President's Message

THE COLORS OF AUTUMN

I realize that the calendar tells us the season of summer ends on September 21, but I know better. For Wisconsin golf courses the summer season ends on Labor Day. September belongs to autumn just as surely as December belongs to winter. What a relief! Good season or bad, the really difficult days for us ended on September 3. We may yet have a day or two over 90 degrees, and we will be keeping up daily routines for a while, but no matter. Psychologically, autumn has arrived.

September, at last. This is the first of what I call the "ber" months of fall. If you say aloud the twelve months of the year, you'll find that the last four, which include fall, all end in "ber." They have the nicest, roundest and most melodious sounds of all — September, October, November and December. And isn't it curious that three of the four end in "ember," most appropriate, it seems to me, when the fires of the year are dying down.

Golf courses are beautiful places every season, indeed every day of the year. But they seem to be at their very finest in the fall. One of the reasons is obvious — the colorful foliage of the trees. When we reach this time of the year, the mystique of golf courses is amplified by the beauty fall color gives to the maples and oaks, the ash and aspen, the hackberries and the hickories. The mystery of it all inspired me to sit down with a plant physiology book and a couple of plant biology books from my library a few days ago to remind myself of what is known about this marvelous change in color nature gives us each fall. Even though the books are fifteen years old, it was a good refresher course. An hour of reading helped bring back to my memory how the color and tintings of autumn come, grow in brilliance, tarnish and fade. I guess some of this miracle may never be completely understood. I really perfer it that way — science should not be able to explain everything in nature.

I found that the easiest autumn color to explain and understand is yellow, the beautiful golden color of hickories and birch and aspen. Carotene, the pigment that most of us associate with carrots, and xanthophyll are present in leaves all summer. In fact, there is a greater amount of these two pigments in green leaves in the summer than there is in the fall. In the summer they are masked by the presence of chlorophyll — the source of green color. During the summer, tree leaves produce and use chlorophyll continually. When fall's cooler temperatures arrive, the production of chlorophyll is retarded more than is its use, and the chlorophyll is broken down into colorless compounds. The green color then disappears from the leaves and the yellow pigments are able to dominate. Xanthophyll is more plentiful in the leaves than is carotene, but the two together give us the golden leaves that are so spectacular against the green grass of our golf courses.

The red colors of autumn leaves are the result of new compounds that aren't present in green leaves in the summertime. They are called anthocyanins, which are cell sap pigments. The green of chlorophyll and the yellow of xanthophyll and carotene are contained in the protoplasm of the cell, whereas the anthocyanins are carried in the solution of the cell sap. Therefore, all of the shades of red and scarlet and rose, which for me are the most startling colors of fall, are the result of tinted sap within the leaves. These are the same materials that give red color to red cabbage and cranberries. They are responsible for the color of grapes, of radishes and of poinsettias. They are responsible for the purple tinge some bentgrass varieties take on during the cool months of fall. Some plants produce anthocyanins in great quantities, like those mentioned above. Other plants, like the hickory tree, don't produce any of it. A rather interesting and curious characteristic of anthocyanin is that it develops only when the sunshine strikes, which explains why the flaming colors of a sugar maple are brightest at the ends of its branches where the most sunlight is received.

There is another important factor involved in fall color — cold temperatures. When the temperature drops to 45 degrees F. or cooler (which it did last night!), it interferes with the removal of sugars and other substances from the leaves. This favors the accumulation of pigments in the cell sap. A sudden drop in temperature just after sunset is especially productive of bright autumn leaves. So are crisp and sunny days. Mild and cloudy days produce duller foliage, mainly yellows and browns. Years ago it was thought that frost was necessary to give us good fall foliage. Now it is known that just the lowered temperatures will achieve this, with or without the frost. In fact, a hard frost or freeze early in the fall tends to destroy yellow pigments and prevents the formation of anthocyanins. In these kinds of autumns we tend to have trees that merely turn brownish without the reds and yellows in the quantities we need to have an awesome color display.

The exact process by which the tide of autumn color recedes and is overtaken by varying shades of browns isn't (or wasn't when my books were printed) perfectly understood. Knowing how this final process of fall foliage works seems to matter little to me — I'm usually so saddened to see the parade of colors end that it isn't very important, in my mind, what happens at the final ebbing.

