
irrigation '74

FERTIGATION: Double Duty

". . . an excellent complement to our regular fertilizing methods"

By LARRY A. WEBER*

One of the more serious problems facing a golf course superintendent is finding the time to fertilize during the season. A little over a year ago, after the pro shop and I failed to reach a common shut-down time for fertilizing, I decided it was time to look into other methods of fertilization.

The method that showed the most promise was fertigation. Fertigation is the practice of applying fertilizer through an irrigation system.

Inverrary Country Club is a 54 hole golf complex within a 1000 acre development in Ft. Lauderdale, Florida. It includes two — eighteen hole championship courses and one — eighteen hole executive course. The Jackie Gleason Inverrary Classic golf tournament is played here each February.

I chose the executive course as a trial area for fertigation. The course covers 65 acres and has a perfect wall to wall Toro Varitime irrigation system. The greens are planted in Tifton-328 Bermudagrass, fairways and tees are planted in Tifton-419 Bermudagrass and the roughs are seeded in common Bermudagrass.

The fertigation system consists of a few basic components. These include:

1. 1200 gallon storage tank with 6 ton capacity.
2. In line filter.
3. High pressure injector pump.
4. Check valve to prevent water pressure from going back into fertilizer tank.
5. Electric pump start and isolation switches.

My vertical shaft turbine pump station requires a high pressure injector pump. With a centrifugal pump station, the high pressure injector pump can be replaced with a metering valve. The isolation switches allow the flexibility of fertilizing greens only, fairways only or roughs only or any combination of the three.

The fertilizer used was of two analysis. During the summer months I used 12-0-6 with magnesium, manganese, and iron. In the cooler months I used 11-0-5 with same minors to prevent salting out at the lower temperatures. Phosphorous was not applied throughout the year due to an adequate amount in the soil as indicated by soil tests.

The rate of application of fertilizer is based on the number of days irrigation is needed. Our average rate is 20 days per month. We used 13 gallons of fertilizer per hour for 11 hours per night or a total of 143 gallons of fertilizer per night. I used this low rate to compensate for changing wind conditions, to keep the soluble salt level down and to keep the growth rate of the grass at a constant level.

The total amount of fertilizer used throughout the year was far less than I expected. I use a total of 63 tons of the liquid blend, 2 tons of granular 7-3-7 greens mix and 10 tons of Milorganite on slopes and trap fingers. The dry material was used during periods of heavy rainfall when I did not need to irrigate.

The actual amount of fertilizer elements used over the year proved very interesting. The total amount of Nitrogen applied was 250

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*The author is the golf course superintendent of Inverrary Country Club where the Jackie Gleason Inverrary Classic is played in February.

For Your Irrigation System

"... significant labor and money saving advantages"

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 consumated 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.

resumes, the fertilizer injector will automatically start up. A monitoring device can be installed downstream in the main-line which will shut the system off if the fertilizer concentration varies from the preselected level. Several systems of this type are presently on the market.

The less versatile and less expensive alternative is to use a constant volume injection device and try to maintain a constant main-line flow of irrigation water. This can be done 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.

The above described systems are necessary when injecting into a pressurized water line, such as the discharge side of a turbine pump. However, when centrifugal pumps are used the fertilizer can be simply and inexpensively metered into the suction side of the pump. This system can also be valved to operate automatically.

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.

Fertilizers

The fertilizer must be stored in a corrosion resistant tank near the injection device. Most success has been achieved using clear solution fertilizers, rather than suspensions. These materials must stand prolonged stationary storage without agitation.

Some superintendents dissolve dry fertilizers in water to produce their own liquid fertilizers. This procedure is very time consuming and troublesome. It eliminates much of the labor saving advantage of fertigation. Prescription mixed liquid fertilizers eliminate handling labor and are comparable in cost to dry fertilizers.

All nutrients normally applied to turf in dry fertilizers can be applied through the irrigation system. One occasional exception is phosphorus. This nutrient reacts with certain waters high in calcium forming a cloudy, white precipitate which can coat pipes and sprinkler nozzles. Phosphorus cannot be included in liquid fertilizer mixtures containing magnesium.

Those nutrients which are readily leached in sandy soils such as nitrogen, potassium, magnesium, and sulfur can be easily applied. The complete spectrum of minor elements can also be included with no problems.

Advantages

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

"Jobe's TREE FOOD SPIKES save time, labor and money."

says Delos A. Bailey, owner of Del-Mar Landscaping Service, Bloomington, Minn.

George Mann, left, and Chris Danielson, Del-Mar Landscaping Service, Bloomington, Minn., fertilize their customers' trees with Jobe's Tree Food Spikes.

"Good help is hard to get. Up here in Minneapolis we're busy both summer and winter—with snow removal a big job in the winter. Mowing, tree and shrub planting, trimming and fertilizing keep us busy in the summer. That's why we like Jobe's Tree Food Spikes for fertilizing trees. The analysis is right *—and they sure save time.* Jobe's are simple to use: just one spike per inch of trunk diameter."

