designed Augusta's green contours with Bermudagrass in mind.

"The point is," Hurzdan believes "if putting is to be a skillful pursut, then speed and slope must be matched."

Accomplishing this will take some time. Some help from the PGA and its members would be a good start. Playing pros are the most visible and influential people at pointing the way, as they did with higher speeds. They can do the same by moving back towards Hurzdan's three S's: speed, slope and skill; and a return to proper stimpmeter use.

"The stimpmeter can be a useful tool only when everyone has been properly educated to its intended use and an agreement has been struck as to how it will effect our management practices."

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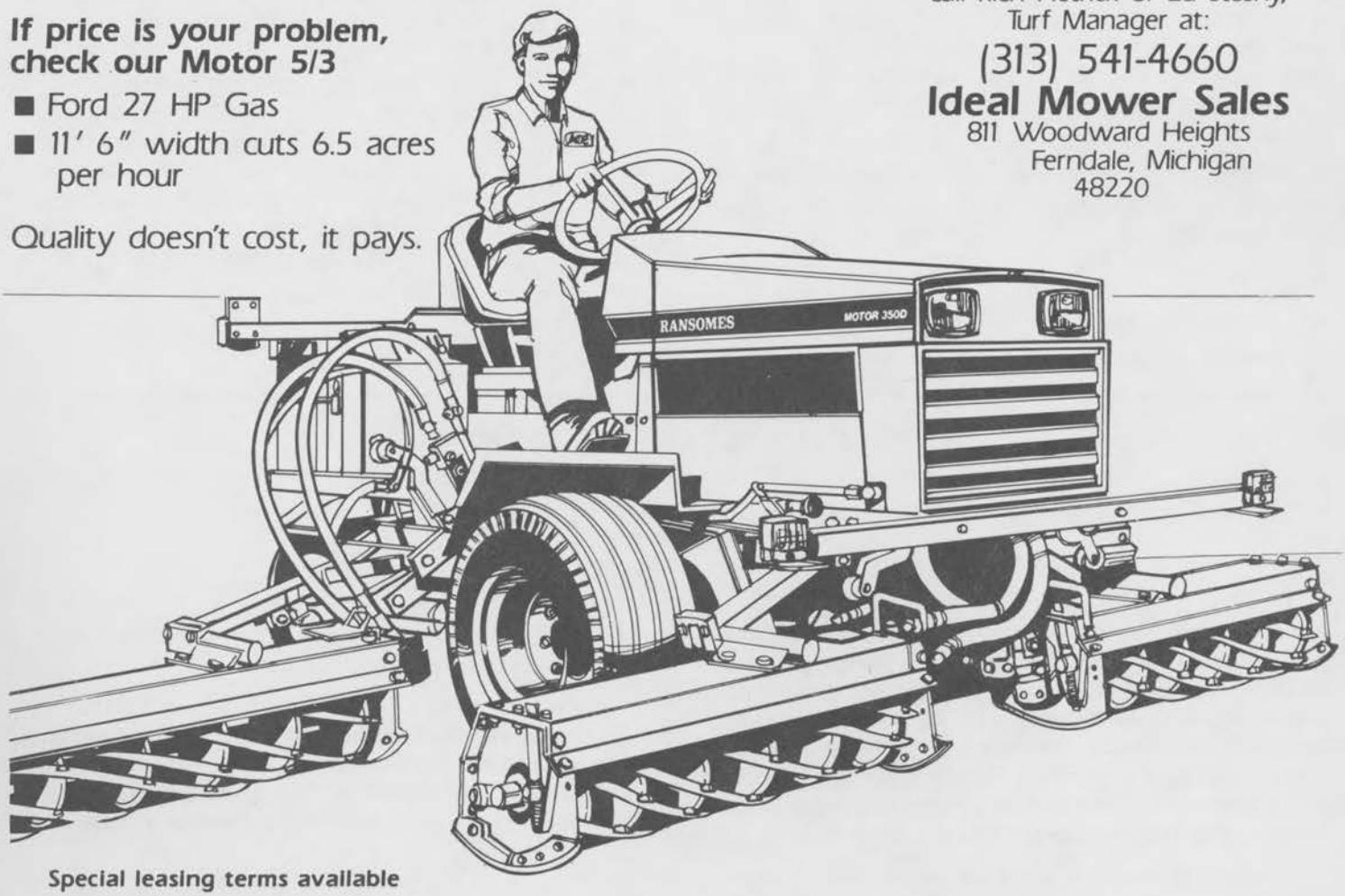

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PESTICIDES AND PROTECTIVE CLOTHING

by
Marjorie A. Sohn, Associate Professor
University of Illinois

Exposing your skin to some pesticides presents a health hazard and clothing provides a vital protective barrier against the exposure.

Pesticide applicators can purchase chemical-resistant apparel, but recent surveys indicate the majority of pesticide users wear traditional work clothing when mixing, handling, and applying pesticides. They prefer ordinary work clothing because it is more comfortable, less expensive and easily available. They also doubt the need for protective clothing.

