



Better Turf for Better Golf

TURF MANAGEMENT

from the USGA Green Section

Changing Greens from Common Bermudagrass to Tifgreen

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During the summer of 1957, the Greensboro Country Club changed all 18 of its common bermudagrass greens to Tifgreen (Tifton 328). Actually, this change was made in a little over half a growing season or 3½ months. Our first green was sterilized April 15 and the last of our eighteen greens was back in play with the new grass on August 1.

More clubs in the southeastern states are planning to change to one of the finer leafed bermudas. The planning requires time, thought, and preparation. Although the actual change-over was accomplished in 3½ months, we did work for two years previously planning this change, in order that it could be done in the shortest length of time; and at a minimum of inconvenience to our regular play, which had to continue while the change was being made.

Our first problem was to sell the membership and our board of directors on the idea of a new summertime grass for our greens. This we did by first starting with an experimental green, close to one of our regular greens (No. 2), in order that we could switch play to this green when we were ready to test playing conditions.

We started our experimental green on July 1, 1955. This green, which we called No. 2-A to distinguish it from our regular No. 2 green, was planted in Tiffine

(Tifton 127) bermuda. (Tifgreen was not available at that time.) We struggled with this green for a year and really learned from our experience. We made mistakes in sterilizing the old grass, in planting the new grass, and in growing the grass, but we learned. We did this green in our spare time and out of our regular budget. On July 1, 1956, one year later, our experimental green was opened for play. It proved so much superior to the common bermuda as a putting surface that, on our own, we decided to change one of the regular greens to a new grass. Tifgreen had been released that spring, so on July 12, 1956, we planted our regular No. 2 green in Tifgreen bermuda. Play was continued on green No. 2-A.

Based on the experience gained in working with our experimental green, we changed our methods entirely with this green; and in 9 weeks (September 15) it was ready for play. The Tifgreen grass proved far superior to the Tiffine, and we were satisfied that we had the right grass for our locality.

On July 20, 1956, our board of directors gave us an appropriation with which to change all greens as fast as we could work out a program.

Changing the grass on one green while that green is out of play is not a big job, but changing all greens at one time,

and not stopping regular play did present a problem. Our first decision then, was to decide how many greens to change at one time the following year. We could do four or five per year and take four years to complete the change-over, or we could do nine each year and take two years to do the job. We knew that, regardless of the number of greens done each year, play would be inconvenienced; and that there would be a certain amount of complaining from the playing membership. We decided, rather than have play inconvenienced for two or three years, that we would do all eighteen greens in one year, or, in other words during one growing season.

A project of this nature can be broken down into five parts, and in their order, they are:

1. Temporary greens for play
2. Preparatory work
3. Sterilization of greens
4. Planting of the new grass
5. Growing of the grass and conditioning of the green

Temporary Greens

When we decided in July of 1956 to change all greens during the growing season of the next year, the first thing we did was to set a schedule for the work, based on the experience we had gained from our experimental work. This schedule was as follows:

- a. Sterilization of greens, April 15 to June 1
- b. Planting, June 1 to July 1
- c. Growing and conditioning, July 1 to September 15

From this schedule we noted that play would have to be discontinued on part or all of our regular greens, from April 15 to September 15—a period of five months. Actually, we did better this schedule and cut this time to 3½ months.

We knew it was necessary to start work immediately in order to have good temporary greens by April 15. We began this work the latter part of July. These temporary greens were of an average size of 40' x 60', or 2,400 square feet. They were located so that there was at least 30' between the temporary green and the regular green. We knew that if they were located by the side of the regular green there would always be the nuisance of play landing on the area under work. We

did have two greens where we had to locate the temporary green by the side of the regular green; and in these two cases, when the regular green was being gassed, the tee markers were moved up close to the temporary green to avoid the possibility of a ball puncturing the plastic covers. The hole really became a "chip and putt" hole for one week while the sterilization was taking place.

These temporary greens were mowed, top-dressed, rolled and fertilized several times during the remainder of that growing season. When our regular greens were planted in rye for the fall and winter season, these temporary greens were planted in rye also, and maintained during the winter with the same care as our regular greens. This was done in order to have good temporary greens to switch to in the early spring.

Preparatory Work

During the winter months, we tried to do all of the things which should be done ahead of time. We wanted to avoid any possible delay, once we had started.

