

## **Getting the Most Out of Chemigation for Sports Fields**

**By**

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Today, thanks to advanced technology, a new slate of products enhancing integrated pest management program bring chemigation to a promising future for turf management.

Although chemigation is a term becoming more popular in the turfgrass industry, the concept of chemigation through irrigation systems has been a main support in agricultural fields for decades. While chemigation is certainly not a panacea for all sports fields, it has proven to be efficient and cost effective for many applicators. Loma Linda Medical University Soccer Complex (CA), Town of Clarkstown Sports Complexes (NY), Township High School (NJ), City of Alexandria Parks and Recreation (VA), the University of Washington (WA), the University of Tennessee (TN), Irving High School (TX), and New Orleans Saints (LA). These are but some of the applicators who favor the use of chemigation.

### **WHAT IS CHEMIGATION?**

It is a process of injecting chemicals, such as fertilizer and surfactants into irrigation water of virtually any size or complexity for application. By injecting very small amounts (ppm) of nutrients into the irrigation water, it offers turf management the benefit of spoon-feeding principals. Rather than tolerating peaks and valleys of nutrition, turfgrass responds favorably to more frequent small doses of nutrients to maintain a constant growth curve. Pesticides, such as insecticides, fungicides, and selective herbicides, with EPA registration for use through irrigation water could also be used through this program.

### **FERTIGATION**

Fertilizers applied through irrigation water (fertigation) are a highly desirable method of feeding turfgrass. With controlled growth potential, sports turf managers are finding this method to be of the best ways to counter heavy traffic areas on fields. The process is simple. The nutrients are injected by a metered piston driven positive displacement pump, manufactured by Inject-O-Meter Mfg. Co. and private labeled for Opti-Gro Turf Injector). These pumps have been found accurate and reliable in agriculture, landscape,

and turf industry. Small quantities, such as 0.005 to 0.01 pounds per treatment are used until nitrogen levels reach 0.25 or 0.50 pounds to maintain a desired growth rate. Based on soil analysis results, nutrients and application rate are determined. The ideal level of feeding is programmed for once a week application. However, for special events, such as homecoming game or graduating exercise, a greater concentration or more frequent application is used. Products such as iron chelated plus nitrogen source, at optimum temperature of 75 F. to 85 F., could be applied a day or more before the event to stimulate growth and an esthetic appeal.

Fertigation helps stabilize the amount of nutrient availability to turfgrass and reduces leaching under heavy rainfall or frequent irrigation cycles. Because of its chemical nature, it is difficult to maintain an optimum level of available nitrogen in the rootzone. To assure the availability of nutrients, a more frequent small amount gives a regulated nutrient supply and best turf quality. This method of feeding is especially helpful in sandy soil, in soils that have a poor pH or low cation exchange capacity (CEC), and especially to fields heavily used. One of the major advantages in fertigation is you can eliminate peaks and valleys in turf growth while easing labor, equipment, and storage costs. Turf managers have found fertigation to be one of the best approaches in dealing with a heavily used field with little or no time to fertilize during the day time. Fertigation can be set automatically to come on early morning for watering and feeding. Come sun up, the field is stimulated and ready for play. Thus, turf managers have found chemigation beneficial in extending low budgets to meet high traffic play and better turf standards.

### **SALINE-ALKALI SOIL PROBLEM**

At the Maverick Stadium (San Diego Class A) Field, we were aware that we had a saline-alkali soil with a very high pH of 8.2 to 8.5, and high salts, up to 2.25 ppm. Basically, we were watering an alkaline soil high in salts with alkaline water with a pH of 8.2 and high in salt. Every time the field was irrigated it caused an increased salt buildup on the soil surface and eventually in the rootzone. Our solution was to utilize deep irrigation with soil penetrant. This leaches the salt, keeping it moving in the direction of the water movement and away from the immediate rootzone. In solution to the basic problem of watering with high pH and high in salt, a combination of sulfuric acid-urea additive was injected into the irrigation water main. This was used to neutralize the high water pH and high carbonates, eventually adjusting the soil pH and eliminating the toxic sodium level and high salts in the soil. Water pH was adjusted to 6.5 to 6.7 range as it came out of the sprinkler heads. By lowering the water pH, the soil pH was eventually lowered and solubilized the nutrients bound at the higher pH range in the soil. Once solubilized, the nutrients were available for uptake by the root system. After 2 ½ months of repeated application through the adjusted irrigation water, the soil test showed the soil pH dropped from 8.2 – 8.5 to 7.3 within a period of seven weeks. The result was a rapid increase in the growth pattern and aesthetic appearance was noticeably improved with little to no labor involved through the chemigation system.

