

Fertigation Lowers the Boom on Inefficient Nutrient Distribution

By Luke Frank, Irrigation Editor

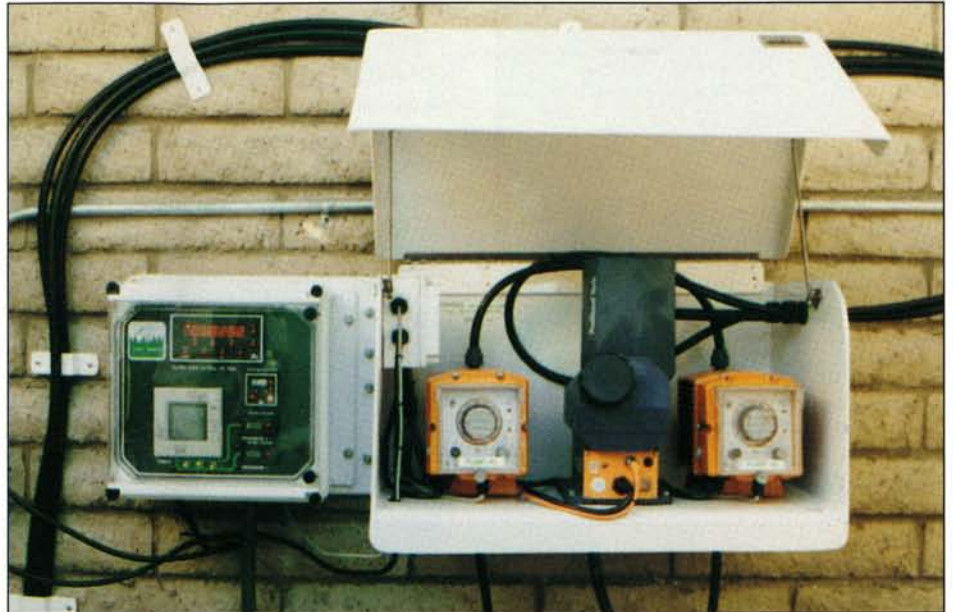
Control is the name of the game. Mastering a golf swing or dominating a fastball ultimately produces successful results. Similarly, controlled application of turf nutrients, soil amendments and some chemicals will ultimately result in a dense, durable playing surface.

Your irrigation system *can* be an effective vehicle for distributing fertilizers, wetting agents, herbicides and fungicides in addition to controlling water and soil pH levels. However, effectively dispersing these compounds largely pivots on the coverage uniformity of the irrigation system through which everything must pass.

There are clear advantages to “spoon-feeding” turf and earth in small doses at short, regular intervals. The compounds applied are more readily absorbed and utilized by the plant material while chemical leaching is minimized. “A turf manager who fertigates may use the same amount of fertilizer annually, but the plant material will use more,” relates Bob Walker with the Irrigation and Training Research Center at Cal Poly, San Luis Obispo.

Perhaps the greatest advantage to fertigation is the savings on labor and material. Funds consumed purchasing and maintaining walk-behind spreaders and tractor-tugging hoppers throwing granular fertilizers may be channeled to cover the expense of installing or retrofitting an irrigation system with an injector system. Once the system is in, fertigation costs no more in labor than maintaining your irrigation system.

Time used mixing chemicals in a tank mounted on a utility vehicle, driving across greens while another crew member pulls pins, then cleaning the tank, the boom and the nozzles, may be diverted to other areas of maintenance like cleaning fairway bunkers, pulling crabgrass from greens or pruning trees. Athletic field maintenance crews can spend more time spraying or chalking lines, resurfacing baselines, or rebuilding pitcher’s mounds. Fertigation also eliminates heavy equipment compacting turf and soil, possibly damaging plant material or sprinkler heads and laterals.



An injector system secured in a building applies fertilizers and other amendments through the irrigation system. The controller gives the power and flexibility to dial a percentage of chemicals to water, or to override the fertigation program altogether. Photo courtesy: Karsten.

