The Irrigation System and the Use of Soluble Fertilizers

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Most golf courses today have an irrigation system — either manual, semi-automatic, or fully automatic. There is no other equipment on the golf course which can cover the turf area as simply and as accurately as a well designed irrigation system. It follows, therefore, that it can and should be used for purposes other than irrigation — primarily the application of plant food, and secondarily the application of fungicides, pesticides, and herbicides.

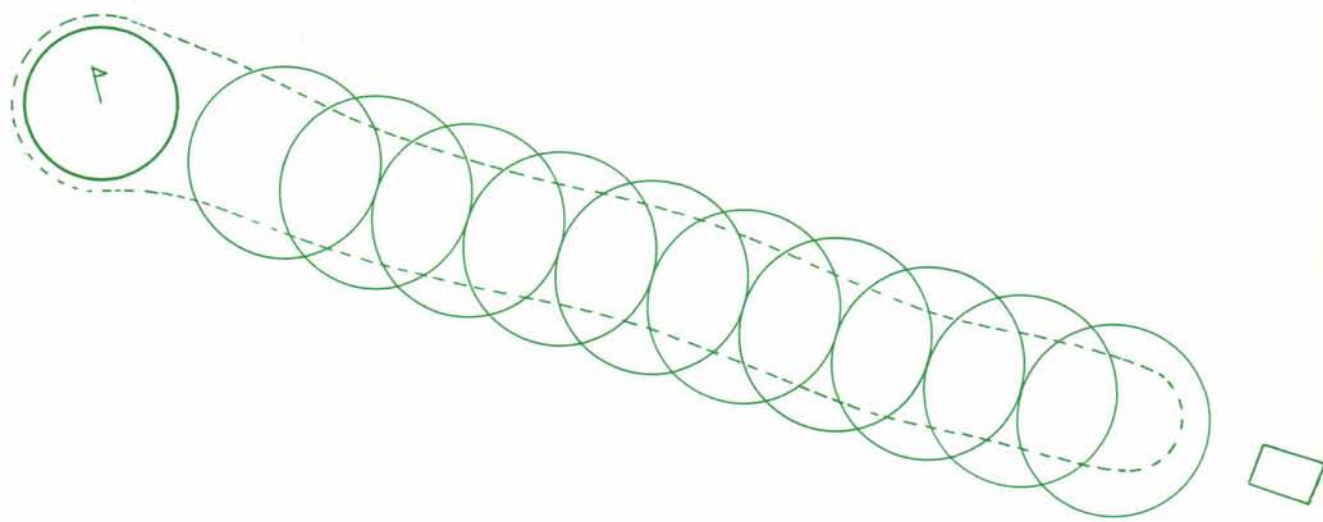
Recommendations for seasonal application of materials in dry form, even with modern equipment, are almost impossible to follow accurately, adequately, or economically. For many years it has been acknowledged that frequent feeding of turf grasses in small quantities gives better results than fewer feedings in larger quantities. The irrigation system is ideally suited to this. As to the mechanics of this type of application, there are many ways of introducing a concentrated solution into a main line or even a branch line. Many types of proportioning and injecting devices are presently in use.

