MAY, 1968
VOL. 21. NO. 12

The Bull Sheet

Official Bulletin
Midwest Association of Golf Course Superintendents

MAY MEETING
LAKE SHORE COUNTRY CLUB
LAKE SHORE'S 60th ANNIVERSARY

ARTICLES

THE BULL SHEET, official publication of THE MIDWEST ASSOCIATION OF GOLF COURSE SUPERINTENDENTS.

DICK TREVARTHAN, Editor
122 Evergreen Drive
Frankfort, Illinois 60423

Dr. Mike Britton, Pathology Dept., University of Illinois, and Robert "Bob" Johnson, President of the Illinois Turf Foundation.

THE M.A.G.C.S. WIVES

The M.A.G.C.S. wives will have their first meeting May 17th at the Matterhorn Supper Club. Matterhorn Supper Club is located at 123rd Street and Mannheim Road. (Route 45.) The meeting will include dinner and a discussion of the formation of the club. Dinner will be at 7:30 P.M. Anyone interested in attending call Mrs. Walter H. Fuchs at 312 257-2869.

You need not attend all the meetings to be a member.

The President's Message

During the Chicago World Flower Show it was my pleasure to serve in the booth of the Illinois Turfgrass Foundation. This is a very rewarding experience. Displayed in the booth were various types of weed plots and grass plots. Recommendations were given for the control of the weeds. Visitors inspecting the weeds would exclaim, "Look! there is the weed that I have growing in my lawn," or "Now I know what to spray on my weeds." Many people asked questions about the problems that they had. The booth was under the supervision of Dr. Jack D. Butler and his associates from the University of Illinois. Dr. Butler's booklet on "Keeping a Lawn" was given to all who desired one. The University of Illinois booth was presented the Mayor's Award. It is given for the exhibit that provides the most useful gardening information to gardeners of the Chicago area.

There were 76 members present at our April meeting held at the Ravisloe Country Club. Many thanks to Roy Nelson, host superintendent, and the club manager, Mr. Kelly. Some of the members played golf and they said that the golf course was in excellent condition. We all enjoyed a fine steak dinner and were shown some very interesting slides. Mr. Dudley Smith showed us slides of golf courses in San Fancisco. Mr. Ted Sokolis showed us slides of new ideas on grounds maintenance. We were honored to have Mr. Charles Eckstein and Mr. Ralph Peterson at our meeting.

Our next meeting will be held at the Lake Shore Country Club. (date) Mr. Adolph Bertucci will be our host superintendent. This is the time of the year when we are all so very busy but I am sure that each one of us will find it very well worth our while to take a few hours off — attend the meeting — and learn about the other fellow's problems. There will be many in the weeks to come, as all of you know. At the present time there are indications that we will have to do more sprinkling this Spring than normal unless we get a break in the weather. With the absence of moisture, and a lot of strong wind, dessication has been quite a problem. We were unable to turn on our watering system because of low temperatures. Many golf course superintendents resorted to the spray rig method of watering greens. I hope the season doesn't present too many other headaches but all we can do is hope.

Walter H. Fuchs, President

The Ladies in San Francisco

by Suzy Frederickson

The Conference this year was an exciting experience, there was something to interest everyone. It is always fun to spend time with old acquaintances and, of course, make new ones.

While the men were busy with their meetings, the ladies attended an interesting and entertaining program arranged by the host association.

This year the activities started out with an exhibit and explanation of precious jewels by Mr. Robert Lindeman. I never realized how many types of jewels there were! Maybe I don't want that diamond bracelet after all, not when there are so many other jewels to choose from.

That evening they held the get acquainted cocktail party. It's amazing how many people you can manage to see and talk to in less than two hours time. The only thing that bothered me about the get acquainted party was where do you put your ashes?

San Francisco has a lot to see, and we saw it on Tuesday. It certainly is a beautiful city, if you can take the altitude changes!

My biggest disappointment in San Francisco was the Golden Gate Bridge. It's not golden! It's not even gold colored, it's sort of an "orangey-brown". I had to admit, though, it's a magnificent structure.

One of the first things that you think of when you think of San Francisco is the cable cars. They are exactly what I imagined them to be. How they ever manage to make it up those steep hills is beyond me, but they do! It's really something to see people loaded down with packages, hanging on the side of these little cars. They certainly must have a lot of intestinal fortitude, it took all I had to sit on the inside!

We never did get to Haight-Ashbury. It wasn't necessary to go that far to see he hippies and flower children as they are on every street corner, selling their underground newspapers.

The most charming place we visited was the Japanese Tea Garden. It was just like stepping into another country. There are little tea houses where you are served tea by girls in traditional costumes, and there is atmosphere everywhere.

Another interesting place we visited was the Cliff House, a restaurant overlooking Seal Rock. We could see thousands of seals basking in the sun. I had one all picked out for a coat until I learned they were protected by the law.

Another part of Frisco we visited was Fisherman's Wharf. There were boats bringing in the fish that would be served for dinner, and the vendors cooking and selling fresh shrimp, crabs, clams and other sea food. Oh the aroma!