Velvet Green Turf

Shooting concentrated granular nutrients heavily in the spring and fall invites “turf torch” where human and mechanical errors are likely. By applying substantially diluted solutions with each irrigation schedule (generally for turf, 1-to-1,000 gallon or higher ratio of fertilizer to water in peak water periods), lush growth is eliminated, taking with it fluctuating turf maintenance schedules, relates Harold Goldsmith with Auto Grow in Las Vegas, NV. Nor will your turf enter stress periods of feast and famine, adds Frank Maggio of Long Island-based Ecoturf.

A light, consistent application of iron and/or nitrogen can help maintain a consistently healthy green luster. Less expensive fertigation systems simply inject these and other nutrients into the main irrigation line, which distributes a diluted solution evenly across the entire turf area, explains Dr. George Snyder with the Everglades Research and Education Center in Belle Glade, FL. Some prefer to use fertigation in this manner, applying a background level of turf and soil nutrients which can be sup-

plemented with more conventional distribution methods, if needed. Snyder encourages turf managers to combine fertigation and conventional fertilization, incorporating the best features of each method for optimal control of application. Snyder adds that fertigation may help with sandy soils which won’t readily retain such nutrients as nitrogen, sulphur, potassium and other micronutrients. Metering fertilizer in frequent, light doses will maintain these nutrients at adequate levels of plant availability while reducing leaching.

Quick recovery for waning or damaged high-traffic turf areas is achievable. Plant material can consume a fertilizer/water solution much faster than water soluble granules tossed out, awaiting melt-down and absorption, emphasizes Goldsmith. A consistently healthier playing surface reduces the level of turf damage.

Fertigation may be used to adjust water and soil pH, add penetrators and utilize wetting agents. Golf course superintendent Chris Mock uses a relatively inexpensive injector system to apply wetting agents with each irrigation,

enabling more efficient use of the water and soil at Hallbrook Farms Country Club in Kansas.

Newly seeded and reseeded areas are also receptive to fertigation practices due to the ease of foliar and root absorption from frequent, light applications and the elimination of foot or other traffic on the seeded surface, adds Michael Chaplinsky of Turf Feeding Systems in Houston. The traditional method of new turf grow-in using dry fertilizer requires applying fertilizer before planting, planting and watering, then interrupting irrigation to apply more granule fertilizer regularly for the next eight to 12 weeks during grassing, according to Chaplinsky. Fertigation shortens grow-in times while minimizing fertilizer leaching and damage to turf and the irrigation system.

When laying sod, Maggio suggests using conventional fertilization methods to stimulate root growth, then following with fertigation to maintain even and consistent growth for the life of the turf.

Custom Blending Your Solution

A big bonus of fertigation is the ability to custom blend fertilizer. Managers can serve as turf dieticians by submit-

ting soil and plant tissues and irrigation water samples for evaluation. Testing such samples identifies what's in the soil and what the turf needs and is getting, stresses Goldsmith. Site-specific elements not required for healthy turf are excluded, saving money and possibly avoiding other problems, while distinct deficiencies may be identified and supplemented. This is the only way to formulate a truly tailored, logical blend for your turf, he emphasizes.

Most prepackaged fertilizers are meant to be general formulas. Historically, matching nutrients to needs meant choosing packaged materials that came closest to meeting a turf manager's requirements, he continues. Custom blending tramples the hit-and-miss turf feeding of prepackaged, dry fertilizers.

Controlling Concentration

There are several ways to mix fertilizer solutions and control which elements are presented to the turf at specific doses and frequencies.

Goldsmith describes the design of injection systems as crucial to the success of a fertigation program. Minimum and maximum flow rates for the irrigation system must be considered as well

as total water usage for peak and low periods. With this information, fertilizer concentrate tank and blending tank sizes may be determined as well as fertilizer and water ratios for the various flows. The manager must also calculate the amount of fertilizer needed in pounds per thousand square feet or per acre unit of time — usually one month, adds Snyder.

An adjustable injection flow rate which controls volume proportioning is also important to the effectiveness of a fertigation program, claims Goldsmith. A fertilizer to water ratio of 1-to-500 may be appropriate in the winter where warm-season grasses fall dormant or rainfall precedes irrigation. But in the summer, when schedules are dialed up with more and longer cycles, the ratio must be adjusted accordingly. The capability of dialing your solution ratio up or down is invaluable.