There is no need to focus on late fall or early winter right now anyway. Take heart! The rough and enervating summer has ended; the best time of the year is here. Savor the relief after summer's demanding days on your golf course. We have two beautiful months before us, two months filled with exciting WGCSA happenings. The Symposium will be here before we know it, and the program for this year is outstanding. We have two monthly meetings with golf remaining. Many of us can hardly wait for our social gathering of the season at Devil's Head, a weekend of well deserved fun that Rod Johnson has worked on tirelessly for most of the year. Maybe some of you will be doing as Cheryl and I will be doing in a few weeks — taking an annual "leaf-peekers" trip to New England. Whatever your plans are, enjoy this autumn — it is the mellowest time of the year.

Monroe S. Miller, President

MUST A GREEN SUPERINTENDENT PLAY GOLF?

By Dr. David Cookson

The question posed above obviously has only one answer — no, the green superintendent need not play golf; but at the same time I submit that his job is made much easier and is more effectively performed if he does play the game on a regular basis.

I would suggest that being responsible for the maintenance of a golf course and not playing the game is akin to setting oneself up as a marriage counselor without ever having been married; or doing sports commentary without having personally ever having been engaged in the activities being analyzed. No doubt one can do a competent job without being actually involved in all these endeavors; but unless the green superintendent experiences exactly what the member golfer is encountering in day to day play he will find it difficult to completely understand what is needed for his course to achieve the highest standard of playing condition.

I think it is imperative that the green superintendent **walk** his golf course. Too often the membership sees him only when whizzing hither and yon in his golf cart, probably en route to some necessary task, but one never sees the little things, that can make such a difference, as well from a cart perspective as one can on foot. The true condition of one's golf course can only be ascertained by stepping on it, and of course, ideally the superintendent would walk the course by playing it; but if he is not a golfer, and finds it impossible to learn to play with enough skill to make it enjoyable and worthwhile, there are alternatives. The best one is to follow along a couple of times a week with players who are experienced and knowledgeable about course conditioning and thus vicariously absorb the benefit of their findings. The membership will be pleased that the superintendent who does not play cares enough to solicit this kind of experience. Another possibility is to have a weekly meeting with one or two such interested members, who would make notes during their play on the course ahead of the meeting, then at the meeting all would go out on the course together to review the various situations. Preferably this knowledgeable member would be the green chairman, but if he is not interested, or unavailable, some other individual could be tactfully selected.

Any green superintendent can make a golf course look good from afar, but it takes special knowledge of day to day conditions and needs to make a course remain in top share for the golfer who is out there playing. The best golf courses both look good and play well; and to answer the original query that prompted this essay, these courses are usually either supervised by a golfing green superintendent, or one who has solicited the aid of experienced golfing members to help him in acquiring the data needed to ensure the best playing condition possible.

I think it is imperative that the green superintendent **walk** his golf course.

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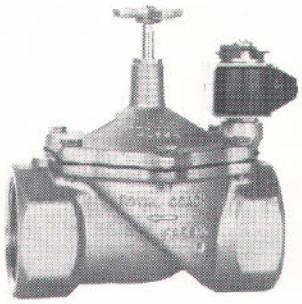

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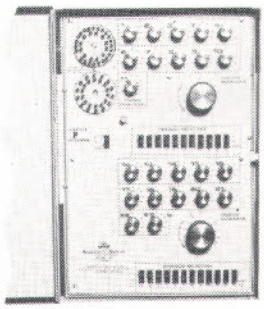

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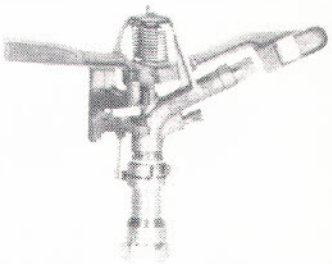

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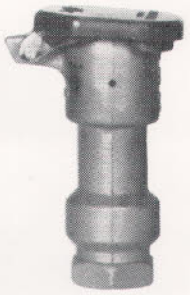

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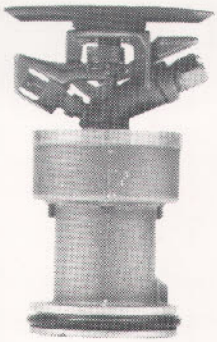

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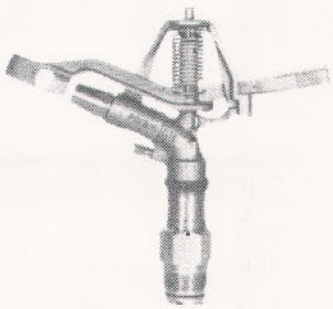

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O. J. WHO?