Chinatown is store after store and ninety per cent of them are gift shops, where you can buy genuine imports. There's one place where you would be disappointed if you bought an object that wasn't stamped "made in Japan". China Town looks just like it does in a Charlie Chan movie except, instead of Opium dens, you see places like the "Gong Gong Topless".

After the bus tour we had a delicious luncheon at the Fairmont Hotel, followed by an unusual fashion show. We were shown ancient ceremonial robes each followed by a modern adaptation of the original, ranging from sports clothes to glamorous formal wear.

Tuesday evening we went to a "Happening", and what better place than San Francisco to attend one? The odd thing about it was that many of the hippies that were there looked a lot like some of the Superintendents we knew. Especially the band of flower children that made an entrance bearing geraniums, carrying signs and looking really up tight. Who was their leader? The one sporting long blonde locks, a five o'clock shadow and a large cigar?

Wednesday we were given a continental breakfast and a choice between a preview of the Hawaiian tour and a "Behind the scenes" shopping tour. On the shopping tour we were taken to some of Frisco's most distinctive merchandise centers and shown what happens behind the scenes.

Thursday a program called "Styles in Cosmetics" was given where we were shown the newest in make-up styles. Beauty Counselors, a cosmetic firm, gave the presentation. We were shown how to make our eyes look larger, smaller, closer together or farther apart. It's amazing how much a woman will go through to make herself more attractive, and there are so many preparations available. There are enough colors, powders, brushes, and paints to bring out the Picassio in every one of us. It was an interesting program, and couldn't have been shown on a better day because the information was fresh in our minds as we prepared for the banquet that evening.

The ladies' program was truly a wonderful experience and I'm sure, enjoyed by all. I'd like to take this opportunity to thank the National GCSA, and the G.C.S.A. of Northern California, and their wives, our charming hostesses, for arranging this outstanding program, and making our trip to San Francisco an unforgettable and enjoyable experience.

Joe Canale and John West, a new member of the M.A.G.C.S.

A baby girl "Kellie Sue Sering" was born to Mr. and Mrs. Bruce Sering February 25, 1968.

M.A.G.C.S. Meetings Sites For The Remainder Of 1968

It is my pleasure to inform the members of the Midwest Association of Golf Course Superintendents that the monthly meetings for this year have all been arranged and verified. I want to thank Mr. Bert Jannes, my co-chairman, and my good friend Mr. Ray Gerber for his kind help to us. Mr. Howard Baerwald will be in charge of collecting money for the dinners at each meeting, along with a lieutenant he chooses to assist him. I will list the names of the host clubs with a little note about each one. The first two monthly meetings which were held at the Clayton House and Ravisloe Country Club are over with and if the meetings held there are any criterion of what's ahead for us, then we are off to a good start.

Now let's begin May 28 — Lake Shore Country Club, Adolph Bertucci superintendent. This is a great honor for us, for Lake Shore is celebrating its 60th anniversary and we are privileged to have our Midwest meeting during the glory of their 60th year. Mr. Adolph Bertucci, the "old silver fox," will be celebrating his 50th birthday shortly after (June) so this will be kind of a double event. I have been informed by Adolph that we are going to have something a little special, and if I know Adolph, all his young and old friends will be in for a real treat. We are sorry about the late date, but the Lake Shore Club doesn't open up till the middle of May. However, this late date will assure us of fair weather for our first golf tournament of the season.

June — Gleneagles Country Club, Walter Fuchs superintendent. The beer we didn't finish at Lake Shore, or the conversation that was just starting can be resumed shortly after, at our President's club, June 10th. The weather man wouldn't dare give us anything but superb weather for the "president's ball."

July 8 — Glendale Country Club, Clarence Mueller superintendent. A club and a man that have a history of being outstanding hosts. Yup, Family style chicken again.

August 12, joint meeting at the Tuckaway Country Club with our friends from Wisconsin. Les White, formerly of Joliet is superintendent. Let's all plan to be there for this annual get together, and intermingle with our friends from the north for golf and dinner. The Tuckaway Club was designed by Killian and Nugent, the irrigation by Scotty Stewart, and construction supervised by Ray Diddier. Jim Holmes will be the speaker.

September 16, Edgewater Golf Club, Mr. Chester Randby superintendent, will be host. I don't believe that we've ever had a meeting there. We are privileged to have Chet Randby allow us to play our annual golf tournament at this famous old club. We hope to have the great Chick Evans honor us with a few words.

October (tentative date is the 15th), Westmoreland Country Club Julius Albaugh superintendent. This will be the twilight of our golfing season in the melancholy autumn month of October. Here is another famous club that we haven't been to in a long long time. Julius Albaugh, an outstanding example of our rising young superintendents, will be host at this fine old club.

November . . . Just a matter of making a decision whether to hold a meeting at an outstanding course, or at one of the big motels on Manneheim Road, and save the country club for a future meeting.

December (I forgot the date). Our calm, annual meeting will be held at Brookwood Country Club, where our big friend Howard Torkelson will be our host superintendent.

The final meeting will be held at the O'Hare Inn in January. Mr. Al Johnson has once again consented to host us. This meeting is prior to our departure for the national convention and nothing beats the excitement of this wonderful airport area to get us raring to go on our travels.