A non-punctured-type Tyvek is one of the disposible chemical-resistant garments on the market. It is made from spun-bonded olefin, a non-woven fabric that provides an effective barrier to many types of chemicals. Although you usually must dispose of non-woven garments after one use, Tyvek garments withstand up to four launderings. However, if your clothing is contaminated with a concentrated chemical, dispose of it rather than trying to clean it because of safety considerations.

FABRIC STUDIES

Testing is under way on Gore-Tex fabric to determine its ability to provide protection from pesticides. Gore-Tex is a microporous membrane that is laminated between a shell fabric and a fabric lining. As a result, Gore-tex allows perspiration to pass through the fabric, but keeps liquid from entering the outside of the garment and contacting the skin.

A North Central Region research project focused on the influence of the following characteristics in creating a protective barrier:

- Fiber content
- Fabric construction
- Functional finishes
- Laundering methods

CHOOSING CLOTHING

Absorbency and wicking are important considerations in determining chemical resistance. Tests conducted on cotton, polyester/cotton blends, polyester, nylon, acrylic and spun-bonded olefin fabrics yielded these results:

- Pure cotton fabric exhibits the highest rate of absorbency, which means it absorbs a large amount of pesticide solution. However, less pesticide solution travels to underclothing or skin.
- Cotton/polyester blends exhibited moderate absorbency and wicking.
- Lightweight fabric (broadcloth) demonstrated lower absorbency than poplin or twill in tests, but it also exhibited very rapid wicking. Broadcloth's tight weave appears to transport pesticide solution more rapidly and in greater quantities to under-clothing or skin.
- Synthetic fiber — acrylic, nylon and polyester — had low absorbency, but they had the highest wicking levels. Compared to other fabrics, the pesticide solution flowed rapidly from the garment to underclothing or skin.
- Spun-bonded olefin fabric showed the lowest rate of absorbency and wicking of the fabrics tested. It provides an excellent barrier against pesticide penetration and it offers extra protection when you wear it over work clothes.
- Clothing with a consumer-applied fluorocarbon soil-repellent finish gives the same protection as spun-bonded olefin, but it is more comfortable to wear. Research showed a cotton/polyester fabric sprayed with a fluorocarbon soil repellent provided better protection than a durable-press-finished fabric. Reapply soil-repellent finishes after three to four launderings to maintain protection.
- Knit undershirts offer more protection than a single layer of clothing.

JUST HOW TOXIC ARE THE CHEMICALS WE ARE USING ON OUR COURSES?

by
Paul Sartoretto, Ph.D.
W.A. Cleary Chemical Corp.

For the past fifteen years I have been going around the country speaking at regional or monthly meetings of the Golf Course Superintendents on the subject of tank mixing pesticides with the emphasis on compatibility and avoiding phytotoxicity. There is a relationship between human toxicity and phytotoxicity as you will see, primarily because of the close similarity of the toughness of the epidermis of the grass blade and our outer skin.

The skin of the grass blade has its stomates through which air and water pass in and out, whereas our skin has pores through which water diffuses.

In my talk I make a general broad statement that all the insoluble pesticides can be tank mixed and sprayed and you will not incur phytotoxicity. The reason is obvious. Even though the insolubles have to be ground down to micron size in order to get them to disperse in water, the

