

As the play on our course is heavy, we find it necessary to move the cups at least four times a week, and daily for a few days after applying compost, as the areas around the cups look bad on account of footprints.

In our bent nursery, which is 2,500 square feet in area, we grow a selected strain of creeping bent, which furnishes us a supply of turf for repairing damage to greens and replacing patches of clover when removed.

Seeded Greens at the Allegheny Country Club

By John Pressler

Here at Sewickley, Pa., we are playing on putting greens planted with seed 28 years ago. Our experience has been that by fertilizing them liberally little trouble will result from brown-patch. Once a week during April and May they are given an application of sulphate of ammonia at the rate of 6 pounds to a green. Each green is also given an application of 50 pounds of a commercial fertilizer at the end of May, and again in August. A top-dressing of leaf mold obtained from nearby woods is given once a year to such greens or parts of greens as begin to show wear or damage from other causes. Reseeding is resorted to only when necessary to repair damage from winter-kill or brown-patch. We do not use temporary greens.

Our soil is shale and clay, and about every four years we give each green an application of 1½ yards of sand. The greens are rolled three times a week with a 150-pound roller. Only three of the greens have tile drainage, the natural drainage being all that is necessary for the remaining 15 greens. They are watered one-half hour each morning, using one-inch hose. They are mowed each day, and the clippings are not removed. The greens are brushed only after being mowed. Each man waters, cuts, rolls, and weeds his own greens, three greens being assigned to a man. With leaf mold readily available, we have never resorted to the use of compost for top-dressing.

Creeping Bent Greens at Hot Springs, Virginia

By Fay Ingalls

On the 10th of September, 1923, we started to construct the Cascades Golf Course out of virgin wilderness. The first greens on the course were planted with the Ekwanok strain of creeping bent in the early summer of 1924. We planted 19 of these greens and played on them in October of that year. In 1926 we remodeled another course, on which we built 15 new greens, planting these with Metropolitan bent. Possibly from wisdom gained from our experience, the history of the Metropolitan greens has been uninteresting, but the Ekwanok greens suffered from all the ills that a putting green is heir to. To begin with, drainage was neglected in their construction; stolons were treated erroneously in the first year of their growth; insufficient top-dressing was applied; weeds and clover at one time threatened to wipe them out; they were burned at one time or another by every chemical applied to them; they developed a long nap; and they suffered from winter injury.

These two courses are located at an average elevation of 2,500

feet. During July and August our average minimum night temperature in the past four years has been 57.2 degrees and the average maximum day temperature 79.1 degrees. In this time the highest temperature recorded was 92, on two days, and the highest daily minimum was 67 degrees. We are subject to late frosts in spring and early frosts in the fall, and frequently during the winter have severe freezes, often with the ground not covered with snow. Distribution of rainfall is quite satisfactory and is supplemented by heavy dews during the growing season. The soil is a clay loam, in most cases with outcroppings of limestone.

This is a natural bluegrass country. If a farmer cuts the brush from a piece of land, he expects within three or four years, without even seeding, to have a good grazing stand of bluegrass.

When the greens planted with the Ekwanok strain were opened for play in October of the year planted, nearly all of them were pretty well covered with grass, but the grass was weak and had started to develop a nap, mat, or grain. Right here in the first three months we made our mistake. When the stolons began to show signs of growth, our greengrkeeper, accustomed to allowing grass on newly seeded ground to attain a respectable size and some strength before cutting, was afraid to cut close. This was the beginning of our most serious trouble, never really conquered until late this spring. We know now that we should have put the knives of our machines right down to the ground at the start, as by so doing we should have obtained grass with a more erect stand and with less grain.

In the spring of 1925 our greens grew luxuriantly. We top-dressed with mountain loam mixed with four parts of sand, and applied sulphate of ammonia probably five or six times during the growing season. As the summer progressed, the matting of the grass became more pronounced. We began to experiment with dragging the greens with cocoa mats and wire door-mats prior to cutting. By the fall of 1925 the greens were covered with a solid turf, but with considerable nap throughout the greens.

