

these Nemagon and Fumazon, both effective nematocides have been developed.

It was first thought that only Bermudas and St. Augustine were damaged by nematodes, but by 1955 it was found that they also infest bents and bluegrass, causing as much damage to Northern courses as those in the South. Samples taken at Florida courses have shown that as many as 25 million ring nematodes may infect less than five pounds of soil. In one study of a Florida green it was found that 95 per cent of the samples harbored nematodes, and 65 per cent of these were heavily infested.

In the last five years, the University of Florida has intensified its efforts to eradicate nematodes. At the moment, five major control projects are being carried on. The parasites feed on one another to some extent and soil protozoa also help to keep the nematode population in check. Where Nemagon has been used effectively, nematodes have been largely wiped out and turf roots have rapidly regained strength.

Describes Bermuda Studies

W. B. Gilbert reported on a Bermuda winter hardiness study that has been carried on at North Carolina State University for the last two years, and was prompted by the deep freeze that struck the Mid- and Deep South in 1962-63. Observations have been concentrated on temperature conditions, hydration, fertilization and management practices.

It is thought that exposed Bermuda can safely withstand temperatures as low as 5 degrees F. Where greens have been covered with straw, turf has not been seriously injured at as low as minus 20. The hydration level in both cases, however, must be in the medium range. It has been observed that when plant tissue is saturated, mere freezing temperatures can have an explosively harmful effect. The different types of Bermudas can be quite seriously injured by desiccation.

Nitrogen Imbalance Effect

A nitrogen imbalance, Gilbert pointed out, has about the same effect on Bermudagrass as it does on cool season turf. Best results are obtained if fall fertilization is carried out about three weeks be-



Elwin Deal, University of Maryland agronomist (r), is shown with two Mid-Atlantic supts. who are not identified.

fore courses are overseeded in late Sept. or early October. Ample potash should be applied to give turf the hardness it needs to carry it through the winter. Phosphorus studies, as yet, aren't complete.

Aprons Hold Up

As for management, the N.C.S. turf researcher said that there isn't any doubt that Bermuda aprons survive freezing conditions much better than the putting surfaces. This, of course, is due to the insulation and deeper root structure that is built up from a cut that is consistently $\frac{1}{4}$ to $\frac{1}{2}$ -inch higher on the aprons throughout the year.

Fourth Session

Irrigation Program Runs Into Overtime

Roy W. Nelson, supt. of Ravisloe CC, Homewood, Ill., was the chairman of this program in which all facets of irrigation were covered. His roster of speakers included John F. Schrunk, an irrigation consultant; Harry J. McSloy, supt. of Wilmington (Del.) CC; Donald E. Wright, supt. at Camargo CC in Cincinnati; Tom Topp of Bellevue CC, Syracuse, N. Y.; Walter Boysen, supt. at Sequoyah CC in Oakland, Calif.; and Ralph E. Engel, Rutgers University agronomist.

This meeting went the equivalent of 14 innings. It was obvious that the education committee was wringing the last molecule of water out of what is recognized as an extremely important subject.



There isn't any doubt that this is front cover material. These women, all supts.' wives, are shown at one of the luncheons the always thoughtful GCSA planned for them during convention week.

But it shouldn't be forgotten that an education session, like a green, should be built with an eye toward runoff. However, the day was partially saved by Tom Topp, who told an amusing tale of his six-month search for a contractor who had agreed to supply a trenching machine for an irrigation installation, and then went into hiding, and by Don Wright, who gave a masterful description of how to install an automatic system.

Faced with Water Crisis

John Schrunk, who must have chosen his occupation with his tongue in his cheek considering his name, declared that if Americans don't soon wake up they are going to be faced with a critical nationwide water shortage. The Western half of the country, he said, already is imperiled and a kind of creeping drought is moving eastward. Shrunk, who has served as an irrigation consultant in the Middle East and is well familiar with the distress that lack of adequate water supplies can cause, pointed out that a fumbling bureaucracy is partly to blame for our threatened water crisis. No government bureau actually has control over conservation, he said, although several federal agencies are involved in it.