By Charles G. Wilson

O. J. Noer (as in Norway), that's who! The greatest turfgrass agronomist of all time is a title most fitting for O. J. For forty some years, the mid 1920's through the mid 1960's, O. J. traveled the length and breadth of this nation, not once, but times too innumerable to keep track of, to offer help to turfgrass growers. He spent almost as much time in Canada as he did in the United States, and sampled the turf of St. Andrews along with golf courses in England, Spain, Japan, Mexico, the Caribbean Islands, etc.

Unquestionably, O. J. trod on more different golf courses than anyone else either before or since his time, passing on words of wisdom to each that helped the superintendent to grow better grass. The initials "O. J." stood for Oyvind Juul, so it is no wonder that he preferred to be called O. J. Herb and the late Joe Graffis called him "Red," but he had been "gray" for several years even before I met him in 1948 or 1949. The meeting was interesting because it called to my attention one small part of his vast turfgrass knowledge.

With experts at Rose Bowl (1956).

At the time I was working for the U.S.G.A. Green Section part time as a research assistant while attending the University of Maryland. Our turf research plots were a joint effort by the Green Section and the Department of Agriculture at Beltsville, Md. One or two winters before the meeting took place, Dr. Fred Grau had Al Radko and me collect many samples from the Alta fescue front lawn that bordered on U.S. Highway No. I. I still remember attending a turf meeting sometime after the incident where O. J. was asked what he thought of Alta fescue as a lawn grass. His reply:

Noer checking long roots in Turforator hole, Big Spring Country Club, Louisville, Kentucky (1950).

"I guess it looks okay at fifty miles per hour."

Al and I collected and potted the tall fescue samples throughout the winter in our greenhouse. Fred said we should pick those that were finer in texture, with good color and disease free symptoms. This we strived to do, and then further narrowed the original selections to about 100 the following spring. These were then planted as large clumps in a Kentucky bluegrass lawn near our field house to see if they would be competitive. As I recall it was either that fall or the following year when O. J. visited the station. As Fred was showing him a clump of Alta fescue, O. J. reached down, removed a blade of the grass, rubbed the edge against his finger and then his tongue, and said: "Fred, I hate to tell you this, but this grass does not have the serrated or knife like edge that would make it a tall fescue, it's probably ryegrass." So were almost all the rest of the clumps that Al and I had planted. To this day it still amazes me that this man who didn't even like tall fescue could recall an identifying vegetative characteristic.

O. J. was mighty with the pen; mighty with the spoken word; and mightiest of all with his keen analytical mind. His technical background was superb. A native of Stoughton, Wisconsin, and son of a medical doctor, he got his Bachelor of Science degree in Soils at Madison. He worked on soil mapping and classification for the Great Northern Railroad shortly before World War I. During the war he was involved with the Chemical Warfare Division of the Expeditionary Force. In fact, he wrote the history of chemical warfare following the conflict.

O. J. returned to Stoughton to work in the family "wagon works." However, this was not entirely to his liking. He longed to get back into agriculture, and told the Soils Department of his interest in getting a graduate degree if someone could help with the financing. Fortunately for turf, the Milwaukee Sewerage Commission was coming on line with a new and pioneering method of sewage treatment, and a by-product that was destined to become known as Milorganite. O. J. was the recipient of the fellowship they established to see if the product had any fertilizer value. You know the rest of the story. Milorganite was tested first on agricultural crops like corn, cabbage, and potatoes, with I might add, superior results to using farm manure or chemical fertilizers alone. However,

Trent Jones, O. J. Noer, Tom Mascaro and Supt. Carl Dilsaver on turf plots at Coastal Plain Experiment Station, Tifton, Ga. That's where O. J. gave me my first lesson on rating turf quality (1955).

Milorganite was primarily a nitrogen and trace element fertilizer that was ideal for grass, but that would have to be supplemented with extra phosphorus and potassium for good seed, fruit and vegetable yields.

O. J. credited the late Dr. Emil Truog of the Soils Department with the suggestion that Milorganite might find a good market on golf courses. Golf growth (1920's) was entering a boom period with lots of new construction. Also, about the only fertilizer being used when any was used other than farm manure was ammonium sulfate. Thus, did O. J. become a turfgrass agronomist, and it is a shame that he never get his doctor's degree. He went to work full time for the Sewerage Commission before completing his thesis. There were one or two minor research details that he and Truog wanted to look into a bit further, but O. J. never

found the time to return to Madison to do them. He was much too busy trying to find out "what makes turf grow," and when assured of the answers, passing the information on to the growers. And, this was at a time when State and Federal sponsored research was at a minimum, and the "greenkeeper" was quite secretive about his methods.