I think that takes care of it, except to mention that our annual get together with our managers will be held at Lincolnshire Country Club in the latter part of September. Mr. Mel Odle will be our host.

Bert Jannes and I want to thank all the superintendents who so kindly and understandably donated their clubs to our Midwest monthly meetings. It is a generous example of a contribution on their part, in order for us to have companionship, golf, and "a little larnin." I hope all true and loyal members of our historic association keep this in mind when we meet and accordingly reciprocate with a personal thank you to each and every host superintendent and his manager.

Paul Voykin — Arrangements Chairman
Bert Jannes — Co-Chairman

HOLMES CORNER

by James L. Holmes
USGA Green Section
Mid-Western Agronomist

Last month all indications were that spring turf recovery was going to be complete and I jumped the gun and said so. As so frequently can and does happen, evidence of winter and spring damage was slow to develop, but develop it did. I have had many calls and made numerous visits, especially to courses west of the Chicago area, regarding desiccation damage on greens—especially on high spots. I am happy to report that in practically all cases turf has not been killed, but rather badly bent and recovery should be complete by Memorial Day. Nodes are, at the time of this writing, still alive and will recover if surfaces, or the mat and thatch layer, are kept **constantly moist.** By constantly moist, greens must be wetted-down 4 or 5 time daily, especially during the hot, windy days we have been witnessing.

Further, it would be added insurance if the most severely desiccated locations were spiked and overseeded. That is, if greens to receive this treatment are a mixture of bents, thus overseeding would not ruin a pure strain; or if turf already is Seaside or Penncross bentgrass. Be careful with use of inorganic fertilizers at this time or until recovery is near completion. Heavy use of these materials will tend to dry existing growth even further. If inorganics are used, be extra careful that they are well watered-in and surfaces are kept wet.

In the event of complete kill, which will occur on highest nobs only, soil opening and overseeding will produce putting turf within 6 weeks to 3 months. It is advisable, especially when considering the great demand on greens today, to resod such areas, thus attaining suitable putting conditions much sooner.

Now that the turf conference season is over, I'm of the opinion that this year saw the best conferences yet. Indeed, they are improving yearly. The most discussed subject was — greens construction, as it usually is, followed with irrigation, then personnel related subjects. I was especially interested to hear Joe Duich's talk, at the Michigan Conference, regarding the soil work they are doing at Pennsylvania State University. It seems the soils people are getting closer and closer together, regarding physical properties optimum for greens construction. Again, especially when considering the tremendous demand on today's greens.

Work is slowly creeping along on selections of superior bentgrasses at a few universities. It would seem that nothing startlingly new is in the offing. Apparently demand for improved bents simply is not sufficiently great to encourage research agencies such as grass suppliers and land grant colleges to expend much money in this endeavor. With the exception of Penncross bentgrass, we have pretty much depended upon natural selections for our useful types By the way, natural selection is pretty hard to beat if you have the time.

Tree Borers

by Stanley Rachesky
Extension Entomologist, University of Illinois

All of the many kinds of borers that attack trees and shrubs are the larvae (caterpillars or grubs) of moths and beetles. Holes in the bark oozing sap, or sawdust and frass indicate the presence of borers.

Borers are particularly destructive to newly set trees and to those in a weakened condition. Some of the factors responsible for allowing borers to easily affect trees are listed here.

1. **Drought** — probably the primary factor, causing trees to be the most susceptible to borer attack. Dry roots or injured roots systemically weaken the tree. A few seasons of low rainfall are usually followed by borers. Newly planted trees are attacked before root systems adjust.
2. **Construction** — change of drainage, water tables, mechanical injury, etc., weaken trees considerably.
3. Hurricanes, ice storms, frost, bonfires, etc.
4. **Sunscald** — sudden exposure to the sun from a shady environment (cutting down a nearby tree).
5. **Defoliation** — due to leaf-eating insects, greatly weaken a tree.
6. **Chemical injury** — salt used to melt snow, gasoline, oil, fumes from industry.

Damage may be severe enough to cause the tree to break off (locust borer), or large branches may be killed (lilac borer).

Life History and Habits — The adult insect usually lays eggs on the bark of the tree or shrub. When the eggs hatch, the young borers tunnel through the bark into the tree. Some of them bore deeply into the trunk, while others move around under the bark in an irregular manner. Some borers develop fully in one year; others require two or three years.

Control — Preventing borer attack is better than a cure. Keep established trees healthy and vigorous by fertilizing and watering when needed. Protect newly set trees by wrapping the trunks with burlap or heavy paper for two years to prevent borers from attacking them or spray with DDT, as will be discussed shortly. Use wrapping material about 4 inches wide. Apply the wrapper in spiral form, beginning at the first branch and working downward to the ground. Heap soil around the tree to close the space between the bottom of the wrapping and the ground. Hold the wrapping in place with stout twine spiraled around the tree trunk in the opposite direction.

Borer attack can also be prevented by spraying the tree trunks with DDT up to the level of the first branches. Use 4 pounds of the 50% wettable powder or 4 quarts of the 25% emulsion to 100 gallons of water. For one gallon of spray use 4 tablespoons of powder or 4 teaspoons of emulsion. Apply the spray at monthly intervals from May 1 to early September. Do not apply DDT to the entire tree, as serious infestations of mites and aphids may follow.