You'll like Jobe's Tree Food Spikes too. They're 16-8-8 fertilizer compressed into the shape of a railroad spike. All you do is pound them into the ground; rainwater does the rest. Trees and shrubs can be fertilized *in one fourth the usual time* and about *half the normal cost.* See the table below:

Jobe's Tree Food Spikes for a 20 Ft. Tree Based on State University Field Tests and Recommendations	
5 spikes 16-8-8 fertilizer—24c per spike *	
1 spike per inch of trunk diameter	$1.20
5 minutes labor @ $4/hr.	.33
Labor and materials	$1.53

Call your nearby supplier or order direct—5 cases @ $30 per case/, 15 cases at $25 per case, freight prepaid.

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with golf play. Golf courses, closing a portion of the course to golfers when fertilizing, can significantly affect revenue at busy times of the year.

There is strong evidence that less fertilizer is needed to maintain healthy turf under fertigation. Certain golf courses on very sandy soils have experienced up to 50% less fertilizer required under fertigation when compared to their normal dry fertilizer program.

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.

Chipco Spot Kleen is the systemic fungicide for prevention and control of dollar spot, Fusarium blight, large brown patch, copper spot and stripe smut.

Its long residual control makes a program based on Chipco Spot Kleen effective and economical. And Chipco Spot Kleen has a wide margin of safety to turf.

Once you use a Chipco something, you'll use Chipco everything.

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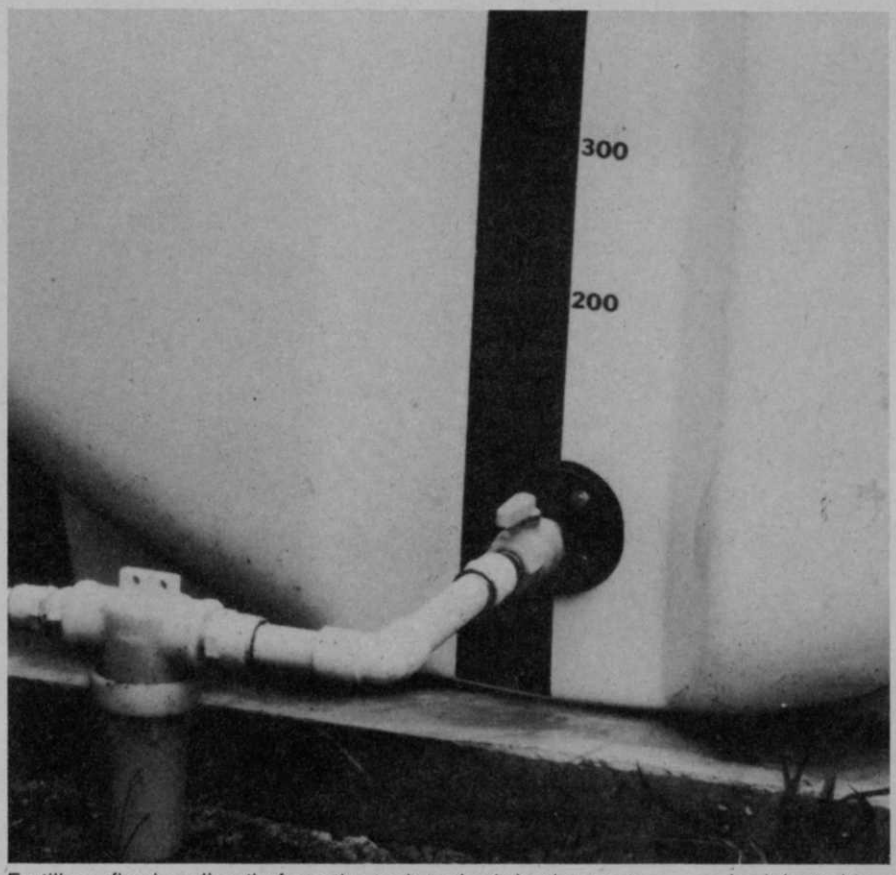

Fertilizer, flowing directly from the tank to the irrigation system, can be injected in a precise, preselected concentration regardless if one sprinkler or many are operating.

FERTIGATION (Weber)

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lbs/acre or 5.74 lbs/1000 sq. ft. This is about one-half the amount recommended by our state for our area. Their recommendation is 9-12 lbs. N./1000 sq. ft./year. Likewise, the amount of potassium was greatly reduced. I applied 112 lbs of K20/acre or 2.57 lbs/1000 sq. ft.

The most pleasing results of fertigation were in the reduction of costs. The total amount spent for fertilizer figured out to $80.37/acre/year. The average cost per ton of the material used was $60.00 to $80.00/ton. With the ever increasing cost of fertilizer materials, the liquid system looks much better all the time.

Some of the main advantages of fertigation are:

1. No labor costs for spreading fertilizer.
2. No disruption of golf play.
3. No storage area required as for dry fertilizer.
4. Grass can be maintained at an even growth rate.
5. Cost of liquid is less per ton than dry.

There are also a few disadvantages, too.

1. It may be necessary to irrigate just to fertilize.
2. Uneven distribution of sprinklers — some running longer than others, therefore putting out more fertilizer.

At Inverrary, our play is very heavy in the winter months. This is also the time of year when the Bermudagrass requires more fertilizer. This is why I chose fertigation.