One of our first preparatory moves was to measure and put on paper the size and outline of each green, accurately plotted to scale. We used the following method in measuring our greens, all of which were irregular in shape:

1. By eye, we established the long axis of the green, driving a small stake at each end to the intersection of the axis and the edge of the green. These two stakes were driven just below the grass surface, out of the way of the mowers, and kept for future reference.
2. We then stretched a line between these points, and beginning at one end of this base line we drove small temporary stakes every 10' along the line.
3. At each 10' interval, we measured the ordinates or distances to the right and left edges of the green. These distances were measured at right angles to the base line by the use of a T square made of two strips of wood about 6' long, tacked together at right angles. The stem of the "T" was placed along the base line and a tape stretched along the top of the

"T" at the point to be measured.

4. From the measurements thus obtained, a scale drawing ($\frac{1}{8}$ " equals 1'-0") of the green was plotted.

After all eighteen greens had been measured and drawn to scale, we then plotted the positions and sizes of the plastic covers which were to be used in the gassing or sterilizing. From experience we had decided to use a 32' width of cover, and not to go over 80' in the length of any cover, as anything larger than this size would be too unwieldy. Also, from experience, we decided to use the heavy duty (.006) thickness of plastic. From the drawings which showed the covers in place, we were then able to determine the number and lengths of covers necessary to do our job in our scheduled time. We used two covers 65' long, two 68' long, and two 78' long. All covers were 32' wide.

Topdressing Prepared in Winter

During the winter months we prepared all of the topdressing necessary to plant our grass and enough additional to take care of the green conditioning. Our topdressing was a mixture of creek sand, topsoil, and peat, in equal parts. This topdressing was sterilized in our dirt shed by the use of methyl bromide gas and a plastic cover. The mixture was spread on the dirt shed floor to a thickness of $3\frac{1}{2}$ " covering an area of 28' x 28'. We used dressed lumber (4 x 4's with top edges rounded) to contain the mixture and to give us something over which to lap and sand bag the cover. Each batch of topdressing mixture was left exposed to the gas for a minimum of 48 hours. Each batch was then screened ($\frac{1}{4}$ " mesh) and stockpiled in one end of the shed. Our dirt shed has a concrete floor, but has open sides. It was necessary to close in these sides with canvas awnings in order that we could heat the building with "salamanders." Without this heat the methyl bromide would not be completely effective.

During the winter months we also collected approximately 500 gallon jugs for use in supporting the plastic covers. A jug laid on its side forms the best support for these covers, as it presents a rounded surface to the cover and, theoretically, the side of the jug in contact with the green does not cover any of the

COMING EVENTS

- September 3, noon to September 4, noon
Penn State Turfgrass Field Days
University Park, Pa. Prof. H. B. Musser
- September 8-9
Cornell University Field Days
Ithaca, N. Y. Dr. John F. Cornman
- September 11-12
University of Rhode Island Field Days
Kingston, R. I. Dr. Jesse A. DeFrance
- September 15-16
Midwest Turf Foundation Field Days
Lafayette, Indiana Dr. Wm. H. Daniel
- September 16-17-18
University of Florida Turfgrass Conference
McCarty Hall, University of Florida
Gainesville, Fla. Dr. Gene C. Nutter
- September 30
St. Louis Field Day
Clayton, Mo. Leo S. Bauman
- October 2-3
Northwest Turf Association Conference
Washington State College
Pullman, Wash. Dr. J. K. Patterson
- October 6-7
Utah-Idaho Turf Conference
Boise, Idaho Mr. Jay Richardson
- October 9-10
Rocky Mountain Turf Conference
Fort Collins, Colorado Prof. George A. Beach
- October 9-10
Louisiana Turfgrass Conference
Southwestern Louisiana Institute
Lafayette, La. Prof. J. M. Peek
- October 15-16-17
Central Plains Turfgrass Conference
Manhattan, Kansas Dr. Ray A. Keen
- October 21
Southern California Turf Conference
Los Angeles, California Mr. Frank C. Stewart
- October 23
Arizona Turf Conference
University of Arizona, Tucson, Arizona
Mr. Joseph S. Folkner
- October 24
New Mexico Turf Conference
New Mexico State College, New Mexico
Prof. C. E. Watson

grass. We had previously tried other items for supporting a cover, but all presented the problem of tearing the cover.