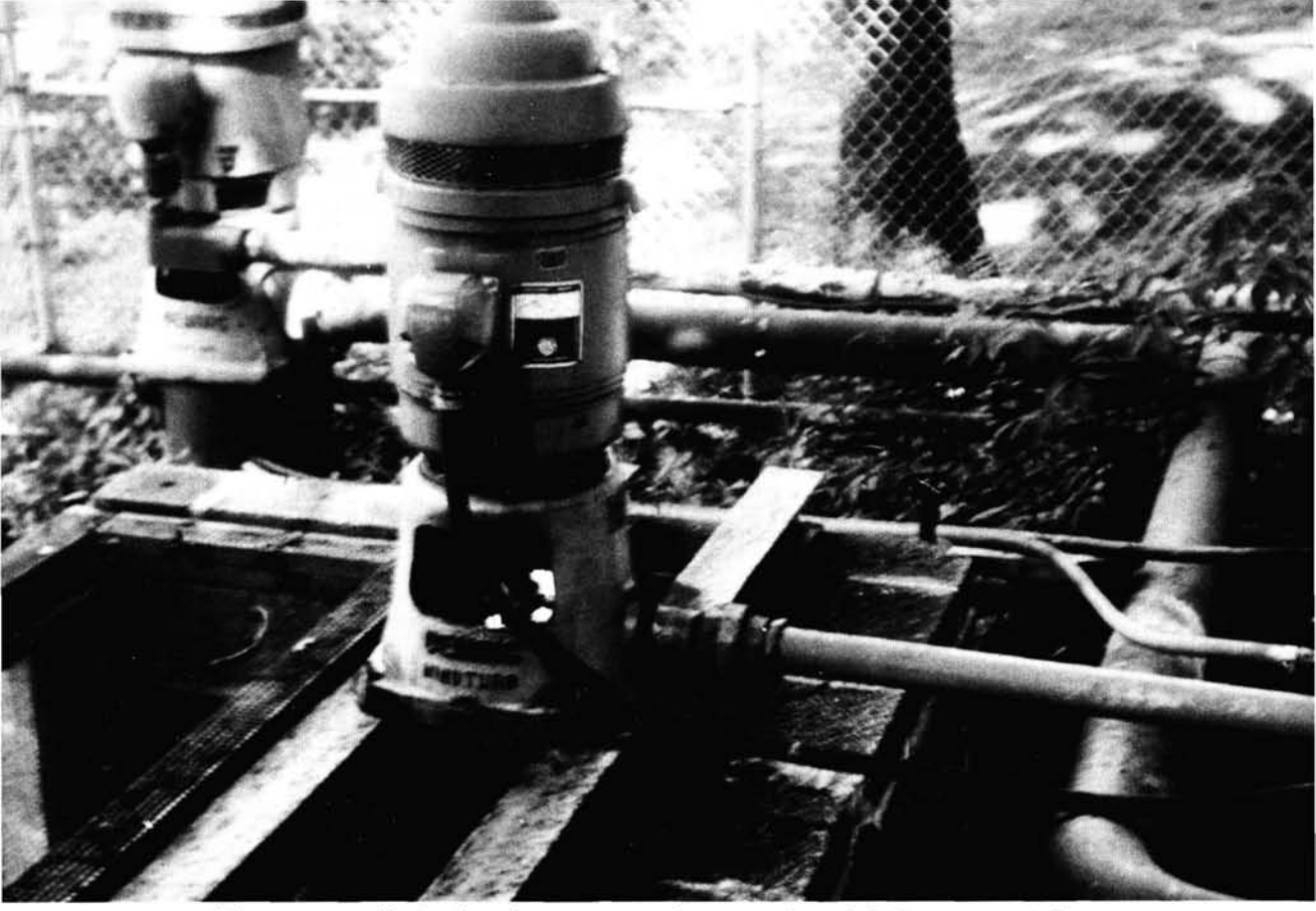
The irrigation system at Somerset Hills Country Club was installed in 1936. Although old-fashioned by today's standards, it is ideally suited as a liquid fertilizer applicator. The system is fed from a pond on the course. A 60 horsepower shallow-set 24-inch turbine pump is set at the pond's edge, and the impellors are set in a sump 12 feet below water level. There is also a small pump and a large pressure tank which keeps water in the lines at all times. Both pumps are controlled by pressure switches which operate on demand.

With respect to our fairways, there are no automatic sprinklers. Kicker type sprinklers are manually screwed into the heads which, starting at the edge of the green, are located at intervals of 100 feet, down the center of the fairway (see Photo 1).

Figure 1 illustrates a par-5 hole, 527 yards long. There are ten heads, and it is representative of an area we fertilize at one time, since the capacity of our pump is about ten sprinklers with efficient pressure. The diameter of the circle covered by each sprinkler is about 180 feet. With the sprinkler at the green covering a half-circle and the rest a full circle, the approximate area covered is 180,000 square feet. Our fairways average about 120 feet in

Figure 1.





The pump used in feeding the water onto the course through kicker type sprinklers.

width. Approximately 120,000 square feet of fairway is covered, and the fertilization reaches a short distance into the bordering rough which is cut quite short, the width of a five-gang mower. It is to be noted that Figure 1 shows overlapping circles, and one would think that parts of the fairways would get an overdose and other parts an underdose. It has been our experience, however, even though we do not fertilize in more than light winds or at night, that there is sufficient drift or spray to make the application even.