First bentgrass growers in Atlanta Pop Beckett, Noer, Charlie Danner (1958).

One of the first things O. J. did on arriving in Milwaukee was to establish a soil testing laboratory. Its use helped O. J. pinpoint the cause of the widespread loss of turf during the hot summer of 1928. O. J. believed as others did that some acidity helped to control weeds. He felt, however, that even the acid resistant grasses like the bents and red fescues would suffer if acidity was carried to extremes. The heat stress of 1928 bore this out. Proof of the pudding was apparent in the Milwaukee area where despite a concentrated effort to acidify the soil with ammonium sulfate the pH stayed near the neutral point. The reasons, as O. J. found, had to do with our "lime sands" used in topdressing, and the hard water used for irrigation. Use of these offset the acid fertilizer with the result that little turf was lost despite the long hot summer.

O. J. credited superintendent Frank Dinelli of Northmoor Country Club in Chicago with helping him to understand the importance of depth in taking soil samples under turfed conditions. The first year our laboratory was in business, O. J. took soil samples of Northmoor fairways. When the laboratory report was finished, O. J. wrote to Frank and suggested that extra phosphorus might be helpful on some of the holes. He suggested applying 400 to 500 pounds of 20% superphosphate per acre along with the Milorganite. The following year O. J. telephoned Frank and asked him to resample the soil. When O. J. reviewed the report he was amazed to find less, rather than more phosphate. He asked our chemist to retest the samples, feeling that our laboratory had made a mistake. When the retesting showed the same results, he called Frank and asked him why he had not applied the superphosphate as suggested. Frank said he had a workman use a shovel and bucket of sampled soil to make a composite that was sent to our lab. The previous year O. J. had used a soil probe and sampled a much shallower depth.

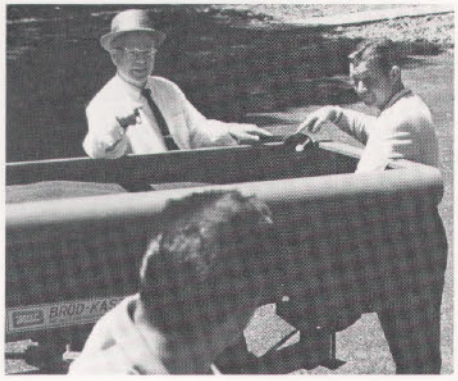
Thus came about the importance of depth of sampling on turfed areas because surface applications of P, K, Ca & Mg move slowly down through the soil profile. After considerably more testing on golf courses throughout the nation, O. J. standardized the depth of two inches as being the most meaningful for turf areas. When deeper samples are taken, recommendations for excessive applications of nutrients are made. This could be harmful if carried to extreme, or wasteful and costly even though the turf is not injured.

Broken legs didn't slow him down. Del Rio Country Club, Modesto, California (1953).

Always the photographer with Ed Cook, Ponte Vedra Country Club, Florida (1953).

It is surprising to me how long it has taken some universities and other soil testing laboratories to recognize this fact. We also find laboratories that remove the thatch before testing the soil. This results in recommendations for excessive applications. The actual tests don't lie. The fault is poor sampling and improper interpretation of the results.

Thousands of tests also showed O. J. that grass clippings contained amazing amounts of plant food nutrients. Where they were removed daily as on putting greens, recommendations for replacement had to be quite different and much higher than on fairways where they remained



Noer and Bob Williams check Milorganite distribution in Brod-Kasten spreader, Bob O'Link Country Club (1960).

Nitrogen needs were sixfold or more where clippings were removed, and potassium requirements were almost as high. O. J. didn't just surmise this would be the case. He had superintendent Les Verhaalen at Brynwood Country Club and later superintendent Jim Hamner of Memphis (Tenn.) Country Club actually save all the grass clippings from a putting green for analysis. These were Milorganite fed greens. And, while Milorganite had an almost perfect ratio of plant food nutrients for fairways it had to be and was supplemented with potash for the putting greens. Increasingly through the years teeing areas also started to show potassium deficiencies because of clipping removal, and now that some courses are removing clippings from fairways we can expect the same thing to happen there.