We needed about 600 sand bags for sealing down the edges of the covers. These were made of twill by a local bag factory. When filled with sand and the open end tied off, the bags resembled a large sausage of about 6" in diameter and 30" long. These bags were also assembled ahead of time and filled to $\frac{3}{4}$ of their length with sterile sand. A bag too tightly packed is unwieldy and does not make a good seal for the covers.

We also needed and had ready the necessary wood strips for outlining and



Fig. 1. Verticutting the green before sterilizing to kill the old grass.

confining the section of green to be sterilized. For the curved sides or edges of the green, we used a regular stock lattice strip (5/16" x 1 1/2") with the two corners of one edge rounded. These strips were placed on edge with the rounded corners up and fastened to 1" square stakes, 7" long, with 3d headed nails. The stakes were driven about 3 1/2 feet on center, and always on the inside of the strip so as not to interfere with the plastic cover. For the straight sides of the section, we used a dressed 2" x 2" (1 5/8" x 1 5/8") with its two top corners rounded. These strips were fastened to the green with 8" headed nails (spikes) driven through holes in the strips bored about 30" on center. These particular 2" strips were ordered in 10' lengths, except that we did have some shorter lengths of 5' and 2' to fill out a side and avoid cutting.

Sterilization of Greens

When our scheduled time (April 15) for starting our change-over arrived, we were prepared and ready to go. As each regular green went out of play, all we had to do was to move the cup and flag to its temporary green. These temporary greens were in good shape by this time.

Before gassing or sterilizing a green to kill the old grass, we first verticut the green (Fig. 1) with the blades set 1/4" deep. This was done to knock out the ryegrass and to loosen up and expose the old bermuda turf to the gas. A greens mower with a basket was then used to clean up the green. We then spiked the green by passing over four times with the aerifier which was weighted for a 4" penetration of the spoons and the plugs were left laying on the green. The spiking further helped to expose the old bermuda stolons and root system to the gas.

The green was then laid out in its pre-determined arrangement for plastic covers, using the existing base line for location of the covers. (Fig. 2) Inasmuch as all of our greens required three to four moves of covers to complete the gassing, alternate sections were gassed at the same time, putting two covers into use

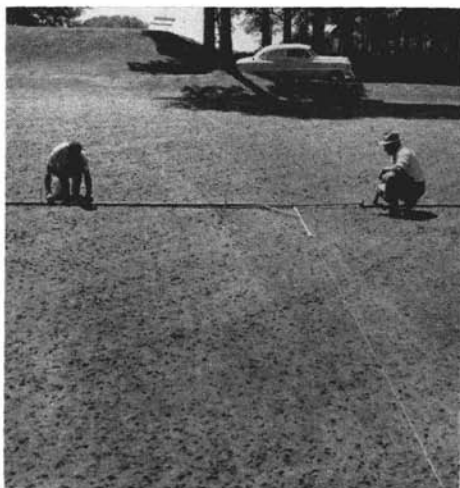


Fig. 2. Laying out plastic cover pattern for sterilizing.

at one time. Sometimes, because of its pattern, it was necessary to use one cover only at a time and to make three moves. We made no change in our cover arrangement, once we had started.

The section of green to be gassed was then bounded by the strips, using the lattice strips on curved sides and the 2" x 2" strips on the straight sides. (The 2" x 2" strip, which forms a com-

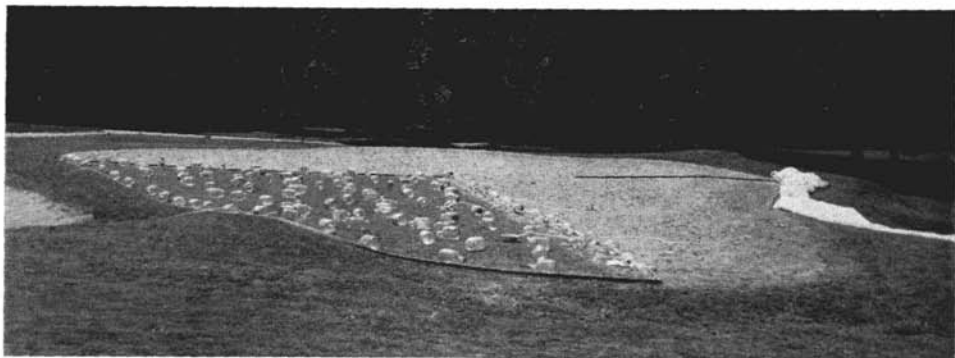


Fig. 3. Section of a green with cover supports and gas applicators in place. The latter were placed so as to get an equal distribution of the gas.

mon boundary between adjacent sections to be gassed, is always moved approximately 3" after the first section is completed, in order that the grass under the strip is exposed when the second section is gassed).