"Our water problems stem from at least four factors," Schrunk explained. "There is a deep water shortage in addition to a ground water shortage. Salt

water seepage threatens our coastal water supplies, and inland, pollution in heavy population areas, causes many problems. If we don't find ways to save water by controlling evaporation, sealing against seepage and generally conserving this great natural resource, we are going to see the day when water will be rationed."

Recommends Use of Probe

In discussing good watering practices, Harry McSloy pointed out that perhaps the best test of irrigation methods is the probe. If a rod used in probing penetrates easily to a depth of six inches, there is a correct amount of moisture in the soil. If it falls short, compaction can be suspected. If the probe goes much deeper than six inches, a tract is over-watered.

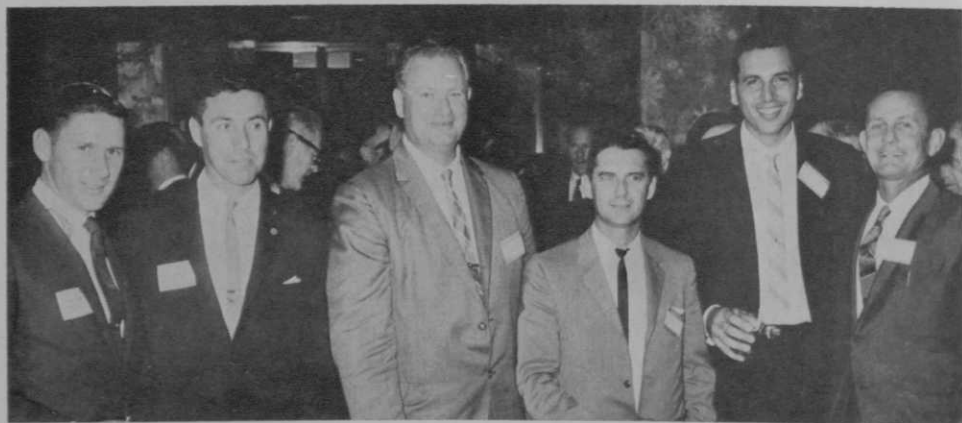
McSloy said that tees are more apt to become compacted than any other course area. To keep them in reasonably good shape, he recommended that they be aerified at least once a year and probed every week. Rainfall usually is adequate to take care of fairway irrigation except in the warm months when wilt threatens. Localized dry spots, however, should be treated the same as tees. In summary, the Wilmington greenmaster said a constant study of root health should be made because it is "what's down under that counts."

Star of the Program?

When Camargo's automatic irrigation



Surrounded by charming women at a GCSA luncheon are Earl F. Yesberger (seated) and Bill Fannin. The ladies (from left) are: Mrs. William Fannin, Mrs. Ralph Locher, wife of Cleveland's mayor, Mrs. Walter Ward, Mrs. Yesberger and Mrs. Charles Winch.



Here is a happy band of relaxed greenmasters at the Hospitality Hour, held on Feb. 7 . . .



. . . and this group of golf writers seems to be taking all things in stride at the GCSA press luncheon.

system was put in a little more than a year ago, Don Wright, supt. of the Cincinnati club, took approximately 1,500 photos of the installation. He is donating 150 of these to the GCSA library. The 25 or so slides that Wright showed on the education program were exceptional examples of photographic art. In addition, Wright is an accomplished enough speaker to give travelog appeal to a workaday project such as an irrigation installation.

\$10,000 Saved

He estimated that his club saved more than \$10,000 in a year's time in labor and water in switching from manual to automatic irrigation. More than five miles of pipe, 50 miles of wire and 400 sprinkler heads went into the Camargo system. There is an 80-foot separation between heads, which run exactly down the center of the 33-yard wide fairways at Wright's club. Five pop-up heads, uniformly spaced, cover each green.

