

Fertigation

by SCOTT A. SINCERBEAU

FERTIGATION, the term for applying liquid fertilizers through an irrigation system, is expanding rapidly on golf courses in South Florida where sandy soils have little nutrient-holding capacity and demand for high-quality turf is intense. Royal Palm Yacht & Country Club, in Boca Raton, Florida, installed a fertigation system in 1976 to help improve playing conditions at a reduced cost.

Our irrigation system consists of four pumping sites with a 40-horsepower turbine pump at each site. All water is pumped from wells. There are 744 valve-in-head centrally pro-

grammed sprinklers on a looped piping system covering 120 acres. Because sprinklers cycle on and off in different areas of the golf course, one pump may pump different proportions of the total water supply. Therefore, standard constant volume fertilizer injection pumps would have made equal distribution of the fertilizer into four separate pumping sites impossible.

Recent technological advances allow the precise automatic metering of liquid fertilizers, even on golf courses with more than one pumping site. This induction sensing system monitors the flow volume of water from

each pump and injects a specified amount of liquid fertilizer into the irrigation water. If one sprinkler is running, therefore, the same rate of fertilizer is being applied as though 10, 20 or 30 sprinklers are running.

Fertilizer requirements are closely related to water requirements. Soils with higher water retention capacity seem to have a greater nutrient-holding capacity; stress areas, or areas where water retention is low, will also require more fertilizer to maintain quality turf. On a given golf course, where both soil extremes exist, we automatically correct this problem by dialing compensating

Calvin Orr, irrigation technician, checking the operation of the pumping system. Daily checks insure proper sprinkler operation and proper fertilizer distribution.





Close-up of the injection pump showing where the liquid fertilizer is injected into the main irrigation line. The black marks on the fertilizer storage tank allow easy determination of how many tons of fertilizer are on hand.

times on the individual clock stations. Regardless of your soil type or geographic location, whether you use large amounts of fertilizer or relatively small amounts, better turf quality can be achieved more economically with fertigation.

Uniform growth is one of the biggest advantages of fertigation. Liquid fertilizer distributed through any reasonably well-designed irrigation system with induction sensing will give very uniform results. Any one night the water pattern may be disturbed by wind, but on an average, amazing results have been achieved. Also, fertigation does away with the peaks and valleys of growth by applying small amounts of fertilizer regularly, supplying what is needed by the plant from day to day, which is what we have been trying to accomplish for years.

SINCE WE installed our fertigation system, the golf course no longer needs to be closed for fertilization, because minute quantities of liquid

fertilizer are automatically applied nightly during the regular irrigation cycle.

Superintendents in this area have actually reduced the amount of fertilizer applied by 15 to 40 percent and have been able to maintain turf superior to what they had with dry fertilizer. This has been accomplished by feeding the plant small amounts of fertilizer as it is needed, eliminating the waste. These percentages represent significant savings. Labor saved in fertilizer application and handling can be put to other uses. It is expected that 600 man-hours will be available that were used to fertilize the golf course in previous years.

In Florida, where golf is played the year around, fertigation is also helping in other ways. Uniform levels of nutrients in the plant during short-term cold snaps help keep the turf strong and gently help the plant grow out after the cold has passed.

The Superintendent has always been concerned with "hot" fertilizers that streak, track or burn. With dilu-

tion rates ranging from one gallon of liquid fertilizer in 1,000 to 5,000 gallons of water, there is never a burn. Our total range of dilution using 12 percent nitrogen fertilizer is from zero parts per million to 120 parts per million.

Royal Palm Yacht & Country Club is surrounded by private homes, many with large screened-in patios and pools. Dust from dry fertilizer application has always been a problem. Also, players have had to put up with the course being closed, or at best a portion of the course being closed, so that it can be fertilized. With fertigation, this is no longer necessary.

WHENEVER THE subject of fertigation arises, there are always a number of questions that follow. Some of the most common are: What size are the storage tanks? Where are they located and how are they filled?