It is not easy to rid trees and shrubs of borers. You can probe them out with a wire or knife or kill them by injecting carbon disulphide or nicotine sulfate into the tunnel with an oil can. Make certain the tunnel is plugged with putty afterward, and be vary careful handling carbon disulphide, as it is highly flammable.

Some of the borers found on trees are specific for that tree and easily identified. Following is a list of some of these commonly found borers.

Bronze birch borer
Boxelder twig borer
Azalea stem borer
Ash Borer
Cedar Tree borer
Chestnut bark borer
Cottonwood borer
Dogwood twig borer
Flatheaded Cherry tree borer
Hemlock Borer
Iris Borer
Lilac Borer
Linden Borer
Peach tree borer

CHANGING TIMES

Old Bill he was a gardening man,
Of skill in high degree;
Few others could produce produce
Near half as well as he.
The folks around oft asked him why
Things grew so fast and sure;
To which Bill always would reply:
"I use racehorse manure."
Bill had a daughter, fussy lass,
Who sought her Pa to cure,
And make him use a nicer word
Instead of (ugh) "manure."
So she called her Mother's aid
To see could she advise her
On any way to get her Pa
To call it fertilizer.
"You leave your Father be," said she,
"His way you must endure;
It took me twenty years to make
Him call that stuff manure.!"

Where Do The Fines Come From?

by Bob Dunning

The most overlooked factor on golf greens that causes our most serious problems, even in greens properly constructed, is the accumulation of fines at and near the immediate surface — this is something that is constantly happening.

Silt and clay, or the finest materials, are air-borne the majority of the days of the year and this is the major source of fines. If one would leave their car in a parking lot on the campus for two or three days then observe the dust that has accumulated on the surface within this period it can be readily understood how a putting green in a more precarious position 365 days a year can accumulate fines on a wet or dry surface.

I am sure all of us have walked down fairways or through roughs wearing freshly shined golf shoes only to have this disappear in a very short time. It is amazing to see the accumulation of dust that has gathered through and above our socks when we shower.

This, however, is not the entire problem. As the silt, clay and fine materials accumulate, so also does desired organic matter including humus. There are some factors that are not so desirable such as: in the process of what would be desirable in other forms of agriculture, bacterial slime, one of the cementing agents, that creates crumb structure and permanent soil structure in good agricultural soils becomes a sticky, slimy mess of goop at the immediate surface of the putting green that seals out oxygen, decreases absorption, infiltration and percolation of water or permeability, increases divots, wet surface increases disease instance, is a host for fungi and in particular faculative fungi that are sure to make their appearance when the climatic conditions are favorable and attacks of epidemic proportions can be expected. How important it would be if the Superintendent could apply minute rates of fungicides daily with his automatic sprinkling system. The above when accompanied with mat and thatch can create all types of trouble including difficulty in watering, desiccation during the winter and these fines by excluding air decreases decomposition and increases the possibility of putrification and loss of turf. This material at the immediate surface of the green is completely without structure and when rubbed between thumb and forefinger it will be found to be near a sticky glue in consistancy.

The worst condition is when fines accumulate over coarser material then the attraction is upward or water is held in this material rather than downward causing a wet surface rather than a well drained soil.

Some of the other troubles caused are: foot long roots becoming less than an inch in length, accumulation of salts, increases the frequency of syringing, localized dry and hard spots and when soils become saturated turf may thin and surface become hard and crusty or the lower soil horizon remains overly wet causing putrification, thinning or loss of turf. In fact, it is difficult to name any green trouble that is not adversely affected by this condition. It would take different degrees of correction to overcome this problem in accordance to how long the material has been allowed to accumulate and how serious the condition has become.

A major sourse of fine and very fine sand is often encountered in construction when it is not recognized that these aggregate size materials are not desirable. They are often used to take the place of properly graduated sand or cut down on the purchase of sand of proper gradation. These fine and very fine sandy materials will readily compact under putting green conditions and when combined with silt and clay and cementing agencies such as organic slime, permeability may become near nil as well as properly aeriated greens.

However, in new greens if it is recognized initially that the accumulation of fine materials will become a problem then the application of a light topdressing with materials of the same consistency that the green was constructed of, disc spiking and an occasional verti-cutting and aerification will take care of the problem. In older greens it may require more drastic treatment, long periods of aerification, completely filling the holes with a sandy mix topdressing and it is very important that they are completely filled, and could necessitate the removal of the sod or even rebuilding the green. This could be where severe mat and thatch layers are allowed to form. This problem starts even during construction and in some cases is man-made by workmen dragging fines onto the green, players often track fines onto the putting surface and in many instances water is the source of fines. Three or four improper topdressings can seal the surface of a well constructed green.

Never sod a green with turf that has been grown in finer material than the green is constructed of.

It is a relatively simple problem when recognized and proper steps are taken to correct it but one that is highly disasterous when not recognized. A difficult task will become much simpler when it is recognized that fines are a major source of trouble on putting greens. They must be diluted with properly graduated material and through manipulation all surface materials be incorporated into each other to form a surface of proper gradation and consistancy. This is practicing putting green sanitation.