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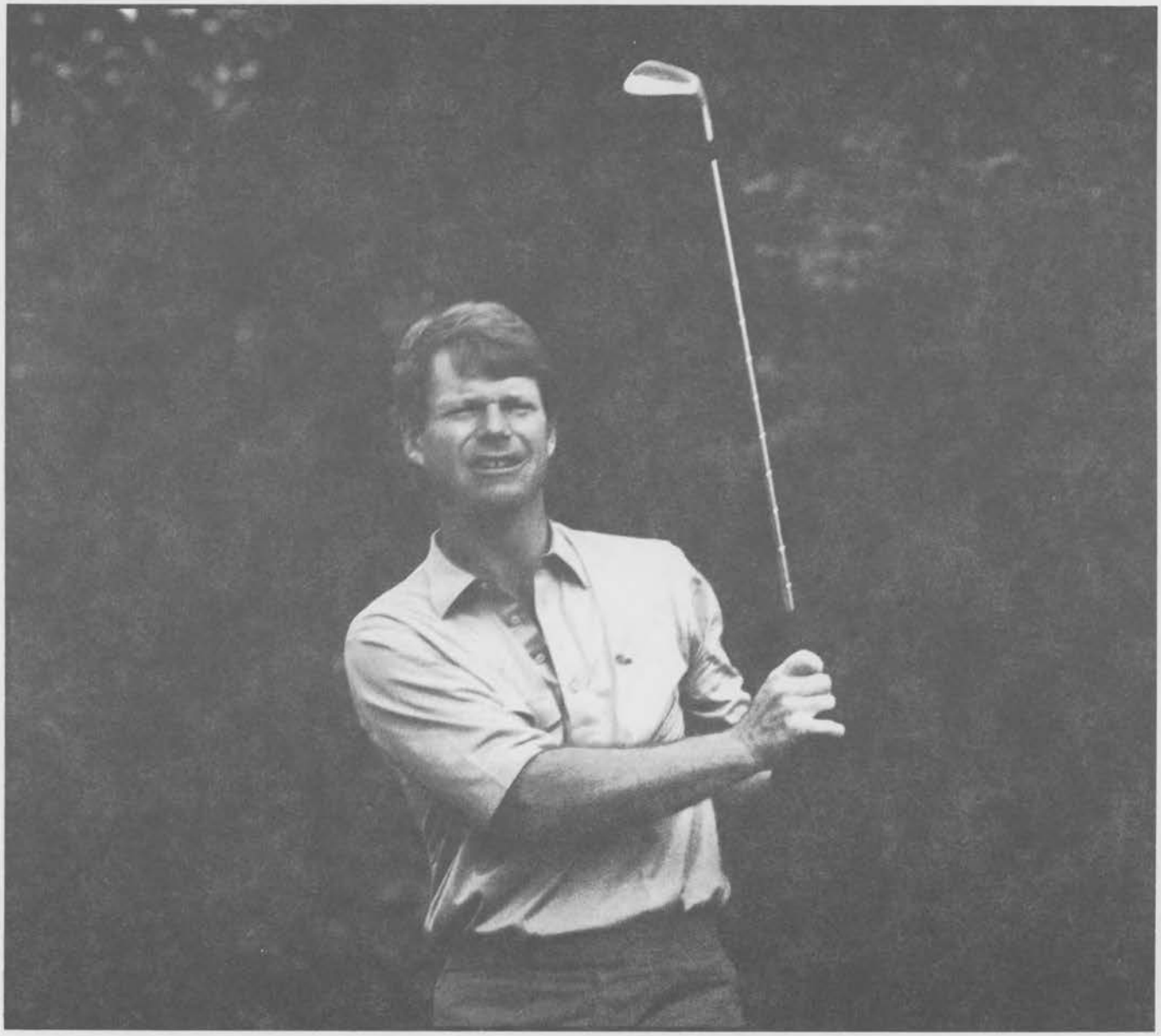

After you follow through, don't forget to follow through.

Golf Course Superintendents Association of America
Professional Golfers Association of America

Photo of Tom Watson courtesy of Ram Golf Corp.

WESTERN MICHIGAN GOLF COURSE SUPERINTENDENTS ASSOCIATION'S

GOLF DAY

★Monday, August 29th, 1988★

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4 Man Best Ball
— Best two of four full handicap —

● **ENTRY FEE: $75.00 per player ($300.00 per team)** ●

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- **GOLF (8:00 A.M. Shotgun / 1:00 P.M. Shotgun)**
- **GOLF CART**
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- **DINNER @ 7:00 P.M. (Sharp)**
- **PRIZES**

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_____ 8:00 A.M. Shotgun

_____ 1:00 P.M. Shotgun

_____ We would like to play Kent Country Club in the afternoon.

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Name Handicap

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Entries Must be Received by Aug. 21st, 1988

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micron particles are too large to diffuse through the stomates. They have to be thousands of times smaller, actually molecular in size and in solution to diffuse into the cells of the grass blade.

The same principle applies to our outer skin. The insolubles cannot be absorbed through our pores because the particles are too large, and only the solubles that are molecular in size can diffuse through the skin.

You can take a certain amount of comfort in knowing that you work with a large number of insolubles and that they cannot penetrate our tough outer layer of skin, and you can conclude that epidemal toxicity with insolubles (wettable powders and flowables) is non-existent to a very high degree.

From what you have learned thus far you can see how doubtful the claim was that a golfer died as the result of dermal exposure to Daconil 2787, which is an insoluble and was sprayed on the grass. No way could Daconil have diffused into his body. It could be argued that Daconil vaporized and that he breathed in a sufficient amount of it to poison him. I will now show you how doubtful this mode of toxicity is with respect to Daconil.

Whereas the grass plant breathes through stomates and receives nutrition, not only through the stomates but also the roots, we humans breathe through our lungs and receive nutrition through our mouth, and then via the alimentary canal, by digestion into the blood stream. We measure toxicity primarily by the minimum lethal dosage necessary to kill an animal by ingestion. Let us use aspirin as a bench mark to compare with our pesticides. It takes 1750 milligrams of aspirin for every kilogram of bodyweight to kill 50% of the animals ingesting it. The MLD_{50} of aspirin is 1750 — that's about 6 aspirin tablets. An adult weighing 50 kg (110 lbs.) by extrapolation would die from 50 times the dosage or 300 aspirin tablets. In actuality 10 times the dosage or 60 aspirin is fatal — 17.5 grams or about 2/3 of an ounce. Reference is Merck Index.

But Daconil 2787 has an LD_{50} of 10,000 mg. That is six times safer than aspirin. That golfer would have had to ingest 100 grams or over 3 ounces of Daconil to have killed him. That's unlikely.

In my speech on how to avoid phytotoxicity, I generalize by saying insolubles cannot burn, but solubles can and you must exercise caution in their use. We have been comparing an insoluble Daconil with a soluble aspirin. Aspirin is a safe soluble, but there are a number of solubles that you use that are not as safe as aspirin. Keep in mind the LD_{50} of aspirin as a bench mark.

