

# Fertigation

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## *Applying Liquid Fertilizer Through The Irrigation System*

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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 so 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 would save our course between \$10-15,000 annually. The City Council agreed to transfer \$5,500 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 nutrient that the grass plants will use over a short period of time.** This minimizes volatilization and leaching and allows the turf manager great 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 .5 to 1 oz. of nitrogen per/Msqft 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/sulfur source. Potassium nitrate and ammonium polyphosphate (liquid) are used for Potassium and Phosphorus 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. Several suppliers for pre-mixed material are available in the metro area. 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 that they are watered in automatically, there is no burn potential. We have found

the amount of fertilizer required for vigorous turf has been drastically reduced. As of August 1st, we have applied a total slightly more than two tons of urea and one ton of ammonium sulfate on around 80 acres of turf. This equates to a pound of nitrogen per thousand square feet 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, related 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. Although we have no experience with this yet, some suppliers of fertigation systems have made claims that fertigating can prevent light frosts from forming. You will drastically reduce your fertilizer application costs. Except for tees and unirrigated rough, we do not take the spreader out on the course. The use of a fertigation system eliminates the need to schedule fertilizer applications, use heavy equipment, disrupt play and expose 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 potassium and periodically phosphorus. Our small pump is used for ferrous sulfate and wetting agents. 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. A fertigation system does require a state approved check valve, a \$50 permit and a system inspection, which includes 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 \$550 more plus installation. A single pump system could be installed for \$3-4,000.

With the system in place for half a season, it has far exceeded our expectations. With the money saved on fertilizer

*(Continued on Page 35)*

## Fertigation —

(Continued from Page 34)

we have been able to pay for the system and experiment with some of the new bio/humate products on the market with good results. Last year we spent \$26,000 on fertilizer. This year we anticipate spending 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 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 circles. In most cases the cost for this should be easily defrayed by fertilizer savings as would any system upgrades to provide uniform coverage. With a double row irrigation system we have found no detectable variation in color or growth due to coverage. If your irrigation system can maintain reasonably healthy turf in semi-drought conditions, a fertigation system could work for you. A fertigation system can save time and money, promotes healthier turf and is environmentally friendly.

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The 3-iron was lost at the MGCSA Championship at Wayzata C.C.

Contact: Jim Johnson  
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