

seed to die just as surely. The secret is to keep the root zone and the area just below moist, and gradually increase the quantity of moisture applied at any one time as the root system develops. Never puddle the surface.

To aid in moisture retention, mulches are available, such as straw, tobacco netting, burlap, and a number of specialized commercial preparations. These commercial mulches may hold the seed in place, conserve moisture and increase the temperature of the micro-climate surrounding the seedlings. Clear polyethylene is a good

example of a protective cover or a mulch which serves all three purposes.

Under optimum conditions, the bentgrass seeds germinate in 96 to 168 hours (four to seven days), but it is by no means ready for traffic. In fact, seedling turf should be protected from all traffic for three to six weeks minimum depending on the care it is given and the climate.

Briefly, this is the procedure for planting a putting green. Following this we should begin to manage the green to bring it into play.

## MAINTENANCE OF GREENS

# Cultivation, and Control of Weeds, Insects, Disease

by EDWARD ROBERTS, JR., Golf Course Superintendent, Canoe Brook Country Club, Summit, N.J.

### Cultivation

Cultivation is a very broad subject, which includes the following practices — aerification, spiking, slicing and forking. We know that they are all cultivation practices because they tend to raise and foster the growth of the plant by tillage.

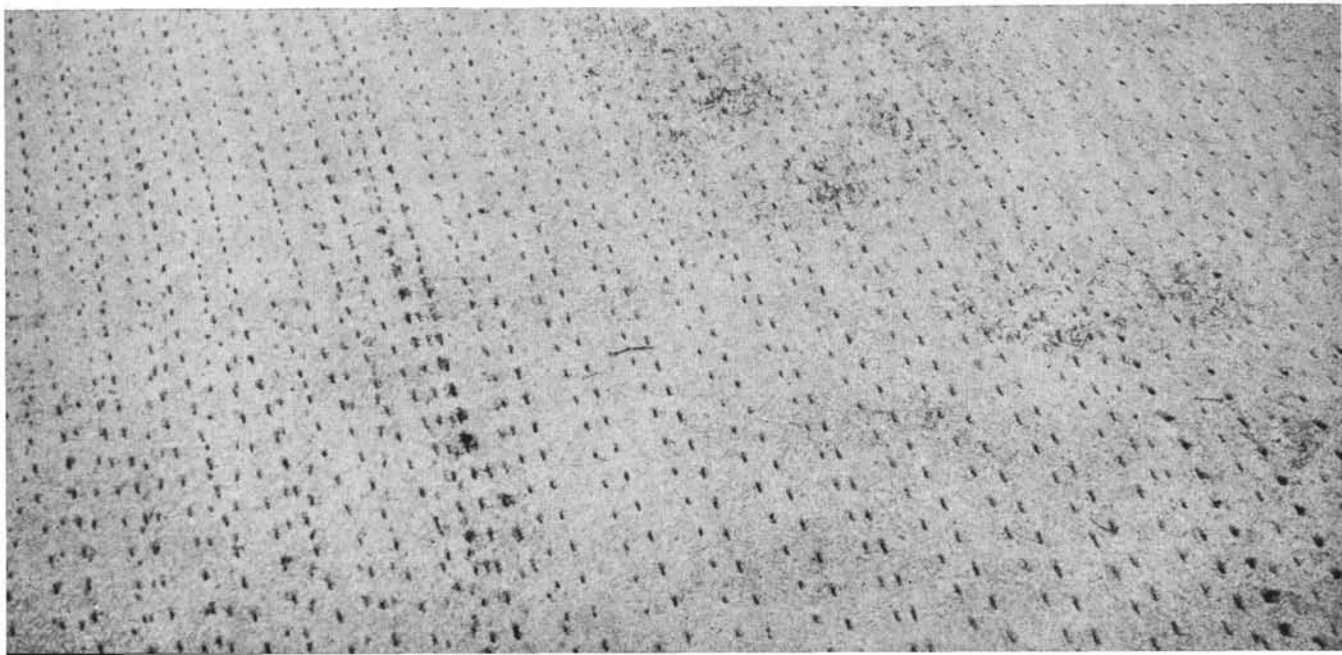
I rely almost entirely on the aeration equipment. Now I realize that from a player's viewpoint this is probably the most detested piece of equipment that goes out on the golf course.

Nevertheless, this is my way of producing better root development: by permitting air and moisture to penetrate the compacted zone.

I use the aerator in the spring and again in the late summer and try to plan the work for times of the least amount of play. This becomes more difficult each year with increased play.