You may have read recently about a fanatic that has

(Continued on Page 16)

been killing a lot of household pets in North Carolina by lacing pet food with the pesticide DISYSTON, an insecticide you don't use, but farmers do. The LD_{50} of DISYSTON is about 3 mg. per kg. A cat or dog doesn't weigh much more than 20 mg., which is equivalent of a couple pinches of salt. DISYSTON is a thiophosphate insecticide not much different than the thiophosphate insecticides you are using, except yours are safer. Oftanol is 10 times safer with an LD_{50} of 32; Dursban is about 50 times safer with LD_{50}135; and Diazinon is 100 times safer with an LD_{50}300. Nevertheless, these are low LD_{50}'s and the concentrates are potentially dangerous. They act on the insects and humans in the same way, poisoning the nervous sytem.

Ironically, Granular Diazinon, which is the safest of the three, has been suspect of use on golf courses in some areas because of unfortunate misuse. They are usually formulated emulsifiable concentrates dissolved in an organic solvent with an emulsifiable agent added. These in turn are to be mixed with large volumes of water and sprayed on the golf course with a further recommendation that they be watered in to get to the grubs. The same emulsifiable concentrate can be mixed with a granular carrier, such as corn cobs or vermiculite, so that they can be applied with a spreader with further recommendation that they later be washed into the soil with large volumes of water. If the corn cob is laced with Diazinon it becomes a tempting poisonous morsel for a bird. Birds weigh less than a kilogram, so all they have to ingest is about the amount of Diazinon that is equivalent to the amount of a baby aspirin.

Unlike the insolubles, the solubles can be absorbed through the skin. As a rule one need not worry about the diluted spray, but has to exercise caution in handling the concentrates. Wear protective clothing and a respirator when preparing the diluted mixture in the spray tank.

Let's consider a prominent soluble fungicide which has been around for many years and has a startlingly high toxicity, yet you have used it successfully for a couple of decades without any fear that it could have been hazardous. This product is Actidione TGF — and antibiotic! Antibiotics are safe; haven't we all taken antibiotics prescribed by doctors? Well, this one has a LD_{50} of 2 mg. pr kg.! But, Upjohn, the manufacturer, did an excellent job of formulating the product so that you recieved it in a form that was non-poisonous. A product must bear a skull and crossbones label if the formulated material has an LD_{50}. By diluting Actidione with inerts so that you received a 2% mixture, the formulated product then had an LD_{50}100. You, in turn, were asked to dilute the product with water at the rate of 1 oz. per 3 gallons of water. The diluted spray then had an LD_{50}37,500.

This example emphasizes the importance of exercising great care and caution when working with the formulated concentrate and at the same time demonstrates the minimal danger of handling the diluted spray. Actidione was taken off the market because EPA challenged the risk factor and Nor-Am made the business decision to drop the product.

Following is a table providing you with LD_{50}'s of all the pesticides available to the Golf Course Superintendent. This data was taken from W.T. Thomson's Agricultural Chemicals 1985-86 Revision. Bear in mind that the LD_{50} refers to the pure active ingredient so that if you want the LD_{50} of the formulated product you divide by the prcentage of active. For example Caddy is 20% Cadmium Chloride solution. Since Cadmium Chloride has an LD_{50}88, dividing by 0.2, the LD_{50} of Caddy becomes 440.

Nothing in my talk should be interpreted as a suggestion that you can ignore safety in using pesticides. Read and follow the label instructions carefully! Read the Material Safety Data Sheet carefully! Follow the manufacturers recommendations on personal protective equipment required. It is better to be overly safe than sorry.

TOXICITY OF PESTICIDES

Expresed as **M**inimal **L**ethal Dosage necessary to kill 50% of test animals by ingestion expressed in milligrams per kilogram body weight MOD_{50} mg/kg.

TOXIC CHEMICALS *(Continued from Page 16)*

INSECTICIDES	
Dasanit	4
Nemacur	15
Oftanol	32
Mocap	62
Dursban	135
Diazinon	300
Proxol	450
Sevin	500
Methoxychlor	6000
HERBICIDES	
Paraquat	150
2,4DP	300
2,4-D	375
DMSA	600
MSMA	700
Betasan	770
MCPP	930
Dicamba	1040
Pendimethalin	1250
Dacthal	3000
Balan	10,000

FUNGICIDES	
Actidione	2
PMAS	40
Caddy	88
Bayleton	363
Cadminate	660
Thiram	780
Banner	1517
Koban	2000
Rubigan	2500
Chipco 26019	3500
Dyrene	5000
Alliette	5800
Fore	7500
Fungo	7500
Banol	7860
Daconil 2787	10,000
Tersan 1991	10,000
PCNB	15,000
3336	15,000

WEATHER OR NOT

When it comes to summer weather, some folks just can't stick to the facts

Well, the sun was shining a few munites ago, but now it looks like there's a big storm coming. Mark Twain, remarking on American weather, said one time that he sat in one place and counted 136 different kinds of weather inside of 24 hours. That may be an exaggeration. When it comes to the weather, Americans do tend to exaggerate. So, when we decided to do a national weather survey, we sought out only exceptionally truthful individuals, like my friend Roger Welsch, a Nebraska tree farmer and keen observer of Nebraska weather.