Wright supervised the irrigation construction project, but he entrusted the electrical installation to the best engineer he could hire. He advised supts. who are planning going over to automatic systems to do likewise, pointing out that this amounts to long range economy. Camargo's water system operates off two booster pumps and is controlled through a 12-switch panel.

Appearing along with Wright on the automatic irrigation panel were Walter Boysen, who described Western irrigation methods, and Tom Topp, who started out to tell how watering is carried on in the East, but got wrapped up in a humorous but woeful tale of an outside contractor who wasn't able to find Topp's Bellevue course for six months. "Maybe the poor guy did get lost," Tom remarked. "We're pretty far out in the country."

Sold on Automatic

At Sequoyah CC, Boysen applies from $\frac{3}{4}$ to 2-inches of water a week, operating his system daily for as much as 12 hours. He advised against installing more than from three to five heads on a single control valve, and suggested that each side-hill outlet should be hooked up to its own separate valve. Poor results are obtained in installing automatic systems,



Kansas City delegation used heart to remind GCSA members they'd be in KC on Valentine's Day in 1966.

Boysen said, if care isn't taken in the vertical placement of heads, keeping them below the ground surface to avoid damage. Good drainage also should be insured in the immediate areas surrounding sprinklers.

Of special interest to the audience were Boysen's remarks on using the irrigation system to apply fertilizer. He advised against it, saying that it is only about 60 per cent efficient. In many instances, fertilizer is stacked up in one spot while another may not be touched.

The Sequoyah greenmaster concluded his remarks by saying, "You'll never go back to manual watering after you have installed an automatic system. You may be discouraged at first with the new system, but allow for an 18-month breaking-in period and your troubles will be behind you."

Get A Firm Contract

When Tom Topp finally got his automatic system installed, he was well pleased with the way it operated. Money was saved on both water and labor, and it was only necessary to set the controls every two weeks and let the system carry on thereafter. Bellevue's system is geared to give a $\frac{1}{2}$ inch per hour precipitation rate and operates 40-night hours each week.

In preparing to make an installation, Topp said that several things should be

taken into consideration. Course topography should be carefully plotted so that natural obstacles can be avoided or minimized. The entire irrigation route should be staked out in advance to speed up the building of the system once it is undertaken. Every effort should be made to avoid widespread damage to turf. There should be as much pipe prefabrication as possible and great care should be taken to select the proper sprinkler heads. Finally, and Topp emphasized this with some irony, if the installation work is to be contracted, the club and supt. should insist on an iron-clad agreement with the outside company.

And, speaking of irony, when the contractor finally located the Bellevue course and brought his equipment in, the ditching machine dug up no more than ten feet of turf when it broke down.

No Watering Formula

The final speaker on the irrigation program was Ralph Engel, an 18-year veteran of the Rutgers University agronomy staff and one of the most knowledgeable turfmen in the country. He spoke on watering as it is related to soil, climate and management.

Engel emphasized that watering isn't done by the book or formula. There are so many variations in the moisture needs of turf, roots and soil that the watering process has to be continually studied. Its keynote should always be flexibility of application. In the final analysis, Engel said, watering comes down to the need for preserving life, and for providing a coolant when temperatures are extremely high. If a supt. grasps these two essentials, he is well on his way to understanding the whole purpose of watering.

Besides flexibility, the Rutgers professor listed several other things that should be kept in mind when a system is installed and actual application of water is undertaken. These are: A need for uniformity in distribution; the ability to slow down the application rate and even cut back on the size of droplets, if necessary; protection against uneven runoff; the application of correct quantities at all times; and ability to coordinate the watering system with rainfall. (Turn to page 112)

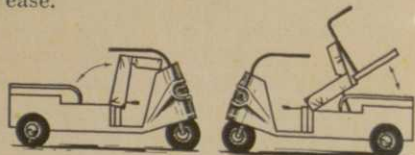
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