## **INJECTOR PUMP**

All types of injection systems require the installation of a backflow prevention device between the injector and the water source. Normally, the injector is mounted at a lower elevation than the backflow device and higher than the irrigation main.

All electrical driven piston injector (Inject-O-Meter Mfg. Co. and Opti-Gro, Athletic Fields Specialty Co.) were used in our chemigation program.

Some of the features of this metered proportional pump are: (1) positive displacement piston, (2) all non-corrosive 316 stainless steel wettable parts, (3) metering accuracy of  $\pm \frac{1}{2}$  of 1 % repeatability, (4) capacity from .06 GPH to 36 GPH (Model I-70 Duplex, Electric), and (5) heavy duty components designed to withstand outside conditions. Two important steps to follow before installation of the injector pump, (1) it is imperative to follow the proper city and state code requirements and (2) to install the correct backflow prevention assembly – a reduced pressure backflow prevention assembly (RPZ). The assembly has the ability to protect the portable water system from both forms of backflow contamination, back siphonage and back pressure. For more efficient chemical injection to water flow ratio, a flow rate sensor is installed. When flow rate changes during certain time of day or night using domestic water or when water source is changed from well or lake water to domestic water, the sensor detects it and automatically adjusts the amount of product injection according to the flow rate difference.

## **TOWN OF CLARKSTOWN, NY**

The Town of Clarkstown Parks Board and Recreation Commission, is situated in the south central border of New City, New York, a city of more than 90,000 inhabitants. In June, 1989, the city dedicated 6.5 acres of a sports complex called Germonds Park. This complex is composed of an official size baseball field, two skin softball fields, a soccer field overlapping the baseball outfield, an Olympic size pool, and nine acres of landscaping. Ball fields were constructed with complete subdrainage systems, using the PF-TURF (100% polyester fabric) System Design. “Since construction of these fields, close to 5000 games have been played within 4 years without rainout,” reports Bruce Knarick, Park Supervisor. Based on the successful playability of Germonds Park, construction of a new 20-acre sport complex called Zukor Park was completed with the PF-Turf System Design in the spring of 1993. The sports complex involved two little league fields, official size skin infield softball and grass fields, and an official size soccer field. In 1995, both Germonds Park and Zukor Park were recognized by the New York State Parks and Recreation Association as the best sports complexes in the State of New York. The key to successful construction of a sports field or complex is based on a proper design; complete specifications, a proficient project manager, and a sound follow up maintenance program. Both of these sports complexes are completely maintained by chemigation program.

## **BIOSTIMULANT & BIOFERTILIZER**

Recently, chemigation coupled with use of natural organic products, such as biostimulants and biofertilizers have been reported by golf course superintendents and turf managers to reduce pesticide use by as much as 50 percent and a better standard of turf grass quality. It is reported that nearly all pesticide degradation proceeds by the action of microbes, such as fungi, bacteria, and actinomycetes. Direct and indirect action by these organisms leads to the ultimate elimination of the pesticide from the turfgrass environment.

Golf course superintendents and turf managers using microorganism through irrigation systems for some of the reduced efficacy of turf grass pesticides have reported accelerated biodegradation.

Biostimulants contain a concentrated humic acid which improves soil conditions by improving the cation exchange capacity (CEC), increasing nutrient and moisture retention, reducing compaction, freeing dormant nutrients, increasing oxygen supply, stimulating the activities of microorganism, and improving the water movement in the soil. Humic acid also acts as a chelating agent to hold nutrients in the rootzone longer and its enzymatic reaction stimulates plant root growth. Hormonal supplements, benefits of seaweed extract in biostimulants, enable the turfgrass maximum growth potential as well as conditioning the turfgrass to handle environmental stress and increase tolerance against insect and disease damage. Possibly the most striking results from chemigation of biostimulants to sports fields has been the increased total root mass and depth of roots and improved color and aesthetic quality due to increased chlorophyll production and retention.

Biofertilizers also feature environmentally safe appeal through the chemigation program. In addition to nitrogen it also contains a group of beneficial microorganisms and enzyme complexes. The microorganisms include billions of aerobic and anaerobic bacteria and fungi which are able to produce growth promoting substances, produce enzymes to solubilize phosphorus, suppress pathogenic microorganisms such as *Rhizoctonia solani* fix nitrogen from the air, stimulate germination, and promote growth. As a consequence of the biological activities, soils treated become a better environment for turfgrass.