KURALT: When the real dog days come, it does get hot in Nebraska.

ROGER WELSCH: I don't think there's any place hotter than Nebraska in the summer. Down here by the river, just not too far from us, it'll get so dry that the catfish will come up here to the house and get a drink at the pump. Yep, really. Yeah. And a lot of farmers around here will feed their chickens cracked ice so they won't lay hard-boiled eggs.

Well you may laugh, but the hot weather leads to tragedy sometimes. Kendall Morese rememebers what happened in Maine.

KENDALL MORSE: Oh, it was so hot here in Maine last summer that one day — it was right in the middle of corn season, that corn was almost ripe — and it got so hot that the corn started to pop, and it popped and it went all over the place. And there was a herd of cows right next to that cornfield and they looked up and they saw that popcorn coming down like that. And cows are not very bright, of course. They thought it was snow. and everyone of them idiot cows stood there and froze to death!

For Maine, of course, that was a hot day. Here'a Hoosier weather report from Charles Porter.

CHARLES PORTER: It was so hot one day in Odon, Indiana, you could take a frozen hamburger patty out of the freezer, toss it up in the air, and when it came down it was cooked well done. But you had to be careful and not toss it up too high. If you did, it came back down burned. *(CHUCKLES)*

We went to Arizona in mid-summer to ask Jim Griffith how he and his neighbors are holding up.

JIM GRIFFITH: It does get a little bit warm. Joe Harris says it usually gets so hot and dry in the summertime that he's got to prime himself before he can spit. And the dog's sort of wandering around at midnight trying to find some shade to lay down in. It does warm up a little bit, but you get used to it. It's been known, especially in this part of Arizona, to get so dry that trees will follow the dogs around.

That's dry, all right. But right there in Nebraska, Roger Welsch's wife has run their well through the wringer this time of year to get enough water to cook with. And the river gets low, of course.

(Continued on Page 20)

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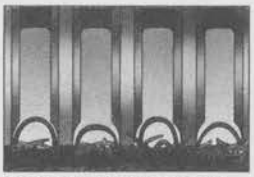

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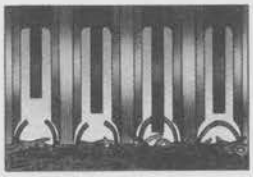
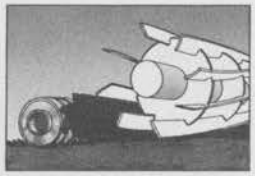


The knife blades rotate through slots in the front rollers, slicing horizontal runners before they lie down.



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WEATHER OR NOT *(Continued from Page 17)*

WELSCH: They talk about frogs that would grow up to be three and four years old without ever having learned how to swim. And they'd have to in schools, you know, get little cans and put holes in the bottom and sprinkle water so that kids could see what it was and wouldn't panic the first time they saw it rain. They tell about one farmer who's out plowing one day and it started to rain, and the first drops that hit him shocked him so that he passed out. And to bring him to, they had to throw two buckets of dust in his face!

What rain they get in the Great Plains comes all at once, eight or ten inches in one day and that's it for the year. Every farmer has a little lane out to the highway and the rains on the plains fall mainly on the lanes.

WELSCH: Like this road of mine, there's some holes out here you can run set lines in and catch fish out of the road. And there's a farmer who talked about finally having to walk into town to get some groceries, and he found this huge puddle in the middle of the road. And there was a nice hat floating around in the center. So, he reached out with his foot and kicked in this hat, and there was a guy's head under it. So, he got down on his hands and knees and he said, "Are you all right, stranger?" And the guy said, "Well, I guess so. I'm on horseback." *(Laughs)*

Wherever you got puddles like that, of course, you get mosquitos. I thought we had big mosquitos back home in North Carolina. My grandfather told me he saw a couple once the size of crows, and heard 'em talking about him. One of the mosquitos said, "Shall we eat him here or take him with us?" The other one said, "Well we better eat him here. If we take him with us, the big guys will take him away from us." What surpirsed me was to learn that they grow mosquitos even bigger than that out West.

JIM GRIFFITH: They get reasonably good sized, not so big that you can't shoot 'em down with a scattergun. You know, you don't have to take a rifle to 'em, but they get pretty goodsized. But the really big ones are up in southern Nevada. There was one, I remember, it was in the papers at the time, that came into Nellis Air Force Base up there, and they filled it up with high-octane before they realized that it had the wrong markings on it. And-

KURALT*(Laughing)*: That was a big mosquito.

GRIFFITH: That was a good-sized mosquito, yeah. that was pretty good-sized.

I should mention again I'm not sure all these stories are true. Americans do lie sometimes. There was a fellow down home with such a reputation for lying that he had to have a neighbor come in to call his hogs. But if these aren't true stories, they're about as true as any other weather reports you're likely to hear.