In the summer of 1926 we got our first real attack of large brown-patch, the effects of which were simply devastating. We tried the organic mercury compounds, but the failure to control the fungus was probably due more to our lack of experience than to ineffectiveness of the chemicals. On our 13th, 16th, 3d, and 9th greens at the end of the attacks there hardly seemed to be any grass whatever. These greens were all sheltered, in locations typically favorable to growth of brown-patch. Incidentally, it is worth noticing that one tee on the top of a hill exposed to the wind on all sides received the severest infection of all. We top-dressed the infected greens heavily and applied sulphate of ammonia, and by fall most of these greens had come back, although those heavily infected were thin and weak looking.

In the summer of 1927 we had our first attack of brown-patch on July 3, almost the same date at which it occurred in 1926. In 1927 we adopted a new method of applying chemicals, using a compound machine and applying them in solution. We used a commercial organic mercury preparation, and also calomel. More or less severe burning resulted from the calomel, but we checked the brown-patch, and by gradually diminishing the strength of the solution we succeeded in avoiding burning, although the grass was slightly discolored for a few days following the application.

In the summer of the present year we have had two attacks of large brown-patch, which we treated with a purchased mixture of calomel and bichloride of mercury. The preventive treatment was so effective and quick in action that people playing the course would not believe our statements regarding the presence of brown-patch.

Last year we did not top-dress sufficiently, making only four applications. The top-dressing consisted of two-thirds loam from the woods and one-third sharp sand. We applied sulphate of ammonia in solution every three weeks and treated the greens with a fungicide about once in three weeks, although this latter treatment was determined mostly by the conditions prevailing. The greens grew luxuriantly, but the matting was becoming more and more severe. At the end of the summer, after a visit to the Arlington experimental plots, we made an experiment on a green on which the matting was most severe. We took steel rakes and filed them to knife edges. We then dragged these rakes across the green in two directions. After this treatment the grass would be standing up from 2 to 3 inches. We cut this as close as possible. Immediately afterwards we top-dressed and applied sulphate of ammonia. The small portion thus treated in two or three weeks came back to a normal appearance and we found most of the napping was gone.

Beginning the end of May this year we went after the napping in

earnest. Today we have eliminated it from all but four greens. Of these greens, two we have been unable to treat because of adverse weather conditions, and the other two are going to require a second treatment. On the balance of the greens there is no nap, and furthermore the grass on these greens is upright. It was amazing to see the amount of grass which we took off the greens when applying this severe raking. On one green of about 7,000 square feet, the clippings after raking filled 91 heaping bushel baskets. It should be borne in mind that the morning this green was raked it had been cut as close as possible without scalping.



Raking creeping bent turf, preparatory to cutting, in the control of matting. The clippings are collected in bags

The illustration shows fairly well the appearance of the grass just after raking, and also the type of rake used. Unfortunately, the appearance of the grass after cutting does not show—it was more like a *Crex* rug than a green, with hardly a blade of green to be seen. We top-dressed at once with 1½ yards, and in two weeks the green was as nice a putting green as ever was seen, with no grain whatever.

As we see the problem, there are two things which this severe raking enables us to accomplish. In the first place, if a nap is ever allowed to start it prevents close cutting and prevents application of top-dressing about the roots of the grass. The knives of the machine

may be set right on the ground, but they will ride over the grass. Furthermore, the mat becomes so thick that it is impossible to work top-dressing about the roots and make the grass stand up. Once, however, you start with new shoots, it is possible to keep the knives low so that the grass does not get long enough to fall over, and to work top-dressing in among the roots, which assists in keeping your grass erect. I am confident that if we had cut our grass short enough in the beginning, these three years of work to get rid of napping would have been unnecessary, provided we had been wise enough to top-dress as heavily as we are now doing. If you want to keep your grass growing upright, our answer is to top-dress as heavily as you think the green will stand, and then apply double the quantity of top-dressing.