To see if fertigation was the best method of fertilizing, I had to compare it to the conventional methods of fertilizing. I have gone on a complete Scotts program on the West course and on the East course I am on a granular dry fertilizer program. It will be several months before I have enough data to accurately compare the three methods.

I don't feel at this time that fertigation is the complete answer to all our fertilization problems. I do feel that it is an excellent complement to our regular fertilizing methods especially during the winter months in Florida.

Installing underground utility lines and sprinkler systems can be a problem for grounds maintenance people, landscaping contractors, and golf course superintendents.

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At most sites, it's possible to make underground installations of telephone and electrical cable — even a complete sprinkler system *without* having to dig a foot of trench across your expensive turf. Ditch Witch vibratory plow equipment can do the job quickly and efficiently.

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Selling and maintaining Ditch Witch undergroud equipment is your Ditch Witch dealer's only business. He knows your area and its soil conditions, so he can help you determine the most practical and economical way to solve your problems. Let's get together!

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Golf course irrigation installation

A family affair for 'Formost'

"Everyone has to find a specialty to be successful these days," says Ken Cloud, and his Formost Construction Company has certainly been successful in carving out its particular niche. Formost, headquartered in Venice, California, is one of the top two installers of golf course sprinkler irrigation systems in the country and, Cloud says, probably installs more systems on existing courses than anyone else.

"You've got to be really good at one specific thing," Cloud explains, "and the only way to have that kind of knowhow is to do it every day. That's why we specialize in golf course irrigation only, and after almost 30 years in business, we know what we're doing."

Much has happened to golf course irrigation since the Clouds first started in business in 1937, and the family has been a part of the changes. "When my father started out putting sprinkler systems in residential lawns and gardens, I used to thread galvanized pipe by hand," Ken says. "When asbestos-cement pipe came out, we thought that was the living end, but we didn't reckon on plastic pipe, which has now revolutionized the industry."

Ken is president of Formost, the twelve year successor to the business the Clouds have been in for 28 years. It is truly a family business, involving one of Ken's brothers and also his three sons and numerous nephews. His oldest son, Charles "Scott" is in charge of Western Division. "Right now we have three generations of Clouds in the business," he beams.

The Clouds graduated from residential work, mostly on irrigation systems for the estates of the wealthy, like movie stars Robert Stack and Dick Powell, to freeway and commercial work back in the 50's.

In the early 60's the family business began to move toward golf courses, where the market was wide open and growing. "There might be four companies in the entire field doing strictly golf courses," Ken says. "We saw a market for an outfit that would do a better job, faster, and install consistently reliable equipment," he explains. 'In other words, the 'Foremost' golf course irrigation installer, and that is what we've become."

But climbing to that pinnacle involved a lot of investment, hard work, and especially inventiveness. Ken, a born inventor, started early adapting existing machines to the special necessities of golf course irrigation installation, to get the job done better, faster and with less labor.

"About 20 years ago I developed a small ditch digger powered by a Wisconsin engine that was especially adapted to irrigation work," he tells. "It was suggested that I get patents and manufacture the thing, but I was too busy digging ditches with it, and probably blew the biggest chance I ever had." At least five or six companies are now making out nicely manufacturing machines similar to the one Ken developed.

As the years went by, Ken continued developing equipment to help him install irrigation systems better. One of the biggest labor-savers has been the "pipe-puller." This machine was developed by Ken at a cost of $65,000 more than two years before similar machines were brought onto the market. It allows Formost to lay plastic pipe up to 2½ inches in diameter without digging a trench at all.

The "puller's" blade simply "slices the turf down to the level the pipe is to be laid at, and then, through a special tube behind the slicing blade, the pipe is snaked into the slit continuously. Since the process opens up just a narrow slit in the turf, tamping it back into place is a simple matter, and the course is ready to play almost immediately.

This is a matter of pride with the Clouds. In these days of sky-high costs, closing a course down for repairs during playing season could well close it down permanently. "We've never closed a fairway for an installation job," Cloud boasts.

As an example, Cloud cites the Miami Shores Country Club, where the firm's Florida Division completed a job last March. The job had to be done during the height of the club's season, and superintendent, Dave Buxbaum, said "I wanted that course continuously playable!"

"They didn't lose a single round of golf during that irrigation installation," grins Ken's brother Cecil Cloud, Formost's Florida Division manager, who oversaw the Miami Shores job.

Where hard-rock coral just beneath the surface prevented the use of the pipe "puller" for the main lines and some laterals at Miami Shores, Cecil had the crew dig a trench with the other end of the same machine, a powerful continuous ditcher. Then, once the pipe was laid in place, another Ken Cloud invention moved in to backfill and compact the trench. Called the "Spider" by those who work with it, the 11 foot wide mechanical monster was completely designed by Ken and built to his specifications.

The "Spider" is powered by a standard 6-cylinder industrial engine, which drives the various moving parts through a series of hydraulic pumps and motors. The machine has three sets of augers that completely backfill the earth into the trench as the machine passes over it, each one followed by a hydraulic "tamp" that packs the dirt in 12 inch lifts solidly over the pipe.