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SOIL FOR TURF FACILITIES

by

Dr. Gene C. Nutter, Agronomist

In the operation of modern turf-grass facilities more problems are caused by improper physical condition of soil than probably any other single factor. While other symptoms may be more readily recognized and treated (such as disease, compaction, poor aeration, weeds or fertility problems), the real and underlying cause is usually poor soil physical conditions. It is time that we recognize this basic fact so that we can begin to cure the real problem and stop the neverending, expensive job of just treating the symptoms.

True, most superintendents and managers of turf facilities inherit their soil problems. How sad it is, however, to see the great number of new facilities (including expensive and complicated golf course greens) that still ignore the importance of proper soil conditions, including surface and internal drainage, soil preparation, and use of amendments and soil conditioning. Certainly there is enough information available to guide the planners and contractors of these jobs in this age of technology.

Why, then, does our industry continue to make these inexcusable and expensive mistakes? As long as we continue to follow this line of extravagant ignorance, we will be burying our heads further in the sand instead of advancing our individual courses, our profession and our industry image.

What are the basic aspects of soil management that seem to be so often overlooked or ignored? First, let us consider the origin of soil.

SOIL ORIGIN

In its natural condition, soil is a complex mixture of mineral fragments, decayed plant residues and microscopic organisms. Each of these classes of ingredients have their influence on the nature of the soil. As a natural body, soil developed through a constantly changing pattern which was greatly dependent upon environmental conditions such as temperature, rainfall, plant life and location.

For the majority of cases, the native soil is most influenced by the mineral fraction (called plant material). These soils are called mineral soils. Parent material may have developed from underlying rock formation, or been transported by ice (glacial soils) or water. Thus, soils which developed from rocks through the age-long process of weathering will have properties akin to those kinds of rock. Examples are the heavier, more complex mineral soils, such as clays. Usually these soils are more difficult to manage physically (poor internal drainage and aeration), but are richer in fertility potential (will hold more nutrients).

(Continued on Page 25)

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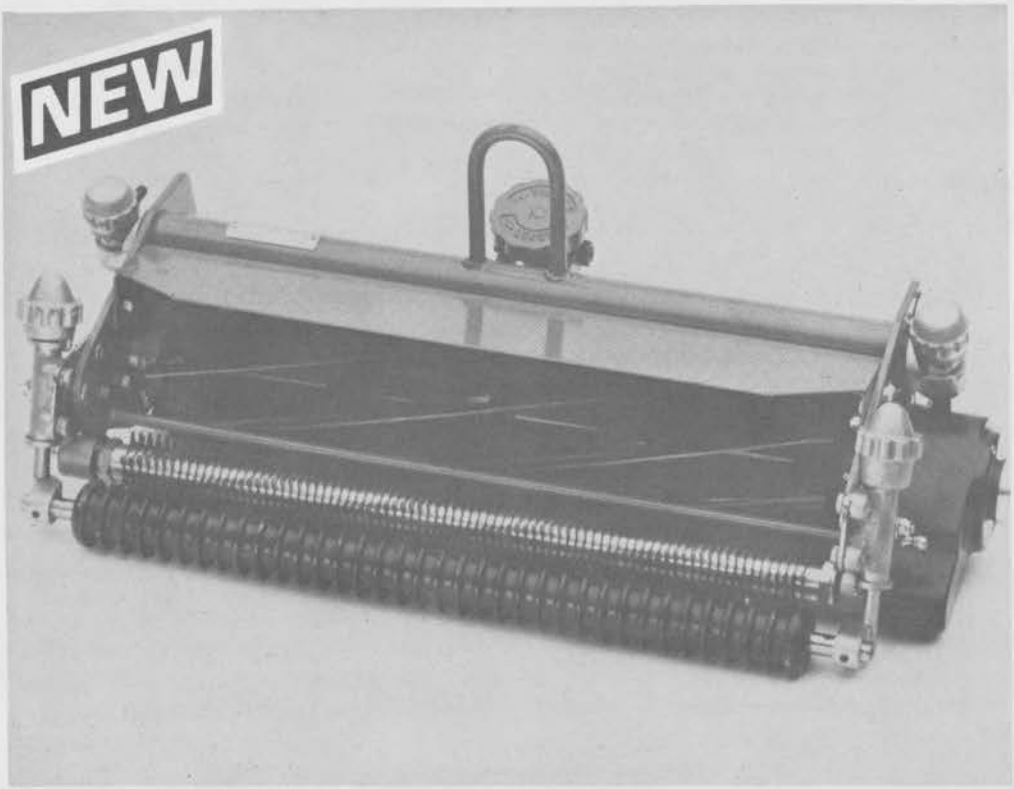

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SOIL FOR TURF *(Continued from Page 22)*

On the other hand, soils which were laid down from water deposits — such as sands, would reflect a lighter, simpler structure. These soils (such as our various Florida sands) are easier to manage physically (better drainage and aeration), but have much lower fertility capacity.

Then there are organic soils, derived from decayed plant residues. These are the muck soils of the rich Everglades region, and the peat deposits scattered around the state.