Our routine for the care of these greens during the growing season is as follows. Once a month we top-dress with about $1\frac{1}{4}$ yards per green. This top-dressing is one-third sharp sand and two-thirds either mountain dirt or broken down compost made up of alternate layers of bluegrass sod, leaves, and manure, and rotted for two years. Every two weeks we apply, with a compounding machine, 20 to 22 pounds of sulphate of ammonia. We find the labor cost of applying sulphate in this manner very low, being not much greater than the regular sprinkling. We apply three ounces of the bichloride-calomel solution to 1,000 square feet, also by the compounding machine, as indications seem to warrant, every ten days if we have a hot, muggy spell, but if the weather is good and the greens look healthy possibly once a month. The greens of course are cut daily and watered if it does not rain. The course is never closed to play. It is not unusual to have 100 players a day in March when the frost is coming out of the ground before growth has started, and those who do not know the vitality of this grass always make dire predictions at these times. A few days of growing weather, a little rolling and top-dressing, and the greens are as good as ever.

After our 1926 experience, at the opening of the 1927 season we had almost determined to rip out our Ekwanok bent greens, on account of napping, and plant the Metropolitan strain. We even started grass nurseries for this purpose. Today, with the treatments of calomel and bichloride, and with the severe raking and heavy top-dressing, we are willing to put these greens in comparison with any greens in the world. We had thought in 1926, with the increased severity of the brown-patch infection, that the vigor of the stolon grass was waning, and this was also told to us by many advocates of seeded greens. Today all these greens are covered with a beautiful sod. It is possible for even a moderate golfer to play and hold a pitch on any of the greens, although for actual putting the greens are as fast as could be asked. There is no question in our minds that this grass today is growing more strongly than at any time in its history.

Partly because of experience gained in handling the Ekwanok greens, and partly because of the stronger strain, we have experienced fewer of the troubles with the Metropolitan bent than we had with the Ekwanok. One or two greens have shown indications of running to matting, but dragging with cocoa mats and heavy top-dressing before cutting have quickly eliminated that. We have had few attacks of large brown-patch in the two years these greens have

been in. We have had, however, more or less serious attacks of the small brown-patch, but in no case so severe as not to be controllable by calomel, or to affect materially the putting surface. We found the Metropolitan greens to be slower in forming a dense turf to hold a pitch shot. We found also that it took the turf considerably longer to knit into a compact mass. However, at the present time, after a scant two years, this fine, thick sod is coming, and the entire surface of the greens is completely covered. For reasons not determined, we have greater quantities of annual bluegrass (*Poa annua*) in these Metropolitan greens. This is the one thing so far which seems to have us beaten. At a very considerable expense we have cleaned these greens completely several times but the only result has been to leave holes in our bent for a few weeks until they filled up. At the end of two months the annual bluegrass was back with us again. As a putting surface the chief defect we find with it is the difficulty of cutting it close enough. We confess that at the present time we are simply accepting annual bluegrass as an evil that can not be avoided.

On the 16th hole, planted with the Ekwanok strain, the bent has spread in some places 15 or 20 feet through the bluegrass on the apron of the green and is today thriving. No application of mercury has ever been made to this apron. It has had sulphate of ammonia occasionally, as have all our approach areas, given as a matter of routine to stimulate the grass and discourage clover.

(The 1928 United States Women's National Championship was played on the Cascades course.—EDITORS.)

Care of Seeded Greens at Youngstown, Ohio

By John Morley

At the Youngstown Country Club all of the putting greens are seeded. The turf on 8 of the greens is about 90 per cent bent. The remaining greens are about 25 per cent bent and 75 per cent annual bluegrass (*Poa annua*). These greens are from 8 to 17 years old. The course is open for play all year, and hence we have not found it necessary to maintain temporary greens. The greens are top-dressed with compost in the fall, immediately after Labor Day, and two of the greens are covered with granulated tobacco. The compost is prepared from sods, sand, and stable manure and is not used until it is two years old. It is applied at the rate of about one ton to 5,000 square feet, the greens averaging from 7,500 to 10,000 square feet in size.

Our subsoil is mostly silt; the topsoil is made from compost. In order to prevent the formation of hardpan near the surface we have found it advisable to water the greens heavily every third day so as to allow the water to penetrate the subsoil. This watering is done in the morning.

The turf is poled every morning before it is cut. The greens are mowed every day except Sundays. They are weeded by women, whom we keep employed throughout the season on this and other work. The cups are moved twice a week. As fertilizer we use sulphate of ammonia and activated sludge. This past season we have used organic mercury compounds in brown-patch control. During the dormant season we avoid the use of much fertilizer high in nitrogen content. In the spring the greens are gone over once with long wooden rollers.