Next, the empty gallon glass jars (Fig. 3) for supporting the plastic cover were placed in the section about 4' on centers, both ways. We always placed a row of jugs approximately 12" from the strips, and always one in any corner formed by the strips. This helped keep the cover up at its edges.

The gas applicators were then placed so as to get an equal distribution of the gas. We always used six applicators per cover. The applicator tubes discharged into a small procelain enamel pan of about 10" diameter. The end of the tube was weighted down on the bottom of the pan with a half brick. The tube also was looped through the handle of a glass jug placed near the pan. These last two steps prevented the tube from jumping out of the pan when the liquid gas under pressure was released from the can.

The cover was placed, and the edges of the cover were sand bagged and against the boundary strips. (Fig. 4) We always had at least a two foot lap of cover on which to sand bag. Allowance for this two foot lap was made when plotting the cover on the drawing layout. A straight side of the boundary was always bagged first, then the opposite side, stretching the cover as tightly as possible. The sand in the bags was always distributed evenly within the bag itself before placing. The bags were lapped by

the side (not on top) of its adjacent bag.

When the section was completely sealed, the methyl bromide was released. We used one and three tenths (1.3) pounds of gas per 100 square feet of area although the manufacturer stated that 1 pound per 100 square feet was sufficient. We used the extra amount of gas because our sterilization was done in the spring-time and not with summer temperatures. The cover was left in place for a minimum of 48 hours. Sometimes, the cover was left on three days if the outside temperature did not reach 70 degrees. When the cover was removed, the grass was



Fig. 4. Sand-bagging the edges of the plastic cover.

browned out and no green color showing at all. The grass also looked dead and the stolons had a dead feel.

If, during the time a green was being sterilized, the covers were in danger of being damaged from a ball in play, that green was protected from such danger by a 1" mesh poultry netting fence 4' high, attached to 2" x 2" wood stakes, 8' on center. This fence was placed across the front of the green about 4' off its edge. The fence was removed after gassing was completed.

Planting

Immediately on the completion of the sterilization of a green in its entirety, fertilizer (20-0-20) was applied at the rate of 20 pounds per 1000 square feet and watered in. The green was watered daily for a period of 10 days, and no other work was done to this green during this time interval.



Fig. 5. The fertilized green is toppedressed with straight sterile creek sand.

At the end of 10 days, the green was then verti-cut two ways. The verti-cutting at this time loosens up the dead grass and also cuts up the plugs left by the aerifier. A greensmower with a basket was then used to clean up the green.

Next, the green was toppedressed with

straight sterile creek sand. (Fig. 5) This sand was matted-in two ways. The green was then ready for planting.

We used the "broadcast" method of planting and used 0.65 bushels of grass per 100 square feet of surface planted. The required total quantity of new grass for that green was hauled and stored at the edge of the green. We used a John Deere Field Harvester for cutting and shredding the grass (Fig. 6) preparatory to planting. This machine was placed at the edge of the green (with the wind, if any, at its back) and with the spout placed so that shredded grass would land and stockpile on the green. A tractor was used to furnish the power for this machine.

All of the grass for that particular green was shredded at one time. The green was hand sprinkled with water immediately prior to broadcasting. The broadcasting was then done by hand (Fig. 7), using half bushel baskets as containers, which were filled from the one stockpile. This operation was done as quickly as possible starting at one side of the green and working across it, broadcasting as evenly as possible and continuing the planting until the stockpile was used up. The larger clumps of grass that did not fall "roots down" were turned over. One man, using a nozzle with a mist spray, kept both the stockpile and the planted grass damp all of the time.

The grass was then rolled before top-dressing, in order to press as much of it as possible into the sand dressing. The



Fig. 6. Shredding stolons with a field harvester.



Fig. 7. "Broadcasting" the shredded stolons by hand on a dampened surface. The job was done quickly and distribution kept as even as possible.

prepared mixed topdressing was then applied with a spreader. The dressing was spread to a thickness of $\frac{1}{8}$ ", rolling the spreader in one direction, and then another $\frac{1}{8}$ " of dressing was spread at right angles to the first direction. This total thickness of $\frac{1}{4}$ " amounts to about $\frac{3}{4}$ of a cubic yard per 100 square feet of green. The topdressed green was then rolled in two directions, and immediately watered, using a fine spray or mist.