At Royal Palm Yacht & Country Club our tank capacity is 1,250 gallons, over six tons of fertilizer each. They are above ground at each pump



Superintendent Scott Sincerbeau adjusting the rate of fertilizer to be applied. This adjustment takes only a few seconds and is very accurate.

site, and they are filled by the suppliers' trucks, which are equipped with pumps and hoses.

Do the injection pumps mount near the irrigation pumps? Our injection pumps are relatively small, with a capacity of 18 gallons per hour, and they are mounted in a convenient location at the pump site. They are plumbed into the pressure side downstream of the irrigation pumps.

Is this fertilizer a foliar fertilizer? The product applied to golf courses through the induction sensing system is a ground application grade of clear solution fertilizer. Some foliar feeding takes place in both trees and turf, but nutrients are taken up mainly by the root system.

How does liquid fertilizer affect trees? Can you see a difference in their growth? Deciduous trees under fertigation on golf courses get their new leaves up to two weeks earlier than those outside the perimeter of irrigation. They also appear to be more vigorous, hold their leaves longer and seem to grow somewhat faster.

Does the use of liquid fertilizer limit us to certain analyses? No, the liquid fertilizers can be ordered in any complete fertilizer ratio required by particular soil or turf conditions

with the micro-nutrients that are regularly supplied in South Florida. Also, nitrogen sources can be changed to assist in pH control. Even with special formulations, prices are comparable to dry fertilizers and decidedly less expensive than slow-release type fertilizers.

How much does the liquid fertilizer cost a gallon? Liquid fertilizer is purchased by the ton. You apply it the same as dry fertilizer, by pounds of nitrogen to the acre.

How does the actual cost per acre compare with conventional fertilizers? I have compared prices of dry inorganic, slow-release and liquid fertilizer to determine which would be most efficient and most economical. Dry inorganic 16-4-8 fertilizer at the rate required by our geographic location and our soil structure would cost about \$150.00 per acre per year. Slow-release type fertilizers to give us equal amounts of nutrients would cost from \$200.00 to \$280.00 per acre per year, depending on the product used. Liquid fertilizer at equal rates costs us less than \$130.00 per acre per year.

WHAT HAPPENS IF an irrigation pipe breaks and runs all night? There is no burn, as one might think. At 35 ppm nitrogen there may be a

lush green spot, but after a blowout and a successful pipe repair, the turf needs a little extra nutrition to help it heal over anyway. Today many courses have automatic low-pressure cutoff switches to eliminate waste of water and fertilizer.

Will the fertilizer deteriorate the pipes or sprinklers? Our natural irrigation water has more soluble salts than is contributed by the liquid fertilizer we use. We don't consider the diluted fertilizer to be a problem. As long as it is handled properly, no unusual pipe or sprinkler deterioration is foreseen.

A much asked question is: What's the catch? Where are the bad points? I can honestly say that I have found no really bad points with this system. Sometimes, during long, rainy periods when the irrigation system is turned off, the turf gets no fertilizer. When the system is turned back on, the fertilizer rate can be increased until required monthly rates are applied. There is great flexibility with the induction sensing system.

The most asked question of all is: How much does it cost to install? The cost depends entirely upon the individual course and the type of pumping system on hand. In general, the storage tank and sensing system for each pumping station approximates the cost of a large dry fertilizer spreader. Royal Palm Yacht & Country Club has the most sophisticated fertigation system on a golf course in Florida and most likely in the world. The system has already paid for itself several times. It has freed building space that was previously used for dry fertilizer storage. Now a proposed \$40,000 equipment storage building is no longer needed.

Fertigation is a new tool to help the golf course superintendent produce high-quality turf and control his budget. Some superintendents are presently using this tool as a supplement, some are using it as a basis of all fertilization. Regardless of how it is used, in the end it is going to help create better quality turf at a lower cost with less interrupted play. In the future it will become more and more widely used as people see and experience the improved playing conditions it helps to create.

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