University of Illinois Turf Extension Booth at the World Flower and Garden Show.

FOR SALE

One Ezee Flow type fertilizer spreader. Call Francis Krueger at TE 7-2741. Used three times.

FOR SALE

One used Toro Professional 76. Call Mike Bavier at Calumet Country Club, 312 - SY 9-5111.

Largest Irrigation System being Installed Today. Is at Arlington National Cemetery. 6,700 quick coupling valves and costing $1,000,000.

It is said that taxation is the art of plucking the goose to secure the greatest amount of feathers with the least amount of squawking.

ADVISORY REPORT

First, I want to mention that at the advisory sessions each year, we have many excellent suggestions and ideas by other progressive chapters. They, like the Midwest Association, want certain things done to improve our national body. At these sessions all ideas and suggestions are presented and read by the chair. They are then talked about, kicked around, and voted on. The executive board then takes whatever is passed, looks into it further, then puts it on Ben Chlevin's shoulders to carry it out. Well, all I wish to say is how satisfied we the delegates are with the professional way that this is expedited by the head office. And, I think we should voice our thanks to Mr. Ben Chlevin for this, and hundreds of other little details that he follows through with, to make our national meetings a success. Oh, I know he gets paid for it . . . but so do you and I, and we like a pat on the back once in a while. I believe some of us in our Midwest Association forget this. There are some of us, that if we were lucky enough to get to heaven, and sat next to the Good Lord Himself, we would complain about the seating arrangements.

The report about what was proposed at the February 19 meeting (there was only one meeting) will be out in detail in the news letter soon. We didn't propose anything new from the Midwest, but I did personally speak to Mr. Brandt, the chairman, about investigating the possibilities of hotels and motels on the outskirts of town for those with cars, who didn't mind a ride each morning, and who would rather stay at interesting places away from downtown. The prices are wonderful and service is usually first rate. In an interesting town like San Francisco, it was an adventure to take a trolley car up to the conference site every morning from Fisherman's Wharf, as Mr. Dudley Smith and I did.

Respectfully submitted,
Paul Voykin
Midwest Delegate

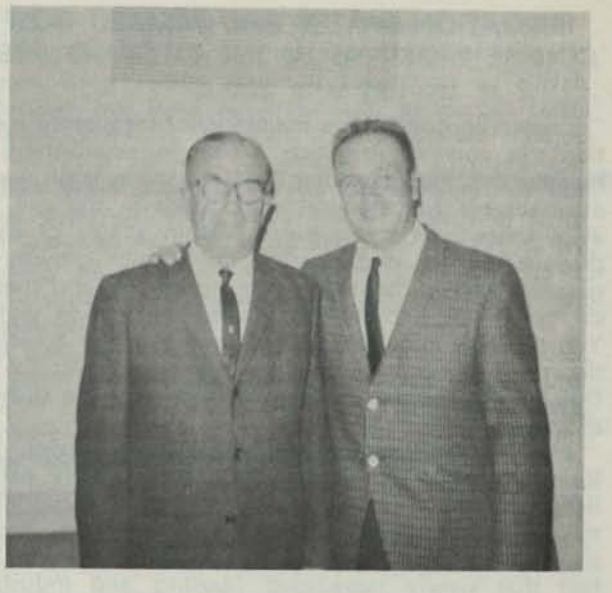
SUMMARY OF EDUCATIONAL SESSION OF APRIL, 1968 MEETING

At our April meeting held at Revisloe C. C., Homewood, Illinois, the Education and Research Committee presented a Koda slide session.

Mr. Ted Sokolis from the Village Links, Glen Ellyn, Illinois, showed several slides of their new clubhouse, which has been constructed during the winter months. He also showed slides of a fertilizer bulk box he constructed, that fits on the bed of his small dump truck. The box, which is loaded with a front end loader, will hold about 2 tons of material. By raising the dump bed, the fertilizer can easily be loaded into a cyclone spreader, on the golf course. It's a great labor saver.

Mr. Dudley Smith from the Silver Lakes Golf Club had an excellent slide presentation of several Monterey, California golf courses, where our annual 1968 G.C.S.A.A. tournament was held. With the use of slides we went on an actual hole by hole tour of Spy Glass Hill and the famous Pebble Beach Golf Links, as Mr. Smith played the courses. Some of the problems that Mr. Smith and the other members of his foursome encountered, plus his excellent commentary were enjoyed by all present.

Ted Sokolis
Educational Chairman



Walter Pieper and his son Dale, Superintendent and assistant at Flossmoor Country Club.

IRRIGATION WATER AND RELATED GOLF COURSE PROBLEMS IN THE CHICAGO AREA

By V. J. Zoiman

Experts in golf course maintenance frequently mention the role of irrigation water in establishing a healthy turf. However, the usual emphasis is on water as a solvent for chemical compounds in the soil, or as a transporter of nutrients within plants or as a prerequisite for metabolism and normal growth of grasses. Seldom considered are ingredients and chemical compounds applied to lawns in irrigation water. Yet, these compounds, having once reached a certain degree of concentration in the soil, may critically influence the general soil environment and the growth of grasses.