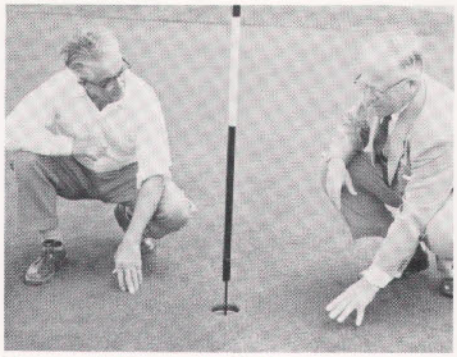
With increased use of chemical fertilizer mixtures in the 1930's, O. J.'s testing brought to light an imbalance or wasteful build up of phosphorus in putting green soils.

Most of the mixtures used then were low in nitrogen and high in phosphorus like a 3-12-6 or 5-10-5. Some greens were becoming "low grade phosphate mines" according to O. J., with a resultant foul up in iron metabolism. He became known as "iron chlorosis Noer" and showed more than one golf course how to save the grass with prompt sprays of iron sulfate.

Noer was the consummate agronomist. His involvement covered anything that happened to turfgrasses. He tested many new products as they were introduced for turf use. He became involved with fungicides, insecticides and herbicides in trials he made on turf under actual playing conditions. His applied research was the essence of simplicity. He laid out plots using "half, recommended and double" rates of application. He reasoned that one should know if less will do the job, and also be aware that "overlaps" are unavoidable, thus products must be safe to apply at double the recommended rate.

Noer and Ron Kirby rate Tifgreen bermuda growth on beach, Arawak Country Club, Nassau, Bahamas (1962). Milorganite was used in this test, then on fairway planting at 17 tons per acre, to overcome salt buildup.

And, he had the uncommon ability to see beyond the efficacy of the product's intended value. He was concerned, always, for the grass and looked for any delayed reaction that might harm it even though the weed, disease, etc. were being controlled. It was O. J. who first called attention to the fact that use of 2,4-D caused a delayed injury to bentgrass and brought about an increase in Poa annua. He had pictures of his plots at Milwaukee Country Club to prove it. Similarly, with a resurgence of interest in the use of calcium arsenate as an herbicide for Poa control, O. J. warned that it

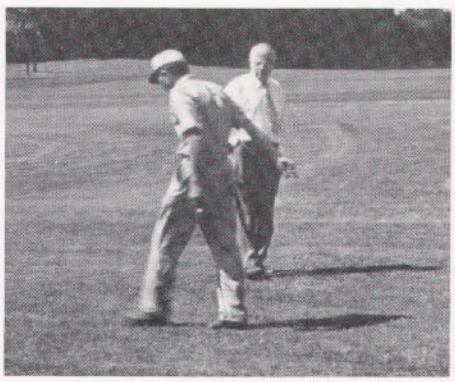


Noer and Owen check Penncross green, Royal Montreal Country Club (1959).

was an unstable chemical that could damage good turf, especially under acid soil conditions. Such was the case at more than one golf course in New England.

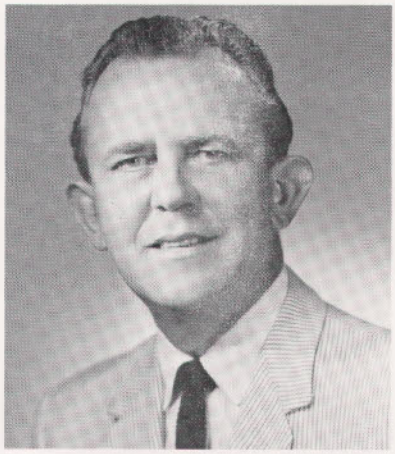
Noer's vast experience also taught him early on that "changing the grass" to a new and improved but different variety would not work unless the management practices were changed at the same time. Many were the failures where Merion Kentucky bluegrass was tried in fairways that continued to be managed for bent and annual bluegrass. Fairway irrigation more than any other factor brought about the demise of Kentucky bluegrass and red fescue and brought in Poa annua in the north. O. J. wrote about and recorded this on film, and had good reasons indeed for advocating bentgrass while others were pushing Kentucky bluegrass. Just think of the monies that would have been saved had everyone followed O. J.'s advice.

One could go on and on about O. J.'s accomplishments. He was honored in his time by the USGA, the GCSAA, and many local and regional golf superintendents and turfgrass associations. The one I am proudest of is the foundation



Noer and John Stampfl check knotweed control with Sodium Arsenite, Milwaukee Country Club (1959).

established to honor his name. Although O. J. may be forgotten with the passage of time, his ideals will live on with continuing financial support of turfgrass research through the O. J. Noer Research Foundation, Inc.



Editor's Note: We are deeply grateful to Charlie Wilson for the time and effort he has given in putting together this special issue of the GRASSROOTS about a special man to Wisconsin.

