TURF TROUBLE-SHOOTING

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NAGA Convention Address

IN describing some of the experiences encountered in the greenkeeping profession, we have drawn largely upon the status of the work in Pennsylvania where it is conducted by the department of agronomy of the Pennsylvania State College. One of the outstanding problems on turfed areas today, not entirely confined to the East, is that of poor drainage and the attendant ills of puddling and poor aeration which induce a shallow root system. Where this difficulty exists there is the tendency, due largely to the demands of the players for soft or resilient surfaces, to use water in excess to provide the conditions requested. This is not new. It has been the subject of many talks and articles over a period of years.

Let us take a look at a course where we were cordially invited to visit, ask questions and make suggestions for improvement.

A putting green had been located in a low spot below a long steep hillside. Close by, and almost on a level with the green surface, ran a small brook. Large trees were clustered about the green so as to partially shade the putting surface. Only in very dry seasons did this green need water due to the fact that the soil water table was close to the surface. For years it was virtually impossible to hold a turf throughout the year.

Sturdy Strains Answer Some Greens Problems

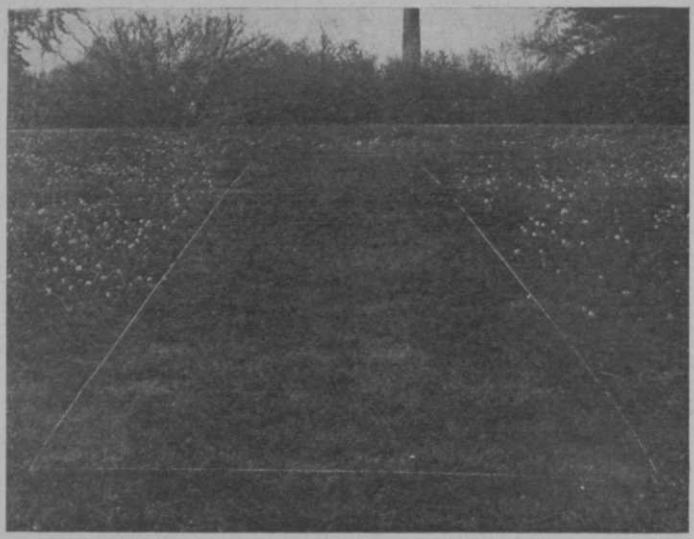
Unable to rebuild, this superintendent noticed, however, that one particular strain of creeping bent (it had originally been seeded to German mixed) seemed to like the location and insisted upon thriving in spite of the conditions. Patiently he lifted stolons of this strain of bent, replanted them in different parts of the green, and even more patiently watched them slowly spread and form a solid turf. His diligence was rewarded. Today that putting green is covered with a dense turf of an unnamed strain of bent that stands as a living testimonial to this man who saw and grasped the opportunity offered him. Not once since this unnamed strain completely covered the green surface has there occurred the former annual loss of turf.

We could name other similar experiences which give us confidence to suggest that, where an unknown strain is found doing well where no other pure strain will persist, this unknown be developed for that particular condition. This is more especially true where the budget is limited, or where physical or other circumstances do not permit rebuilding or changing conditions to fit the requirements of well-known strains.

Expanding Budgets Through Close Buying

Let us examine the facts surrounding another course which is representative of some of the smaller clubs and even some of the larger ones whose budgets have been cut to the bone in order to pay the interest on the clubhouse mortgage. The fairways are usually the first to exhibit the lack of attention and fertilizer. The putting greens are usually maintained in fairly good shape even after buckhorn and moss have taken possession of the areas that one hopes to hit on the tee shot. Obviously, the necessary item is plant food but where is the money coming from? This is a frequent occurrence and quite often we are able to point out that by a wise choice in the purchase of fertilizers, the greenkeeper can save enough on his fertilizer bill alone so that he can afford to fertilize the starved fairways without increasing the budget. We could name many true experiences that exemplify the point which in no way ridicule the profession but point out the great need for continued instruction in greenkeepers' schools and for an increase in the staff of extension men trained in this highly specialized field.

In another instance in northwestern Pennsylvania we were called upon to inspect some fescue greens that were spot-



An Arlington test plot on USGA Green Section control of weeds. Note weed eradication in old bluegrass turf formerly heavily infested with dandelions and other weeds. Cost of chemicals for some of the new weed treatments developed by the Green Section is as low as 80 cents an acre.

ted and patchy. We found German mixed greens—good ones at that—with only a touch of brown-patch. The real problem there was thin, spotted, weedy turf in the fairways while behind the compost shed lay several truckloads of "burnt fish" bones and ashes from a local fish processing plant. As much more of this material as they wanted was available for the hauling. The superintendent was frankly and openly surprised when he was told that this material was rich in phosphorus and had a high fertilizing value. Before we had left the course he had sent a truck to haul "burnt fish".