Golf courses, mostly for business purposes, are located around big cities. They were usually established on small running waters or near artificial lakes to provide a variety of playing conditions, pretty scenery—and irrigation. Very often overlooked is the fact that newly developed housing and industrial plants in the area may cause the water used for irrigation to become polluted with wastes, salts and detergent residues. Repeated application of such water may lead to accumulation of harmful chemicals in the soil. Thus, in many instances, the turf problems of a golf course around a big city may be intimately associated with irrigation water. Lake Michigan water has the content of Epsom Salt close to standard.

Irrigation Water and Disease Problems

Potentially harmful effects of irrigation water have been acknowledged by several scientists and research stations. It has been pointed out that if soil and climatic conditions (such as high temperature, soil moisture and humidity) are favorable, then

> " . . . the majority of disease-causing organisms exist in both parasitic and saprophytic stages and are known as faculative organisms. The fungi known to be most damaging to grasses subsist in dead organic matter such as mat and thatch as well as on live grass plants. They are constantly present and may become actively parasitic on a grass plant, if the plants lose vigor . . .
>
> If irrigation waters contain ingredients such as chemical waste, salts or other chemical compounds which are toxic even to minor degree to a grass plant, the plant may be damaged to the point that it loses disease resistance and is thus subject to attack by the constantly present fungi. Once the balance between plant resistance and susceptibility is tilted in favor of the fungus, disease conditions can reach the epiphytotic proportions. If at any time there is evidence that the supply of water is damaging to existing turf such water should be tested immediately."*

Irrigation Water Standard

The United States Government has established certain general standards for water used in agriculture. According to these standards chemical compounds may not exceed specific limits without becoming harmful. These are shown in Table I below. In respect to golf courses, the Brookside Research Laboratories generally accept the Government standards but emphasize as very important the following chemical limits in irrigation water:

Epsom Salt, (MgSO4 - Magnesium Sulphate): 100.0 ppm

Total Sulphate (SO4): 250.00 ppm; Total Chlorides (C1): 250.00 ppm

Boron (B) 2.00 ppm

The chemicals in excess of these quantities may become toxic to fine turfgrasses.

In the course of my research of the turf problems of certain golf courses in the Chicago area, I have conducted several chemical analyses of the water used for irrigation. The range of main chemical compounds found in irrigation waters is shown in Table I, Column C. As may be seen from that table, most irrigation waters differ to some degree in concentration of Epsom Salt (MgSO4) and Total Sulphates (SO4) or Boron (B), some common salt (NaC1) and Chlorides (C1). Very often, irrigation water has a toxic effect due to the combination of two or three harmful chemical compounds.

TABLE I

Comparison of U. S. Government and Brookside Research Institute Standards with the Results of Analysis of Irrigation Waters in Chicago Area Golf Courses

Chemical Substance[1]	U.S. Gov. Standard (A)	Brookside Lab Standards (B)	Range of Actual Findings[2] (C)
	Concentration mg/L or ppm		
EPSOM SALT (MgS04)	-	100.00*	34.60 - 341.50
ARSENIC (As)	.01	.01	
TOTAL SULFATE (SO)	250.00	250.00*	11.50 - 441.10
COPPER (Cu)	1.00	1.00	
CYANIDE (CN)	.01	.01	
IRON (Fe)	.30	.30	
MAGNESIUM (Mg)	125.00	125.00	
MANGANESE (Mn)	.05	.05	00.00 - .03
NITRATE (NO_3)	45.00	45.00	
NITRITES (NO_2)	-	-	
TOTAL CHLORIDES (C_1)	250.00	250.00*	13.20 - 544.00
ZINC (Zn)	5.00	5.00	
FLUORIDES (F)	1.00	1.00	
BORON (B)	-	2.00*	.39 - 8.60

1 Total Solids should not exceed 500.0 ppm.

2 From 28 irrigation water analyses and from 22 golf courses.

* Emphasized as particularly important.

Toxicity Increase During Dry Period

Toxicity usually incerases during a dry period in the summer months because water is the minimum factor in the soil and turfgrasses require more irrigation during high temperatures. This is generally true for well water where the concentration during the year has changed very little. Running waters as in brooks, creeks and canals are usually of double or higher concentration in summer, when level of water and clarity decrease and concentration increases. The changing pattern of toxicity found in one particular case is shown in Table II.

TABLE II

Concentration of Chemical Substances In Irrigation Water Over Time

Time	$MgSO_4$ Epsom Salt	SO_4 Sulfate	NaCL Common Salt	Cl Chloride	B Boron	Level of Water
	ppm					
June 28, 1965	237.60	252.40	74.2	74.2	204	High
July 29, 1965	341.50	441.10	105.6	105.6	198	Low

Chemical Relationships Between Irrigation Waters and Top Soil of Greens

Relationships of certain substances or elements between irrigation waters and soil on greens are more evident if water is used for irrigation during several years. Under such circumstances, chemical substances accumulate and may reach toxic levels. Furthermore, there exists a positive correlation between levels of common salt (NaC1) found in irrigation water and high sodium (Na) found on greens. This is illustrated in Table III. High content of NaC1 (399 ppm) was found in water and a range 6.46 - 7.63% of Base Saturation of Sodium (Na) was found on Course I. Similarly, on Course II 46.20 ppm common salt (NaC1) in water was found to be accompanied by 4.21 - 5.79% of Na. On the Course III, where the level of common salt in water was found to be 19.80 ppm the base saturation level of Sodium (Na) was only 1.18% in the soil.