Charlie himself is a special person. He is the man who pioneered the Green Section Regional Turf Service in 1952. Charlie was born in Port Jervis, New York and trained for his profession at the University of Maryland, where he earned a B.S. degree in Agronomy in 1950. While he was still an undergraduate he joined the USGA Green Section Staff in 1947 as a research assistant and field agronomist at the Beltsville, Maryland office. In 1952, the USGA announced that the Green Section, which had been devoted to research for the previous 30 years, would take an entirely new approach. From that time on, it would emphasize direct service to member clubs through personal visits by Green Section staff. Before establishing the first regional office, the USGA assigned Charlie to make a first-hand survey of the West Coast conditions during the spring of 1952. The results of the survey showed that the need and desire for such a position was there. The rest is history. Charlie was the first full-time turfgrass consultant the USGA had in the field. He provided a strong foundation for the Turf Advisory Service that so many of us subscribe to annually.

Charlie left the USGA in June of 1955 to become an agronomist with Milwaukee's Sewerage Commission. He eventually became head agronomist, sales manager and director, succeeding O. J. Noer. It was during these years that he became so close to O. J. and got to know him so well.

WISCONSIN GOLF TURF SYMPOSIUM OCTOBER 24 & 25, 1984

From The Director's Desk

REFLECTIONS ON THE WISCONSIN GOLF TURF SYMPOSIUM

By Stanley J. Zontek

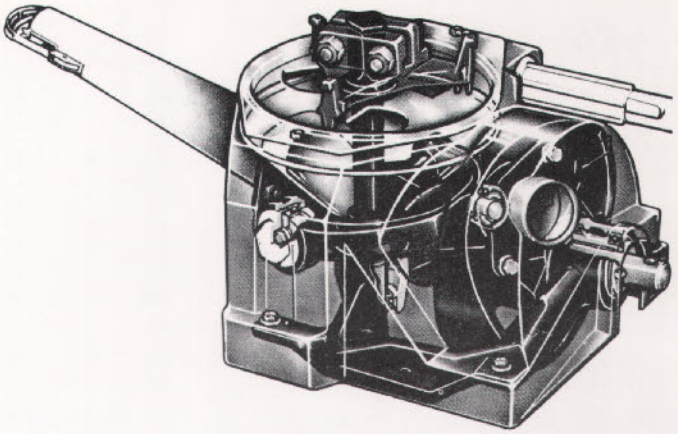
The following are a few thoughts about the Wisconsin Turf Symposium. In my travels as an agronomist for the USGA Green Section I have an opportunity to see and participate in a large number of turf conferences locally, nationally and even internationally. The Wisconsin Turf Symposium is one of my very favorites. It has a particularly unique character among the other conferences held today and this uniqueness is. . .what I like. Specifically, the following are a few items which set the Wisconsin Turf Symposium apart from other turf conferences.

1) One topic is covered in depth. Most turf conferences give the listener a little bit of a lot of subjects which, in many ways is fine but it is refreshing to have a turf conference that takes an important issue of today and examines it from different viewpoints very comprehensively. This is the only conference that I know takes this approach.
2) The conference is a pure golf turf conference. Increasingly, turf conferences are just that. . .conferences that relate to all aspects of turfgrass be it golf courses, roadsides, athletic fields, lawn maintenance companies, etc. In some ways, even with concurrent sessions, these conferences can become general in nature and perhaps even a bit diluted in content for the golf course turf manager. The Wisconsin Turf Symposium stays true to the problems of golf course turfgrass management. This is almost unique any more.
3) Size. The Wisconsin Symposium is not too small. . .nor is it too large. A number of turf conferences across the country seem to be obsessed with numbers. . .more people in the door than anyone else. While such large numbers are fine and even needed to support the turf research effort in the state, a conference can become so large that it stifles such things as individual's questions. It also makes the speaker have less time on the podium so, in many ways, they can't really develop their subject matter. By being more of an intimate group, the Wisconsin Symposium is just big enough to be a major conference and yet small enough to be a "comfortable" conference.
4) A good facility, a good location and a reasonable cost. It is getting expensive to attend turf conferences and sometimes inconvenient to find a place to park, to eat or to be entertained. This is not the case with the Wisconsin Symposium. . .it is all in one building, in a nice downtown location with some excellent (I sure can attest to that) restaurants. Come to think of it, that may be one additional reason why I like the Symposium. . .Milwaukee is an excellent restaurant city!
5) Audience participation. It seems to me that because of the size, atmosphere and continuity of organization that the people in the audience feel at ease to ask questions. I have attended a number of turf conferences where no one literally asked a question of a speaker. This is unfortunate because I do know that people have questions and oftentimes, one question leads to another. This exchange of questions and answers is, oftentimes, just as important as what the speaker presented in his prepared talk. Thus, I feel the audience gets more out of this type of exchange than some of the others.