Multiple pumphead capability may also be desired for additional control of chemical distribution — if your budget can float it. Goldsmith has previously utilized a three-head pump station: one to supply acid, either sulfuric, phosphoric or a combination of both to adjust water pH;

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The ability to supplement irrigation with iron, wetting agents or micronutrients through an injector system, can tremendously boost the control a manager has over growth and maintenance of turf.
Photo courtesy: Amiad U.S.A., Inc.

Fertigation

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the second to supply a desirable balance of nitrogen and potassium; and the third to supply soil penetrators or surfactants which help leach undesirable salts and to alleviate parching and dispersion problems during very hot weather.

Rain of Terror

No system is foolproof however, and there are certain inherent risks to fertigating. Foremost, the quality of the fertigation program rides on the uniformity and dependability of an irrigation system. "If you don't have good uniformity of irrigation, you won't have good uniformity of fertilization," reasons Walker. Logically, some turf managers schedule irrigations to ensure the driest area receives adequate amounts of water, leaving other areas overwatered, thus overfertilized. "Even with an 80-percent efficiency on an irrigation system, you may be looking at a 2-to-1 coverage ratio from the spot getting the least

amount of water to the spot getting the most," he explains. For systems with large sprinklers, Walker recommends an efficiency rating no lower than 70 percent for retrofitting with an injector system. "The irrigation should be more than acceptable, it should be outstanding."

It is notable that if dry fertilizer is being applied to turf, an inefficient irrigation system may also cause burns or damage. Chaplinsky points out if your irrigation system is missing coverage when fertigating, at least the fertilizer is already liquified. Maggio adds there is a capillary effect in surrounding turf to absorb nutrients peripherally, aiding in distribution uniformity. Snyder stresses fertigation may be used with very simple irrigation systems which don't necessarily require superlative uniformity. "Just differences in the wind conditions from one irrigation to the next, will vary the distribution suf-

ficiently that distinct fertilization patterns do not occur," he claims.

Although these master blend solutions should be highly diluted, the risk of mechanical failure to the system is always a concern of fertigators. Spewing excessive amounts of fertilizers and/or acids can damage turf and contaminate soil or water, just as overfertilizing with a spreader can. A situation where valves are sticking open, irrigation pumps are failing while injector pumps are operating, and fittings and hoses are leaking, may trash turf and defile groundwater. Because turf is irrigated at night, essentially unsupervised, these mechanical failures often aren't realized until grounds degradation slaps you in the face. Secondary containment for tanks, an interlocking system for the irrigation and injector pumps, which prevents one from running without the other, and regular inspection of equipment are all recommended by David Zoldosky of the Center for Irrigation Technology in Fresno, CA.

Proper backflow prevention is a must for anyone considering fertigation. "If everyone follows the procedure of pulling permits and installing the prescribed backflow prevention device with their fertigation system, then all's well," Walker says. "But for projects using well water, that may not be the case." Improper backflow prevention can create serious problems and consequences.

Managers should use caution when blending fertilizers. "You really need to understand the chemistry involved," Walker stresses. He adds, they should never mix their own chemicals. First, the packaging should indicate whether it is legal or not to disperse through an irrigation system. If fertigation is permissible, blending should be left to the professional manufacturer or distributor of fertilizer or chemical products. That way potentially dangerous chemical reactions or resultant turf damage liability lies with them. They are the experts.

Fertigation may not be appropriate for distributing nutrients in areas of consistent or seasonal heavy rainfall, since you're locked into running your irrigation system to fertilize, even if irrigation is not needed. Snyder suggests fertigation may be adaptable to soil and climatic conditions that require four or more irrigations per month.

Learn Not to Burn

Fertigation, like many new technologies available to the turf manager, requires extensive education to be a seriously effective tool in creating and maintaining a sturdy, resilient, verdant playing surface. A willingness to spend the money on a system should be partnered with a willingness to spend the time to learn about the systems available and the specific needs of the turf. Understanding how much fertilizer, wetting agent, acid or chemical a system should be feeding the turf at any given time of year is vital to the success of the fertigation program. Calculating how time with each cycle should be dedicated to passing nourishment through the line, then purging the system without leaching the chemical through the root zone, is as vital a responsibility. The dividends of an easily managed, low-maintenance carpet of turf requiring less manpower and long-term equipment and maintenance costs may be well worth the investment. □