TABLE III

Chemical Substances In Irrigation Waters and Their Connection on Greens of Three Courses on One Golf Club

Sources of water	$MgSO_4$ Epsom Salt	SO_4 Sulfate	NaCl Common Salt	Cl Chlorides	B Boron	Range of Sodium[1] % (B.S.)	Different Courses
	ppm						
Well	34.60	116.00	19.80	19.80	2.10	1.18-1.64	III
Northlake	111.50	111.50	46.20	54.00	1.56	4.21-5.79	II
Southlake	170.40	170.40	399.30	544.30	1.53	6.46-7.63	I

1 Standard range .5 - 3%

Similar positive correlation is shown between Epsom Salt (Magnesium Sulfate - MgSO4) in irrigation water and high contents of Magnesium (Mg) and Sulphate (SO4) in soils and greens. This is illustrated in Table IV. Epsom Salt i.e. Magnesium Sulfate (MgSO4) 341.50 ppm and Magnesium (Mg) 30.87 - 36.92% (B.S.) (Standard range 10 - 20%) and Sulfate (S) 2,574-4,509 lbs. per acre. Only two greens were below the 3,000 pounds per acre of sulfate considered to be detrimental to grasses.

TABLE 4

Relationship Between Epsom Salt and Sulfate Concentration In Irrigation Water and Sulfur and Magnesium Contents of Soils

	IRRIGATION WATERS					RANGE IN SOIL ON GREENS	
Sources of water	Epsom Salt $MgSO_4$	Sulfate SO_4	Common Salt NaC1	Chlorides CL	Boron B	Sulfates S[1]	Magnesium Mg^2
	ppm					Lbs per acre	% B. S.
Brook	341.50	441.10	105.6	105.6	1.98	2,514-4,509	30.83-36.90
Well	123.70	301.30	13.20	13.20	4.2	--	--

1 3,000 lbs./acre may be detrimental.
2 10-20% (Base Saturation) is standard range.

Dealing with the Problem

In cases analyzed, the main problems of irrigation waters were mostly chemical substances as Sulfate, Chlorides and trace minerals such as Boron. Unfortunately, we have no economically feasible methods for chemical removal of Sulfate and Chloride compounds from irrigation water. Fortunately, in both cases analyzed, there were better sources of irrigation water in the area. (See Table III and IV). It was possible to recommend discontinuation of use of chemically-defective waters and another source was substituted.

In general, two ways of dealing with the problem are possible, once the chemical analysis reveals presence of chemically-defective matter; one, as followed in cases discussed above, is to substitute new and better source. Alternatively, superintendents can reduce (or even eliminate) some harmful effects of irrigation water by proper maintenance of courses in conformity with natural chemical laws. This means a corrective fertilization program for balancing soil environment, based on scientific principles.

Chemical compounds and their concentration in irrigation waters are important factors which must be considered for the nutrition and healthy growth of fine turf grasses — sensitive monoculture — on golf courses in Chicago area.

* James L. Holmes, "Factors Influencing Irrigation", **USGA Green Section Record,** Vol. 3, No. 6 (March 1966) page 7.

TEN WAYS TO CONSTRUCT TURF AREAS

Where compaction is a problem, where heavy use under all kinds of weather is considered, texture rather than granulation is the key to satisfactory moisture availability and movement. Based on limited research underway, plus much that is being reported from prior research and long-term experience, Ten Ways to Construct are summarized on the attached mimeograph.

The last ways — 8, 9 and 10 — are nowhere now in turf except in experimental plots. Variations of seven have been placed into athletic fields, golf greens, and occur naturally in areas where almost pure sand is used for construction. Two years research, a Master's thesis and greenhouse observations underway at Purdue University look most encouraging for systems 8, 9 and 10.

Look it over! What do you think? Come see! Turf Field Days will be July 29 and September 30. Next Midwest Turf Conference is March 3-5, 1969.

SUMMARY OF TEN WAYS TO CONSTRUCT HIGH USE TURF AREAS EXPOSED TO COMPACTION

SOIL PREDOMINATES — due to fines present

1. ANY SUBSOIL — mud in — shape to grade — and leave as soon as paid!
2. TOPSOIL ONTO TOPSOIL — avoid any subsoil — no wet work — carefully conserve what's good — can save funds — can do for sandier soil — low budget installation.
3. SUBSOIL UNDER TOPSOIL — plus deep tile DRAINAGE — pea gravel backfill — more desirable where major fill is required.
4. Above plus SAND (60%?) and PEAT (20%?) mixed into top 2 - 3 - 6 - 10 inches in hopes of better water movement.
5. VERTICAL POROUS STRIPS — to remove excess surface water promptly.
   — **narrow trenches** — above tile — into pea gravel, in low spots, between tiles, across tiles
   — **slits** — surface and downward — ½" wide by 10" deep
   — **grooves** — 8" apart, 3" deep
   — all are filled with sand or calcined aggregates
   Use as CORRECTIVE where better drainage is needed.
6. INTIMATE TOP MIX — mixed off-site — U.S.G.A. spec.
   Follow laboratory spec. based on sample submitted. 10" - 14" settle top mix over 2" washed sand over 4" pea gravel over tile drainage.
   Gives low tension at gravel "dump action of excess water"