At a small course in central Pennsylvania we found the greenkeeper buying fertilizer from a distance which cost him upwards of $50 a ton for about 20 units of plant food—something like an 8-6-6. Within two miles of the course a local abbatoir was dispensing tankage analyzing 5-15-0 or higher at only $15 a ton.

Study Conditions to Outwit Low Budget

Another small central Pennsylvania course had trouble maintaining seaside bent on one green. They seeded and sodded but did not disturb the hard-packed clay which underlaid the few scanty inches of surface soil. The new sod or seed would hold until play started and out it would go—slowly, to be sure, but never was it healthy. Instead of ripping up the green (which should have been done but wasn't due to the low budget) a change was made to Washington creeping bent together with spiking and more favorable topdressing, liming and an increase in the amount of phosphorus in the fertilizer. At the latest reports the green was doing well and play was continuous. This same experience can be related on two other courses. This should not be construed to mean that seaside bent is not desirable—it simply failed under the conditions described. We can point to instances where seaside bent is used regularly and little trouble of any kind has been found. Drainage and soil conditions, however, are all that could be desired, as well as the fertilizer and topdressing program.

A very interesting case encountered in northwestern Pennsylvania was a fairway problem. The complaint was that, in spite of favorable rainfall, the fairways were continually dry. Within a few days after even a very heavy rain the soil would be so dry that the grass would begin to take on that characteristic parched look. The turf was red fescue but it was uneven and spotty, although springy. Neither lime nor fertilizer had been applied for years. The first plug of turf taken with a pocket knife indicated the reason for dryness. Later a soil test helped to confirm it. The pH value was down to 4.0, at which level any self-respecting bacteria that would decompose the organic matter of plant residues would refuse to work. As a result, the continual deposit of clippings from above and the accumulation of undecomposed roots and stems below, together with the passing effect of wheels on the surface, had formed a matted organic layer nearly half an inch thick through which water

simply refused to penetrate. The effect was that of a "thatched roof". The green-chairman looked at us in amazement and said: "No wonder all the rain that falls on the course runs into the lake." He had previously told us that during a rain the ditches on the course ran bank full and when the rain had stopped the soil beneath the fiber roof was as dry as ever.

Incidentally, when the course was built the fairways were seeded to a bluegrass-fescue mixture. Dry summers, grub injury, lack of plant food and the depletion of the available calcium all united to discourage the bluegrass and convert the turf to solid fescue. This is a common experience on Pennsylvania courses. Whereas the fescue turf on this particular course was uneven, there are many courses in the East that have perfect fescue fairways. These have had a small amount of plant food and some lime and had fortunately (not intentionally) been mowed slightly higher than most fairways are today. No good fescue fairway that we have seen has been the victim of a overuse of a sprinkling system. We do, however, know of some fescue fairways that were successfully established several years ago—a solid stand of fescue. Nitrogen was fed liberally and the turf was strongly watered. Today the fescue has been replaced largely by the bluegrass and white clover.

These experiences, together with a number of soil tests on these fescue fairways, indicate some of the preferences of good fescue turf. The best fescue turf found was thriving on soil that had a pH value of 5.6-6.0, high enough to permit the active growth of organisms that decompose plant residues, but not so high as to unduly encourage the bluegrasses and clover.

Soil Tests Need Supporting Data

The subject of soil tests on golf course soils is an interesting one and merits our earnest consideration. From the results of our experiences at Penn State we are forced to draw the following conclusions:

1. In most cases the results of soil tests without supporting data are worthless for diagnosing the cause of turf ailments. By supporting data we refer to management practices, location of the affected area, and other pertinent information.

2. Soil tests as we have them today are most valuable for detecting excesses of plant nutrients in the soil solution although we have not yet satisfactorily established the point at which they become toxic or detrimental to plant growth. Nor will this soon be accomplished due mainly to the very great differences in soils and their natural capacity for absorbing ions and for yielding them to the growing plant. We cannot yet satisfactorily determine the point at which the supply of plant nutrients is so low that the plants are insufficiently nourished.

Obviously, value will change due to the varying abilities of different species or strains of plants to tolerate high concentrations or to thrive on very low concentrations. As you well know, Kentucky bluegrass is a heavy feeder and requires a rich soil relatively high in calcium and phosphorus. Red fescue, on the other hand, thrives where the ion concentrations of these elements are so low that bluegrass will not grow. Bermuda grass, although, climatically different, succeeds on soils low in fertility. Some species will tolerate great excess of ion concentrations.