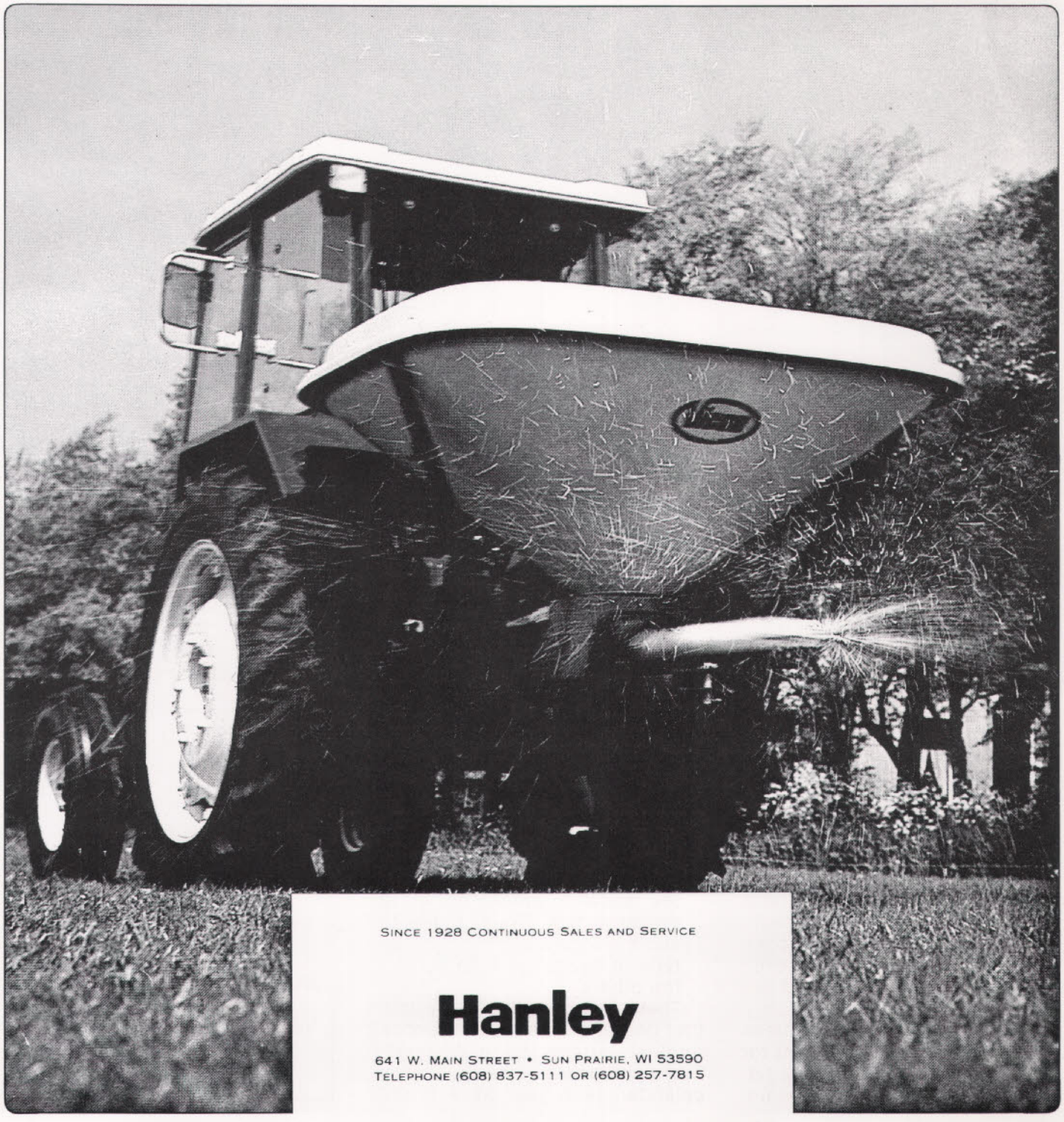
There is no doubt in my mind that one of the best conferences I routinely attend is the Wisconsin Turf Symposium. I mark it on my calendar each year as a priority conference to attend. It usually falls on my son's birthday but. . .what's in having a little birthday party a few days early or a few days late! It gives me a chance to do some shopping for him in Milwaukee.