NATIVE VS. ARTIFICIAL SOILS

If we were farmers, we would be growing crops on one of the types of native soils mentioned above. We would gather information about the nature of our particular soil from state and federal soil scientists who had surveyed, studied, classified and mapped the major soil formations in every county in Florida (and likewise most other states). This information would provide guidelines as to the physical condition and fertility status of our particular soil, and this information would guide our crop production practices.

However, turf managers are not farmers — and, with few exceptions (sod producers, perhaps), they are not growing turf on natural or native soils. Instead, they are managing turf facilities which were built by a mass mixing of soil through excavation, fill, grading and leveling processes. For example, housing projects, apartment complexes, golf courses, athletic fields, and highway sites have gone through mass movements of "dirt". When finally completed, there usually is no resemblance between the resultant "dirt pile" and the original native soil profile that occurred on tht same site.

What does this mean to us practically? If means simply that you have to throw the "book out the window" and start over. None of the previously compiled information of soil scientists applies. It could be that the original soil was improved (richer soil hauled in), but usually it works the other way. Often, damaging foreign material is mixed in (debris, chemical deposits, etc.)

Another serious problem is that the mixing process was not uniform and, therefore, there is much greater variability in the final soil material. This is why we find "spotty" soil conditions underlying. In short, all of these factors mean that turf soils are more difficult to manage!

Where do we go from here? Good turf managers have learned the vital importance of proper soil conditions to the success of grass production and maintenance. Therefore, the problem is simple. By carefully studying and evaluating the soils you inherit, you can then go about an intelligent soil management program. For intensively

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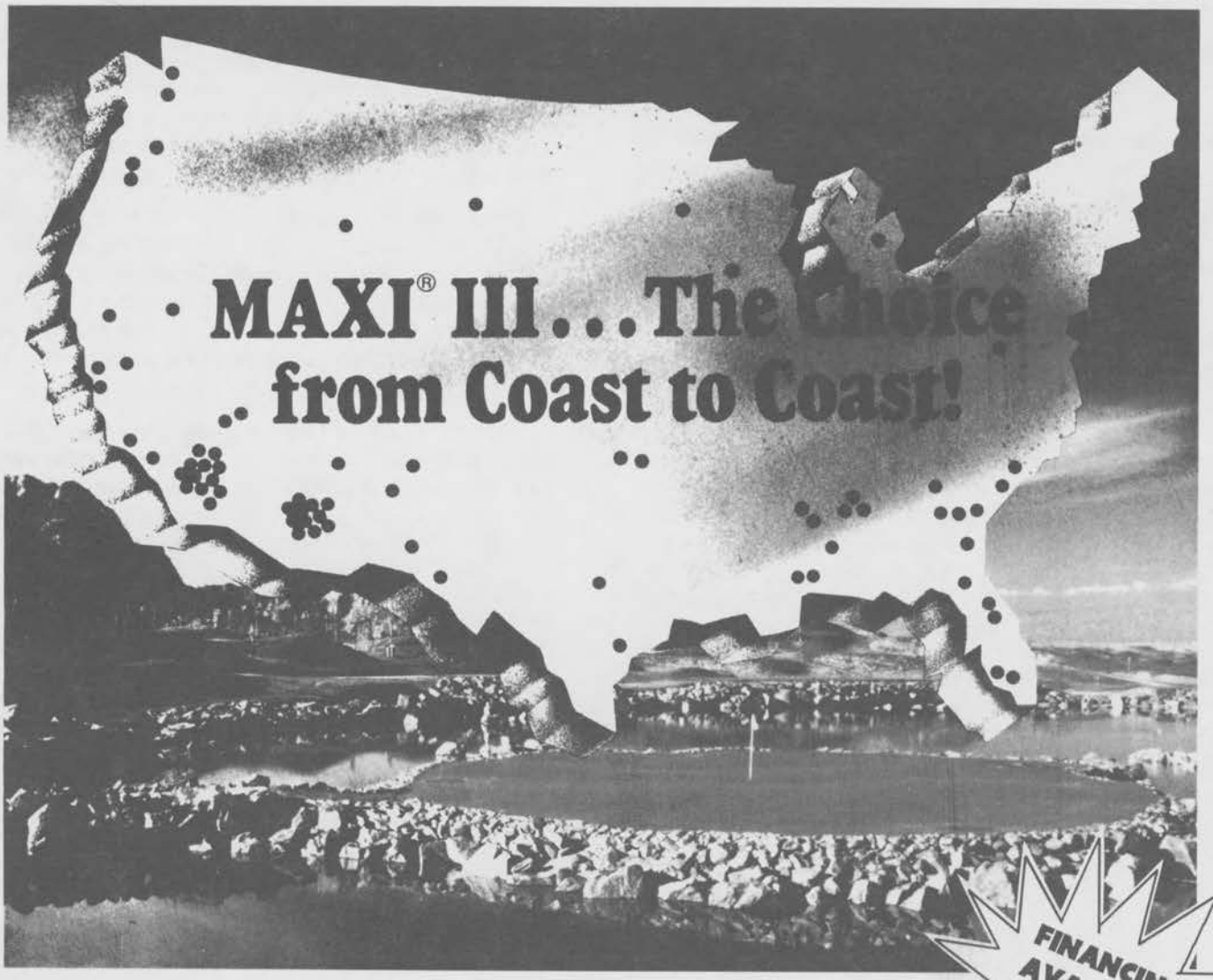

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managed turf areas (such as putting greens, tees, athletic fields, etc.) you may need to improve that inherited "dirt pile" by the use of soil amendments. We know generally, for example, that heavy, mucky soils can be improved by the addition of coarse sands; or that infertile, ball bearing sands may become more productive by the addition of heavier soil fractions like clay or organic matter such as peat.