After a green was planted and topdressed, we kept that green damp or slightly wet at all times for the first 10 days. This watering was done by hand (Fig. 8) and by misting or fine spraying. This period, we found, was the critical time of the entire operation. After three or four days growth was noted and after ten days the grass had really started to cover by spreading. After 10 days time we cut our watering to twice daily, and also switched over to the conventional greens type of sprinklers. After four weeks, watering, was done once daily.

Conditioning the Green for Play

The greens, after an average of 17 to 20 days from planting, were ready for their first cutting and topdressing. The first cutting was done with a greens mower set to cut $\frac{1}{2}$ " and without a basket. Topdressing was applied and matted, and the green rolled. Approximately 8 to 10 days after this first cutting and dressing, the greens were ready for this same procedure again. This time, the mower was still used without a basket, but the cutting was dropped $\frac{5}{16}$ " or $\frac{3}{8}$ ". Usually at this cutting there was a cer-

tain amount of "scalping" due to unevenness of the grass, but this condition always cleared up with subsequent topdressings and cuttings. The basket on the mower was used after the first two cuttings.

Five to six weeks after planting, most of our greens could have been opened for play as far as grass coverage was concerned, but they were still not a true putting surface. This true surface did come, however, with additional growth of grass and additional topdressings. We thought it best not to open a green for play until it was in good "putting" shape.

Our fertilizing schedule (after planting) was as follows:

- End of first week—2 pounds of ammonium nitrate per 1000 square feet
- End of second week—2 pounds of ammonium nitrate per 1000 square feet
- End of third week—3 pounds 20-0-20 per 1000 square feet
- End of fourth week—3 pounds of ammonium nitrate per 1000 square feet
- End of fifth week—3 pounds of ammonium nitrate per 1000 square feet
- End of sixth week—3 pounds 20-0-20 per 1000 square feet
- End of seventh week—3 pounds of ammonium nitrate per 1000 square feet

The number of topdressings, after the first two, depended entirely on the particular green. The frequency of cutting,

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of course, increased as a green neared readiness for play.

The previous year we had planted a small nursery of Tifgreen bermuda (25' x 35') for use as quick supplementary plantings by plugs of sod, if at any time we did not get our predicted growth on any area of any one green. We did have occasion to use these nursery plugs to help out on three or four greens and they really helped. A 2½" plug cutter was used.

Where there was a great amount of slope on any part of any one green, that sloping area, after planting, was always



Fig. 8. During the critical 10 days after planting and topdressing, the green was kept damp by misting or fine spraying.

stripped with 1 x 2's set on edge and staked down. This stripping was to prevent washing in case of a heavy rain. The strips were placed 3' x 4' on center, and left in place for the first two to three weeks after planting.

As stated before, we started sterilization of our greens April 15 and our last green was back in play August 1, a period of 3½ months, and 1½ months ahead of our original schedule. We did the sterilizing of all 18 greens in 4 weeks, the actual planting of the 18 greens was done in 3 weeks, and the total growing and conditioning time (from the time the first green was planted until the last green was back in play) consumed 11 weeks. These time periods overlapped, of course. Our first green was planted May 7 and the last green was planted May 29. The average growing and conditioning time (from planting to opening for play) was 8 weeks. As mentioned before, most of the greens could have been opened for play in six weeks with a mediocre putting surface, but we thought it best to wait until the surface was as it should be. Also, we knew that once a green was opened for play, we would have to start catering to the golfers and not to the green.

Over-seeding of Tifgreen Bermuda with Ryegrass for Winter Play

When our old bermuda greens were planted in rye in the fall of 1956, we also planted in rye the one Tifgreen bermuda green which we had just completed and opened during September of that year. For experimental purposes, we used the same quantity (35 to 40 pounds per thousand) of rye that we usually used on the old bermuda. We found out the next year that this was a mistake. We had quite a bit of transition troubles due to the heavy planting of rye. Also, we found out that because of the texture of the dormant Tifgreen bermudagrass, not as much rye is needed as with the old common bermuda. Accordingly, last fall when we planted our Tifgreen bermuda in rye we cut the quantity of rye in half and used only 20 pounds per thousand. We have had good winter greens, and experienced no transition difficulty when the Tifgreen bermudagrass came back in again this spring.