I look forward to the Wisconsin Turf Symposium each year and I can say that I am proud to have been part of and a participant in this excellent turf conference.

Vicon



the New Dimension in seeding/spreading



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THIRTY YEARS TROUBLE SHOOTING TURF PROBLEMS

By O. J. Noer —
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"All other Noer material in this issue is about Mr. Noer. The following text is by him. It was a paper given by O. J. on March 29, 1961 at the Wisconsin Turfgrass Conference. That conference was held at the Wisconsin Center on the University of Wisconsin campus in Madison. Thanks to Dr. Jim Love for the suggestion and the material."

Advances in the art and science of turf grass culture have been tremendous during the past three to four decades. Even bigger ones are in the making. They will be built upon the achievements of the past.

Until 1920 turf grass management was confined to sports turf areas, with most emphasis on golf courses. Maintenance was dominated by British talent imported from Scotland and England. They were golfers essentially with a smattering knowledge of grass care. British methods were employed mostly, some good and some bad, due to marked climatic differences between the British Isles and continental America. Over there a favorable, cool, moist, island-type climate simplified turf grass management. Their methods were found wanting in American areas of continental type climate with cold winters and hot summers.

Fescue was the prized early time grass on greens, fairways, and even on tees. It did well until the appearance of modern power operated mowers. Then fescue lost favor because of its inability to survive under frequent close cutting.

Early-day maintenance was simple. Greens and tees were topdressed every three to four weeks. Otherwise bone meal was the only supplemental fertilizer. The topdressing was a mixture of manure compost and sand. Compost piles were built several years before they were needed. They were long piles consisting of manure and soil in alternate layers. The piles were reworked several times each year to kill weed seeds, promote straw decomposition and insure a uniform product.

The composted manure supplied ample potash and some nitrogen. The bone meal furnished plenty of phosphoric acid. Aside from a skimpy amount of nitrogen, grass received everything else it needed.

Golfers never complained about poor greens in a bad season. It was accepted as inevitable. Fungus diseases were less virulent under the simple, low nitrogen feeding program. Turf troubles were due to other causes mostly.

Fairways were cut weekly, if possible, when horses were the motive power. On some courses fairways received an occasional dressing of manure. It was applied in fall and lumps were destroyed and worked into the turf with a spike-tooth harrow, or a drag mat in the spring.

When golf started to change from a game for the rich to one for the average citizen, the number of courses increased. It became necessary to find answers to problems associated with turf grass development and maintenance, due mostly to the demand by golfers for good greens and tees throughout the playing season, and for better fairway turf.

Although a man named Taylor is said to have established the first turf grass plots in this country, the initial, technically sponsored plots were started by Dr. H. J. Wheeler at the Rhode Island Agricultural Experiment Station in Kingston. This was done when he became Station Director after obtaining a Doctor's Degree in Germany. The plots consisted of fertilizer trials on lawn grass type turf. By-product ammonium sulphate and Chilean nitrate of soda were the main chemical sources of nitrogen at the time. They were used alone and in combination. The plots received phosphate and potash, but no lime. The marked reduction in weeds on the ammonium sulphate plots was very striking. Increased soil acidity was thought to be the sole reason for weed elimination. This lead to the "acid era" in turf culture. Ammonium sulphate only was used on golf greens. Warnings by soil scientists that soils could become too acid, even for acid tolerant bent grasses, were ignored. The acid era died along with the turf on greens during the hot, humid, and wet summer of 1928. Then lime and other types of nitrogen fertilizer regained favor.

Despite the disaster of 1928, the Rhode Island plots were continued for sometime longer. Finally winterkill became so bad on the sulphate treated plots that they were discontinued. The same thing has been observed elsewhere. Grass has difficulty surviving adversity — in summer or winter — on areas where ammonium sulphate is the only or main source of nitrogen, especially where lime is not being used.

The Green Section of the United States Golf Association was organized in the early 1920's, following the overnight loss of greens on a Washington, D.C., golf course just before a major national tournament. Dr. Piper and Dr. Oakley were the first leaders. Through their efforts Dr. John Monteith, Jr., a U.S.D.A. plant pathologist, was assigned the task of investigating turf grass diseases. He identified the organisms responsible for dollar-spot, brown patch, and snow mold. They were the troublesome diseases at that time. In the snow mold investigation he was assisted by Arnold Dahl. The calomel-corrosive mixture now sold under various trade names was developed from these trials.