Treatment of Soil by Sterilization

By M. L. DeParlier
Gulf Stream Golf Club, Delray Beach, Fla.

For several years southern greenkeepers have been seeking some practical method of eradicating noxious weeds which infest the greens of their courses. Nut grass and pennywort cause us most trouble in the South. To eliminate weeds in our greens we decided to remove all turf and soil to a depth of 6 inches, at which depth most of the tubers of the nut grass were found, and to replace it with a soil which we knew was free from nut grass.

After new soil was placed on the greens and they were properly graded we decided to try sterilizing the soil for the seed bed. To do this it was necessary to purchase a boiler and construct a steam chest or sterilizer. The sterilizer, which is 10 feet long, 4 feet wide, and 12 inches deep, is made of 1⅝-inch cypress tongued and grooved. It has a hinged drop gate at one end, and is mounted on wheels in such a manner that it is very easily tipped so the steamed soil can be raked out. A top was made by constructing a frame of 1⅝ by 6 inch grooved cypress and inserting ¾ by 6 inch tongued and grooved boards in the frame to form a solid panel. This lighter material was used to make the top easier to handle. By screwing two ordinary drawer handles on each end of this top, two men can easily handle it. The top is fastened to the sterilizer by means of 6 L-shaped irons made of 3/16-inch iron 12 inches long and bolted loosely to the ends and sides of the sterilizer and hooked over large lag bolts.

Soil and compost sterilizer constructed and used by the Gulf Stream Golf Club, Delray Beach, Fla. By the use of this apparatus the material is steamed, at a small cost, so as effectively to eliminate injury to putting greens by nut grass, pennywort, and various other turf weeds.

After several experiments we found the best way to get steam into the box was to run a galvanized pipe into it through the center of the end not hinged, keeping the pipe about 6 inches from the floor. A tee was screwed on this pipe just inside the box and two short pipes of the same diameter were screwed into each end of this tee, extending toward the sides of the box. On the end of each of these two shorter pipes a 90-degree ell was fitted, into which two pipes extending the entire length of the box were screwed. These pipes were held

6 inches from the floor by means of flanges screwed to the bottom of the box. The pipes are equidistant from each other and the sides of the box. Before the pipes were installed in the box they were drilled with 3/16-inch holes at intervals of 4 inches, and then turned half-way around and drilled again at intervals between the first set of holes. The pipes were installed so that one set of holes was vertical and the other set horizontal, in order that steam could penetrate the soil from both directions. Care was taken to drill these holes of proper size, since steam will not penetrate the soil thoroughly from holes which are either too large or too small unless very high pressure is used.

Most any size and type of boiler may be used, but we chose a 15-horsepower vertical-type tubular boiler, as this seems to be the most economical where a considerable amount of soil must be sterilized in a short time. We were fortunate in finding a boiler at a very low price which, though it had been used, was still in excellent condition. We set the boiler as close as possible to our compost shed and ran a 1½-inch steam pipe into the shed. We then connected this pipe to the sterilizer with 50 feet of steam hose so we could move it around without disconnecting it. We maintain 100 pounds of steam pressure, which will destroy all weed seeds in the soil in 15 minutes. We determined the time required for thorough cooking by placing potatoes in the soil at several points, and found that they were thoroughly cooked in that time.

The entire cost of the boiler, pipe, steam hose, and sterilizing box did not exceed $250. Where large amounts of soil are not needed, or where time is not an important factor, this cost might be reduced.

All soil used on our course is composed of muck, marl, and sand, which are found on our property and which are mixed together in proper proportions. To this is added a small amount of German peat moss which has been composted for several months with activated sludge. We find this to be an ideal soil for our greens. The muck, marl, and sand are hauled and dumped in separate piles close to the pile of composted peat moss near our compost shed. A soil mixer or shredder is placed at the end of these piles and the proper amount of each material is shoveled into the machine. By placing a revolving screen at a proper distance from the mixer, the latter throws the soil into the screen, thus saving one operation. The soil is then shoveled into the sterilizer, the top is fastened down, and the steam is turned on. The soil comes out of the sterilizer wet. To facilitate drying the soil we paved 3,000 square feet adjacent to the shed. When steam is turned on, the sterilizer is pushed to the extreme edge of the paved area, and when steamed the proper time the soil is dumped out and spread while another batch is steaming. In this way the soil can be dried under our climatic conditions about as fast as it can be steamed. As soon as it is dried it is thrown under our shed for later use. In late winter or early spring we can steam and store sufficient soil to top-dress all of our greens throughout the entire summer. The actual cost of sterilizing is 78 cents a yard. By constructing another sterilizer we could cut the cost in half, since while we are dumping and refilling one we could be steaming another, thus eliminating lost motion and loss of steam due to "popping off" between operations.

Fifth hole (142 yards from short and 183 yards from long tee markers), Seminole Golf Club, Palm Beach, Fla.

The weakest creature by concentrating his powers on a single object, can accomplish something; whereas the strongest, by dispersing his over many, may fail to accomplish anything.

Thomas Carlyle