SOIL AMENDED TO IMPROVE PHYSICAL CONDITION

But just a minute! What really are we doing when we add the above soil amendments (and many others — natural processed or manufactured)? First and most importantly, we are changing the physical condition of the soil.

The management of turf facilities imposes unique and damaging requirements on the turf. Heavy traffic, continuous wear, regular movement of maintenance equipment, high rates of irrigation — all these factors work to destroy soil structure. Thus, turf soils must be constructed (remember — no more natural soil, so we must construct a usable soil base from that inherited "dirt pile") to take the punishment and still grow good turf.

Here is where the soil amendments come in — to change the inherited soil to a more desirable physical con-

(Continued on Page 28)

dition. Briefly, to produce good turf under our demanding conditions, soils must have proper pore space. There must be pores to move water through the soil and pores to move air so the grass can "breathe". Approximately half of the soil is made up of solids (the mineral matter plus a small amount of organic matter). The other half is pore space.

Pore space is of two kinds — large (macro) pores and small (micro) pores. Air moves into the soil (and harmful gases move out) through the large pores, except after a heavy rain or irrigation. Then they may be filled with water temporarily, which soon drains out. This is the ventilation system which aerates the soil. The large pores should comprise about half of the total pore space.

Small pores (also called capillary pores) move water through the soil. These pores conduct water to the grass roots (not the opposite — roots don't "grow to water" — water must be there first), from the water table, like a kerosene "hurricane" lamp moves kerosene up through the wick. The finer the pores, the farther the water will move, and the slower.

PROPER BALANCE OF LARGE AND SMALL PORES

The most important aspect of soil porosity is the proper balance between the large and the small types of pores. An excessive proportion of large pores will result in a well aerated but dry soil (like most of our sandy soils). Water will move through (percolate) too rapidly and very little will be retained to grow turf. An excessive proportion of fine pores, on the other hand, will exclude air and may be waterlogged (like heavy clay soils).

Thus, once we have determined our given soil situation, and knowing the physical requirements of our turf facility (percolation rates, drainage, etc.), we can then amend the soil to meet our requirements. A great variety of soil materials area available to do this, including calcined clay, vermiculite, peat, colloidal phosphate, sand, etc.

If we are fortunate enough to take over the turf facility prior to planting, we have a golden opportunity to shape our future soil condition. If we inherit an established facility, the job is more difficult, expensive and time consuming. It can be done gradually, however, by periodically working proper amendments into the soil as topdressing following soil aeration.

The proper proportion of amendments can be determined by a soil testing procedure known as "mechanical analysis". Many soil testing laboratories and industrial firms can provide these tests, and will help you compound or construct a soil to meet your needs based on such factors as percolation rates, etc.

Once you have amended your soil to a proper physical condition, then the previously mentioned secondary symptoms, such as compaction, weeds, restricted roots, etc., will be minimized. Then turf maintenance will be a more enjoyable annd successful business.

CREDIT: The Florida Green

6 ANSWERS TO QUESTIONS WE NEVER THOUGHT YOU'D ASK

(BUT DECIDED TO ANSWER ANYWAY)

1 **Yes, GCSAA can help you become a better superintendent.** One way it does this is through educational seminars and conference sessions it sponsors each year to help you become better informed about turfgrass diseases, pesticides, landscaping and management practices.

2 **Yes, GCSAA is helping to further the advancement of the turfgrass industry.** Through the GCSAA Scholarship & Research Fund, Inc., GCSAA provided more than $13,500 last year in research grants to leading turfgrass programs. GCSAA also provides educational opportunities to turfgrass students through annual turfgrass scholarships.

3 **Yes, GCSAA provides a meeting ground for superintendents.** Each year, GCSAA sponsors an annual conference and show for its members. Last year more than 6,500 educators, industry representatives and members from all over the world attended. GCSAA's executive committee decided at its last board meeting that the conference experience is so valuable that first-year members should be encouraged to attend by being given free admission.

4 **Yes, GCSAA offers recognition for superintendents.** Through its public relations efforts, its magazine, and its award programs, GCSAA helps promote the image and the professionalism of the superintendent. GCSAA also provides information to superintendents about how they can use public relations to promote their own image to their course, their community and their association.

5 **Yes, GCSAA provides each member with a life insurance program.** Supplemental insurance, disability and pension programs also are available.

6 **No, GCSAA can't help you with your golf handicap.** You'll have to work on that yourself.

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