

# FERTIGATION

By Tom Parent  
River Oaks Golf Course

Fertigation is the application of liquid fertilizer through the irrigation system. It allows for the application of micro quantities of low cost nutrients on an as needed basis. Maybe because fertigation sounds too good to be true, few golf courses are fertigating in the northern states. In the summer of 1992 we installed a small metering pump for wetting agents and ferrous sulfate. As the effect of iron and sulfur have such a dramatic color response, we felt this would be a good test of our irrigation system's distribution.

Over the winter of 1993/1994, we decided to install a full scale fertigation system at River Oaks Municipal Golf Course. To the best of our knowledge there were no golf courses using fertigation in the state of Minnesota other than for wetting agents and minor nutrients. On paper it looked like this system could save our golf course between \$10,000 and \$15,000 annually. The city council agreed to transfer \$5,000 from our existing fertilizer budget to pay for the installation. After a great deal of research, we installed our system in mid-May.

A fertigation system can deliver the amount of nutrients that the grass plants will use over a short period of time. This minimizes volatilization and leaching and allows the turf manager greater control over turf growth and color. Being able to deliver frequent small quantities of fertilizer eliminates the fluctuations of growth associated with granular fertilizers.

Extended periods of rain do have a minimal effect on color and growth. This however can be corrected in one or two days of fertigation. The key is to have sufficient fertilizer pump capacity to apply 0.5 to 1.0 oz. of N/M in a normal irrigation cycle. In addition to environmental advantages and greatly improved turf quality are the economic advantages.

A fertigation system allows the use of water soluble agricultural grade fertilizers. We use a mixture of prilled urea, stabilized urea and ammonium sulfate as a nitrogen and sulfur source. Potassium nitrate and ammonium polyphosphate are used for K and P sources. Most of these products constitute a large percentage of slow release mixtures and are twice the analysis at a quarter the cost per pound of active ingredient.

Local fertilizer companies which supply the lawn care industry should carry pre-mixed liquid fertilizer. Typical analysis of pre-mixed liquid fertilizers are 16-2-6, 15-0-5 and 21-0-0. These products can be purchased with varying amounts of slow release nitrogen and custom blended at added cost. We mix our own solutions to have better control of the ratio of nutrients. Because of the minute quantities applied, and the fact they are watered in automatically, there is no burn potential.

We have found the amount of fertilizer required for vigorous turf can be reduced by 50 to 60 percent. At year's end we applied a total of four tons of urea, one and a half tons of ammonium sulfate and one and a half tons of potassium nitrate on around 80 acres of turf. This equates to slightly more than two pounds of N/M on our greens, tees and fairways. At this rate, we have more growth than many would find acceptable.

With a fertigation system you have the ability to apply minor nutrients such as ferrous sulfate, magnesium sulfate, sodium tetra borate ("borax") for boron, etc. As sufficient quantities of these products are absorbed through the leaves, chelated sources are not necessary. Our course has acidic soils, pH 5.6 to 6.3, and nutrient uptake generally has not been a problem. A fertigation system could be ideal for high pH soils where foliar feeding may bypass poor soil chemistry. We anticipate our fertilizer budget for irrigated turf to be around \$4,000, not including a granular dormant application.

Some suppliers of fertigation systems have made claims that fertigation can prevent light frosts from forming. Due to the late onset of frost and a wet fall, we could not verify this. Of course, it didn't rain for a month after we turned our irrigation system off! You will drastically reduce your fertilizer application costs. Except for tees, unirrigated rough and a K application to the greens, we did not take the spreader out on the course. The use of fertigation system eliminates the need to schedule fertilizer applications, the use of heavy equipment, the disruption of play and the exposure of equipment to high concentrations of salt.

Our system consists of a large duplex (two pumps driven by one motor) proportional metering pump capable of delivering up to 28 gallons of product per hour per pump, and a 3.2 gallon per hour pump. We use the high volume pumps to deliver nitrogen and ferrous sulfate, wetting agents and high carbon fertilizers.

Because I was unwilling to gamble the cost of a prefabricated system on an untested procedure, we assembled our system from local suppliers. You can save considerable amounts of money by doing this, but it is more difficult. In Minnesota, a fertigation system does require a state approved check valve, a \$50 permit, and a system inspection which included a facility inspection, as well.

We spent a total of \$6,000 on our system which included metering pumps, proportional control systems, bulk tanks, containment, check valve, electrician costs and permits. If you do not have a flow meter which generates an electrical signal, your system will cost around \$500 more, plus installation. A single pump system could be installed for \$3,000 to \$4,000.

With the system in place for a full season, it has far exceeded our expectations. With the money saved on fertilizer products we have been able to pay for the system and experiment with some of the new biohumated and high carbon fertilizer products on the market, with good results. In 1993 we spent \$26,000 on fertilizer. This past year we spent around \$8,000 for N, P, K, S, Fe and minors.

There are some drawbacks to this system. All areas of the course are fertilized equally if watered equally. We manage our fertigation to the greens and supplement other areas as needed. Except for the tees and a few fairways that were behind on nutrients, this approach has worked very well.

A major irrigation leak could be a problem if you are fertigating at a very high rate. However, small leaks are easily detected due to the presence of fertilizer in the irrigation water. If you have water hazards which receive irrigation water, this could become a problem. Some sprinkler heads may need to be moved or converted to part circle. In most cases, the cost for this should be easily defrayed by fertilizer savings as would any system upgrade to provide uniform coverage. With a double row irrigation system we have found no detectable variation in color or growth due to coverage.

Another potential drawback to fertigation we saw was an increase in fairy rings. This could have been due to nearly ideal climactic conditions. I feel, however, that it may be due to the lower amounts of nitrogen we used. The turfgrass plant is so efficient at absorbing urea through the leaf tissue that I feel very little is reaching the soil.

Mr. Eric Lavold conducted weekly soil tests on our first fairway and first green in 1994 as part of his summer internship for the University of Wisconsin-Madison under Dr. Wayne Kussow. The results show that the nitrogen level in the fairway samples average about 5 ppm and the green samples averaged 3 - 4 ppm. I would consider this too low to support an active microbial population which could keep the fairy rings in check.

At the end of the 1994 season we started to experiment with high carbon soil amendments and fertilizers. We are currently running test plots using whey fermentation products and Toro's bioplex 5-3-2. The more I researched this subject I've found that anything that goes into our livestock is good for your soil. In the spring we will run plots using the above mentioned products plus corn steep liquor, kelp (meal extract

and concentrate), solubilized leather and molasses.

Most of these are by-products of the food industry and are used in livestock feed. Hopefully the turf industry can find a way to keep these by-products out of the landfill. My hope is to drastically increase my microbial populations, which should lead to better soil and plant health. My real hope is an elimination of the use of fungicides.

Is fertigation for you? If your irrigation system can maintain reasonably healthy turf in semi-drought conditions, a fertigation system should work for you. If you irrigate regular at a low rate, variations in wind conditions should average out a less than perfect distribution pattern. A fertigation system can save time and money, promote healthier turf and offer environmental friendliness. ♣

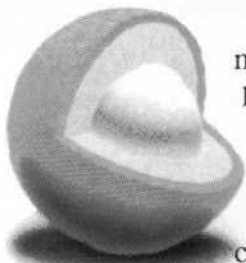
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