For Your Irrigation System

By MAX A. BROWN*

Turf managers for years have felt that applying fertilizers lightly and frequently had many advantages over heavy, infrequent fertilizing. So-called "spoon feeding" of turf areas eliminates cycling between heavy flushes of growth soon after fertilizing and hungry, weak turf when the next application is due. "Spoon feeding" also minimizes the risk of heavy losses of fertilizers from surface erosion or leaching when heavy rains occur.

But applying fertilizer costs money. The labor and equipment required to apply dry fertilizers is calculated to be between $5 and $10 per ton for bulk handled materials and over $10 per ton for bagged fertilizers. On an area basis it costs between $1 and $3 per acre each time you apply fertilizer. Therefore, most fertilizer programs become a compromise between the frequency we would like to use for best results and what we can practically afford in time and money.

A reasonably designed automatic irrigation system provides the ideal tool for applying fertilizers lightly and frequently without labor costs. The automatic irrigation system is by far the most expensive piece of mechanical equipment on the golf course. In fact it usually costs more than all other pieces of mechanical equipment combined. This system can apply fertilizer to all irrigated areas as well as water them.

Fertigation, the coined word for the practice of applying fertilizer through an irrigation system, involves a "technological marriage" between the solutions fertilizer industry and the irrigation design and equipment industries.

Liquid fertilizers are not new. They have been a major factor in the fertilizer industry for many years and today account for about 30% of all forms of fertilizers. Irrigation equipment and design have evolved considerably in the past ten years. Quite acceptable uniformity and dependability can now be expected from these systems. The "technological marriage" of these two industries is consummated by the technology necessary to precisely introduce the liquid fertilizers into the irrigation system.

Injection Methods

Fertilizer can be injected into the irrigation water flow at any point. However, the most successful systems have been those in which the fertilizer is injected into the main irrigation line. Those systems with independent injection into each sprinkler or group of sprinklers have been troublesome.

A requirement for uniform fertigation is that there be a uniform concentration of fertilizer in the irrigation water. This can be achieved in two ways, with one being more versatile and expensive than the other.

The ultimate system of choice involves a flow sensing device in the main irrigation line. This device precisely measures the flow rate of water. It then causes fertilizer to be injected into the water in a precise, preselected concentration regardless of whether one sprinkler or many are operating. As the main-line flow rate decreases at the end of a watering cycle it automatically shuts off. Once the main-line flow...

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Liquid fertilizer is stored in a corrosion-resistant tank and injected directly into the irrigation water. All nutrients normally applied to turf in dry fertilizers can be applied through the irrigation system.

by manipulating the irrigation controls so there are the same number of sprinklers of one type operating any time the injection device is operating. This system can also be installed so that it is automatically started and stopped.

Advantages

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Fertigation is a significant labor-saving technique. Fertilization is done automatically and rates are adjusted by turning a dial. There are no bags to lift and no dust. Fertilizer is usually delivered directly to your tanks by the supplier and moved by pumps and hoses. The need for large fertilizer storage space is eliminated.

There is no danger of burn to turfgrasses since liquid fertilizers are greatly diluted with irrigation water. Wheel tracks and speckling of turf burned by fertilizer granules is eliminated.

Fertigation does not conflict.

Most failures of fertigation systems result from a) poor injection methods and b) fertilizer problems. Once a thorough study is made of injection methods, a good understanding of available fertilizers and their limitations can be achieved.

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Disadvantages

Clear solution liquid fertilizers are limited in the total amount of plant food they can contain. Solutions containing large quantities of potassium, for instance, may "salt out" at low temperatures. Users must be aware of the "salt out" temperature of each fertilizer grade they use.

It is difficult to apply large amounts of fertilizer through an irrigation system during rainy weather. Care must be taken to apply phosphorus through fertigation only if it will not react with chemicals in the irrigation water and other fertilizer nutrients.

Distribution

Uniformity of fertilizer distribution through fertigation is only as good as the irrigation system. This can be good but is sometimes quite poor. However, we are not comparing with a perfect standard. Most dry fertilizers are bulk-blended granular materials applied with centrifugal-type spreaders. Uniformity with this type of equipment is normally quite poor especially on variable terrain like a golf course where no straight lines for uniform overlapping are possible.

Segregation of materials occurs in dry fertilizers because of differences in particle sizes, shapes and densities. Heavy particles are thrown farther and small light particles drop near the applicator. With liquid fertilizers each individual drop contains the same plant food content.

Fertigation will not fit every turf situation and will not match every turf manager's program. But the significant labor and money saving advantages, and the enthusiastic acceptance by most superintendents who have tried it, lead me to believe that a major portion of large-area turf fertilization will be done by fertigation in the near future.