We have installed two 50-gallon steel drums which lie on their sides in the pump house at the pond. A large hole has been cut on top to put water and fertilizer into the drums. At one end of each drum is a valve and hose leading to the sump (see Photo 2).

Proper amounts of fertilizer for the area to be covered are thoroughly stirred with water in the drums and the valves are opened to a pre-determined setting to meter the liquid into the sump over a 45-minute span. From the sump it is pulled into the system by the running pump along with great quantities of water from the pond.

We estimate that by the time the fertilizer reaches the sprinklers the concentration of nitrogen by weight is one part to 5,000 or more parts of water. In any event, we have never had a trace of burn.

Nitrogen is obtained from urea which comes in a water-soluble granular form of 45-0-0 content. Potassium comes as water-soluble muriate of potash of 0-0-62 content. We have not been applying phosphorus to our fairways (on the recommendation of the USGA Green Section to discourage stimulation of the *Poa annua*), but it is also available in soluble form.

Now, as to the amount of fertilizer applied. The entire golf course is fertilized five times each year in the latter part of May, June, August, September and October. This, of course, can be increased to six, seven, or more times, or various portions of the course may be fertilized individually. The amount of nitrogen applied annually is 1¼ pounds per 1,000 square feet, or 54½ pounds to the acre. The amount of potassium is 0.46 pounds per 1,000 square feet, or 20 pounds to the acre.

These figures turn out to be convenient in many ways. For our 18-hole course, a purchase

Two 50-gallon steel drums where water and fertilizer are added in the pump house.

of 3 tons of 45-0-0 urea covers us for the season. A purchase of one ton of a 62 per cent muriate of potash also handles one season. It is also convenient for our greens crew because they know that for each head, 10 pounds of 45-0-0 and 3-1/3 pounds of potash are used for each application.

To help our men determine the proper amounts of material to mix in the metering drums, a large chart picturing the holes in the order of application, by section with number of heads, is posted in the pump house. For example, our ninth hole, par-5, 10 heads, comes first; our first hole, par-4, 10 heads (parallel to No. 9), comes second; our second (two heads), third (6 heads), and eighth (2 heads), which are contiguous, and total 10 heads, comes third; etc. Not all areas work out exactly, varying from seven to 10 heads, with the total sections amounting to 13. One of these sections includes the six grass tennis courts.

On the basis of five applications per year, a total of 5,650 pounds of nitrogen 45-0-0 fertilizer is used. At a cost of $125 per ton for 45-0-0 urea, this amounts to $375 with an allowance for overage. One ton of muriate of potash at $70 brings the total material outlay to $445.

Labor costs are more difficult to pin down, but by giving an example of the procedure, some conclusions may be reached. Using the previously mentioned ninth hole as a starting point, the operation goes as follows:

F (Fertilizing hour)

1. F minus 15 minutes — mix the proper amount of fertilizer and water in the drums.
2. F hour — set out sprinkler heads and turn on fertilizer hoses to pump.
3. F + 45 minutes — barrels are empty, shut off hoses.
4. F + 45-60 minutes — mix new batch for next stand and leave heads on first stand to flush line.
5. F + 1¾ hours — move heads to next stand and turn on fertilizer hoses.
6. Repeat process as from Number 3 on.

This operation may be accomplished by *one man,* but we use two so that the one changing heads can watch them for any malfunction. A set of walkie-talkies would be useful in this connection.

We are convinced we are saving in labor costs over dry form mechanical spreading. For a club with a more automatic system even greater savings should result. We must also bear in mind that, more often than not, when we fertilize, the course happens to need watering anyway, and where this is the case, our labor factor is practically zero.

IN CONCLUSION: It has been argued that fertilization through the irrigation system results in merely leaf feeding. We refute this by indicating that where our ninth hole with its 10 heads receives treatment, the 180,000 square feet area is doused with 30,000 gallons of fertilizer and water and an additional 15,000 gallons of plain water. This does not lie on top but penetrates into the root system. To prove this, after six years of liquid fertilizer only, plugs taken from No. 9 showed strong, healthy roots 14 inches deep.

This year is our seventh season of fertigation, or hydrogation as fertilizing through the irrigation system is sometimes called, and results have been most gratifying.

Because of the need for storage space for tons of dry fertilizer, one club purchased a used trailer for this purpose.