The punching machine with hollow tines is preferred over the open spoons. I am aware of the argument that the open spoon machine creates more cultivating action, but I am also aware of the responsibilities of my position. I

*Spiking operation prior to seeding a green.*





*Superintendent Al Wilfong inspects thatching operation at Cornwells Golf Club, Cornwells Heights, Pa.*

must always produce the best playing conditions possible. The hollow tine does the job and at the same time causes the least amount of damage to the putting surface.

Cores from a green known to have an acceptable soil mixture are retained for topdressing. Whenever a poor topsoil mixture is found in a green, the cores are discarded and a suitable topdressing is applied. While greens usually are aerated twice a year, this is not necessarily true with problem greens. These may require one, or even two more treatments. This would be done between the spring and late summer.

#### ***Slicing and Spiking***

The only time I slice or spike a green is during stress periods such as last summer when excessive moisture lay just at the surface. Algae began to form, the hot sun boiled down, and a crusted layer formed in isolated spots. This is the time to spike or slice to break up that crust.

#### ***Vertical Mowing***

In late summer I thatch or vertical mow to remove as much of the old thatch as is possible. We take out as much as I dare while still presenting a putting surface. I then aerate, fertilize,

and topdress to force the new growth into a good, healthy turf cover before winter. One last step is the application of gypsum some time around October. The gypsum aids nature in granulating the soil particles, thus permitting better drainage.

#### **Control Of Weeds, Insects And Diseases**

I prefer a preventive approach to these problems with a planned program which is altered whenever conditions change.

As the season opens I watch my temperatures about the second week of May and apply Dyrene at weekly intervals to prevent those diseases active at that time. As temperatures increase into the high 80's and into the 90's, and the humidity rises, I change to treatments of Thiram and PMAS at weekly intervals. These treatments will continue through summer except when copper spot may be evident. I then apply one dose of cadminate. During stress periods I will shock conditions with a zineb formulation for one application, then return to the Thiram-PMAS treatment until cooler nights, when I again apply the Dyrene. This usually ends in early October. During late November I apply Calo-Clor for the prevention of snow mold.

My thinking on the timing of snow mold

treatments has recently been altered. I learned recently through Dave Moote, Superintendent of the Rosedale Golf Club in Toronto, that snow mold activity starts much earlier than I had suspected. It is active in October when the leaves begin to fall. Slides that he showed during a conference at Rutgers University reveal that treatments made at that time are far more effective than treatments made later.

#### **Insects**

I rely on heptachlor or chlordane, which I apply about three times during the season. Evidence of insect activity is my guide to the time of application. Birds congregating on greens are a good indication that something is present. A quick investigation usually reveals the need for an insecticide.

#### **Weeds**

What is the greatest weed problem in the green? I say it is **Poa annua**. My answer to keeping this plant in check is an overall program that requires a step-by-step approach. One must be very cautious, and develop the proper conditions to obtain good results.

Check levels of nitrogen, phosphorus and potassium along with pH; be drastic in removing as much of the old plant in late summer as possible; fertilize more with nitrogen to encourage the bentgrass, less with phosphorus, which **Poa annua** loves; keep adequate levels of potash and the pH around 6.1 or 6.2; have the new, younger turf go into winter in a healthy state of

growth; apply lead arsenate in late winter to permit penetration at the level of seed germination.

If this is done when the **Poa annua** is ready to break out, it will be forced to struggle for survival, and the bents will move instead. To me, **Poa annua** is a weed and must be eliminated.

#### **Hole Changing Techniques**

While it is true that it is not always possible to locate the hole in a nice flat area, when an incline is used it should be as gradual as can be found on the putting green. The small green with excessive undulations sometimes permits only 500 or 600 square feet of actual cupping surface. Such small areas will wear quickly on a course that has heavy play, forcing hole placement onto the slight slopes.

I use the standard cup-setter, keeping the top of the cup an inch from the putting surface. I restrict myself to within 12 feet of the inside of the collar.

*(Editors note: The USGA recommends that the hole should be located at least five paces from the edge of the putting green. If a bunker near the edge of the green is brought strongly into play, the distance should be greater.)*

Hole locations at my club are moved in a clockwise rotation so that no matter who changes the locations, they are always moving in the same direction. Thus, I can be sure of not overextending one area with traffic.

In making the cup change, I make two cuts with the hole cutter. The first removes the sod plug about two inches deep. I break or crack the sod plug to make it cone shaped allowing for a good snug fit when placed in the old hole. Whenever there are special events I will position the cups myself, studying each shot into the green and taking into consideration the caliber of golfers who are playing, wind, bunkers, or other hazards that come into play. By making use of the design and intent of the architect, one can toughen almost any hole considerably.



*Happiness is—A sharp, clean-cut hole carefully placed in a level area of the green.*