Affected Courses High in Nitrate-Nitrogen

Perhaps one of the outstanding examples of the limitation of the soil tests is that in connection with the disturbance of 1935 which hit several districts in the East and the Middle West. Many soil samples were collected from affected and non-affected areas and analyzed. The only significant difference between them was the relative concentration of nitrate-nitrogen which was usually higher in the affected areas. To have stated that the presence of the nitrate-nitrogen was the cause of the loss of turf would have been ruinous and a grave injustice to those in charge, but that it was a contributing factor cannot well be disputed. Also that the species of grass present was a factor is generally recognized. But to separate and correlate the combined effects of soil moisture, high temperatures, humidity, high nitrogen, unbalanced concentrations of plant nutrients, and other attendant factors must be left to those in charge of research.

At a very up-to-date course we were called in on a problem of weedy fairways. No doubt about it, the fairways were weedy and the bluegrass was thin. Yes, there had been some fertilizer applied but it didn't seem to help. It wasn't long before we learned that this superintendent was firmly convinced that by cutting his fairways as closely as possible the roots of the grass were strengthened and the bluegrass could then form a more solid turf.

You know the fallacy of that theory and so did we. Our work was to point out that recent research and countless experiences, —his own included—completely exploded his theory.

Topdressing Is Source of Puzzle

Referring again to hard greens we recall the course in northwestern Pennsylvania that asked for help because they could not seem to have soft greens without the excessive use of water. This proved to be a delicate problem because everything seemed to be done according to Hoyle. The construction and drainage were seemingly good, the fertilizer program adequate, and the topdressing mixture apparently satisfactory. We collected plugs from the greens and took samples of the topdressing mixture as well as some of the fine-looking, black material which was used as a source of organic matter. We found the solution to the problem in the so-called organic matter which analyzed only 13 per cent organic matter and contained nearly 80 per cent of silt. When wet, this material became slimy; when dry it could be cracked like hickory nuts. It was taken out of a swamp where the accumulation of the organic matter imparted a rich black color to the silty mud that collected these. Upon changing to a good fibrous, peaty material there was noted an almost immediate improvement in the condition of the greens.

We were called in to advise on the reestablishment of turf on the greens after all their Poa annua left them. Without enumerating all the facts in the case, we were able to point out that in spite of the conditions, they had large patches of a well-known strain of creeping bent that had not even been affected by the adverse conditions and they were rapidly spreading. This was a clear indication that by propagating these resistant strains, at least part of their difficulty would be solved. They were, at this time, rebuilding a putting green. When we were there it was raining and rain had fallen for a couple of days prior to that. They were then rough-grading the green with a tractor and a ship scoop. Mud clogged the wheels of the tractor, the wheels would spin, and the scoop had to be cleaned with a shovel to clear it. I haven't seen the green since, but I think we would agree that the physical condition of the soil on that green will not be all that might be desired.

We had occasion in June to visit a course that was troubled with earthworms (night-crawlers) on the greens. At the time of our visit the greenkeeper was deworming with bichloride of mercury in suspension, using a barrel sprinkler. He used a total of three pounds of bichloride on a green of 4500 square feet. We suggested that perhaps that was a bit strong but he thought not. We later heard that he had burned his greens very badly and was considering some other means of worm control.

Success in Weed Control

Now about turf weeds in general, and crab grass in particular. Since this work was begun in earnest by the Green Section there has been a great deal of interest in it, particularly since reduced budgets called for economy in the use of fertilizers and extra labor. All of the answers have not been found. Neither have all the questions been written. The work is progressing, however, and there are new developments each year. During the past year we are able to report many successful treatments with sodium chlorate. Several have used it to advantage on crab grass infested nurseries. Some are using it successfully in the bunkers. We have record of one course where crab grass threatened to take a green composed of 80 per cent velvet bent. Two applications of chlorate at the rate of one pound to 1000 square feet were made in June or July. When we saw the green in early August we noted a 90 per cent control of the crab grass and complete recovery of the bent.

In several instances in southeastern Pennsylvania we can report almost 100 per cent control of crab grass by the following procedure which, you will perceive, is not entirely one of chemical control, but where the chemical is an "assist" in the put-out.

In late July or early August there was made a single application of chlorate on athletic field, lawn, and fairway turf at the rate of 2½ pounds to 1000 square feet. In three weeks the area was raked, fertilized, and seeded. October found the turf in A-1 condition, healthy, green and solid.