POROUS TEXTURES PREDOMINATE (no soil)

7. THIN ROOTZONE — mix on or off site
   Top 3 - 6" — maximum surface storage of (peat, calcined aggregates and sand)
   Over sand 3 - 4" for lateral INTERNAL drainage
   Above slitted plastic drain lines (frequent) in narrow trenches in any subgrade
8. IMPERMEABLE LAYER — plastic sheet — giving ZERO TENSION
   For drains use slitted plastic pipe laid on plastic sheet. Depth of sheet and drains based on texture — porosity characteristics of stable materials used (SAND, CALCINED AGGREGATES).
9. RESERVOIR POOLS — use double plastic sheet — laid FLAT, LEVEL with upturned edges to form shallow pools (0 - 3" deep) at base of porous rootzones. Drainage and depth determined as above.
10. Above, plus SUBSURFACE FLOAT irrigation, adjustable level, for wetness, constantly on. Use porous rootzones as wick to keep surface uniformly moist. Could add SOIL SENSING — adjust sensing for dryness.

William H. Daniel
Turf Research and Extension
Purdue University
West Lafayette, Indiana

Two timely articles which will appear in the May issue of "THE GOLF COURSE SUPERINTENDENT."

TWO-WAY COMMUNICATION ON THE GOLF COURSE

In the May issue of THE GOLF SUPERINTENDENT, Jerry Dinelli, superintendent of Northmoor Country Club in Highland Park, Illinois, demonstrates how he has put modern electronic communications to work for him (and the members of his club — **every golfer is as close to a "telephone" as the nearest maintenance vehicle . . .**)

"As improvements in maintenance are effected, the need for greater control over manpower increases. It has become virtually impossible for a superintendent to keep a steady watch over all the day's work; yet this is needed to maintain high efficiency and to get the greatest possible return on manpower and equipment expenditures. Even with the aid of small vehicles, a superintendent still cannot be in two places at one time, and there are numerous occasions when this is necessary on the golf course. But this problem is quickly being erased as the Citizen Band Radio is used to a larger extent. With the practical, standard C.B.R., today's golf course superintendent is now within speaking distance of all his men."

SUPERINTENDENT KELLOGG PREPARES OAK HILL C.C. FOR '68 USGA OPEN

Fortunately, for both Oak Hill and myself, I had been through the 1956 USGA Open at Oak Hill, as assistant to Elmer J. Michael, who, last year, received the USGA Green Section Award for distinguished service to golf through work with turfgrass.

January 1, 1966 was the beginning of two years of changes; preparation for all of the hundreds of problems which occur when you host a major tournament.

The following spring, the weather broke early in March and I hought, "Here is the break I need to get an early start on the construction projects." But in early April, Mother Nature decided we hadn't had enough snow and proceeded to prove it with two more 10-inch falls, three days apart. This held things up until late May. Then, when it did break, so did the golfers—right to the first tee.

Thomas O'Hara

ARE YOU MOVING?

Don't forget GCSAA on the list of the many people that you must notify when you change your address. If you are contemplating moving in the near future, please advise us at your earliest convenience so that we can be sure that you continue to receive your copies of THE GOLF SUPERINTENDENT and all other Membership information that GCSAA mails to you, without interruption. It is only by you keeping us advised in changes of your address that we can keep your mail coming to you as it should be.

ARE YOU MOVING?

Don't forget to notify the "Bull Sheet" editor so the "Bull Sheet" can follow you. Due to recent changes in Postal Laws this is necessary.

Ralph C. Peterson, Vice-President of C.D.G.A. and Charles N. Eckstein, Committee Chairman of Handicaps and Course Ratings for the C.D.G.A.

NATIONAL GOLF DAY HELPS TURF STUDENTS

This year golfers will be out to contribute to the GCSAA Scholarship fund (indirectly) when they play against the PGA and U.S. Open Champions, Don January and Jack Nicklaus in the "Round of Champions" scheduled for May 30, 1968. A portion of the proceeds is contributed to the GCSAA Scholarship and Research Fund by the National Golf Fund. Everyone interested in the betterment of the game of golf and fine turf should support the promotion for this worthwhile event.

Last year, the GCSAA received $10,790.00 toward the scholarship and research fund of the $83,000.00 in receipts from National Golf Day. The Fund is shared by caddie scholarship grants, research and golf-related charities. During the past 16 years, the total disbursements have been more than one and a quarter million dollars.

The largest single outlay last year, $21,995.00 went for caddie scholarship grants, second largest contribution of $18,260.00 was earmarked for the PGA Relief Fund; the United States Golf Association Green Section Turf Research and Education Fund received $11,620.00, followed by the contribution to the GCSAA Scholarship and Research Fund.