

The Benefits of Liquid Fertilization on Fairways — Sometimes Being Mixed Up Is A Good Thing

A premixing tank for liquid fertilization can improve application accuracy and help save money.

BY LARRY GILHULY



When fast applications of fertilizers are needed to stay ahead of play, the use of a single nozzle can work as long as wind is not an issue.

Name one of the biggest differences between putting green and fairway maintenance programs? Mowing height, topdressing frequency, vertical mowing, and rolling are all good answers. So are irrigation practices, earthworm control, and surface smoothness. However, one of the

biggest differences between putting green and fairway maintenance programs that might not at first come to mind is how these two surfaces are fertilized. As a general observation, putting green fertilization programs are dominated by light, frequent liquid applications, while fairway fertilization

programs are dominated by infrequent granular applications. There are many reasons for the differences observed in fertilization programs. Let's look at some ongoing fertilization practices that have provided good results in the Pacific Northwest and elsewhere for over a decade.



Overlake Golf and Country Club focuses on maintenance “down-the-middle” with the use of liquid applications assisted by a large premixing tank and proportioner.

HISTORICAL PERSPECTIVE

For decades the fertilizer industry has had two equally good choices for golf course fertilization — fast- and slow-release materials. There is no question that elemental and fast-release materials are generally less expensive, but they also must be applied at light rates and a greater frequency. Slow-release materials are more expensive, but their ability to last weeks, or even months, makes them very attractive from a labor standpoint. The purpose of this discussion is not to state which fertilizer is better, as both are very valuable and practical tools for golf course maintenance, but rather to discuss recent trends in fertilizer application methods.

Fertilizer programs began to change a few decades ago with the introduction of effective growth-regulation materials. Applying growth-regulation materials with light rates of fertilizer on greens has become a common practice, and it is generally easy to spray one or two tanks of this combination before interfering with play. But what about treating large-acre areas like fairways? Unfortunately, filling sprayers with

combinations of fertilizer and growth regulator can be time consuming. Therefore, due to the number of tanks required to spray large-acre areas, making combination applications of fertilizer and growth regulator on fairways may not be feasible. However, this all changed with the introduction of premixing tanks and a little jewel called a proportioner.

PREMIXING TANKS — WHERE THEY STARTED AND HOW THEY WORK

In 2005, USGA agronomists from the Southeast and Florida regions summarized the advantages of home-made premixing tanks in the article [Mixing It Up](#). During the past decade, a significant number of golf courses in the Pacific Northwest, ranging from high- to lower-budget facilities, have also benefited from adding premixing tanks to their operations. The following are some of advantages associated with using premixing tanks:

- The opportunity to use lower-cost, elemental forms of fertilizer.
- The opportunity to apply in front of players without interruption.

- Additional savings in labor and improved playing conditions if growth regulators are being used regularly.
- The ability to apply fertilizer to fairways only, which eliminates excess growth in nearby roughs.

In addition to these four fundamental ways to improve playability and reduce costs, the potential for impacting the environment is minimized when the use of granular fertilizer is reduced. Specifically, when only turf-covered fairways are sprayed, no fertilizer lands on hard surfaces — e.g., cart paths — that may connect to streams, lakes, or other bodies of water via drains or storm sewers, and the risk of fertilizers contaminating surface-water resources is reduced. Additionally, when compared to granular applications, accurate fertilizer sprays minimize the potential for direct application of fertilizer into a body of water. Another potential benefit of liquid fertilizer applications is the reduction of runoff that may occur following a heavy downpour if granular fertilizers have not completely dissolved. So let's take a closer look at some of the equipment, upfront costs, and a few case studies from facilities where this type of fertilization is commonly practiced. Our first stop is Oregon.

CASE STUDIES: EUGENE COUNTRY CLUB

Eugene Country Club annually falls within the ranks of the top 100 golf courses in the U.S. Massive Douglas fir and maples define 18 outstanding golf holes in the middle of the Willamette Valley in western Oregon. Superintendent Chris Gaughan is in charge of keeping this beauty in great playing condition. Over 10 years ago, Gaughan decided to revert back to the fundamentals of elemental fertilization. However, a problem developed. While spraying fertilizers worked fine for the greens and tees, Gaughan was unable to make the large applications necessary to treat fairways without being caught by players. Enter the premixing tank. Gaughan contacted a local company with experience in providing large, polyurethane tanks — usually 1,100 gallons — with hot-tub jet technology to keep fertilizers in suspension.

The company also introduced the use of a proportioner that allowed the elemental materials to be added outside of the tank. The proportioner meters the fertilizers entering the tank to provide up to seven 150-gallon tanks of premixed material that is ready to apply. Another great feature of this process is the speed at which the discharge line can fill a 150-gallon tank. Reports from Gaughan and others with similar systems suggest that this system is capable of filling smaller 150-gallon tank sprayers in just over one minute and the more commonly used 300-gallon tank sprayers in two to three minutes. As a result, one of the major stumbling blocks when considering liquid fairway fertilization — the time required to add material and fill the tank — has been eliminated.

Armed with his new way of applying fertilizers, Gaughan has now spent the last decade implementing a successful liquid fertilization program on his fairways. Gaughan estimates he now saves between \$8,000 and \$10,000 on fertilizer costs and reports that it takes him only three to four hours to fertilize 30 acres of fairway turf with a 150-gallon sprayer. Gaughan uses his premixing tank to make regular light applications of nitrogen — 0.10 to 0.15 pound per 1,000 square feet — and iron sulfate — 6 ounces per 1,000 square feet — to his fairways as a supplement to regularly scheduled granular applications in June and September. Let's now move up the valley to the edge of one of the great rivers in America.

HERON LAKES GOLF COMPLEX

It is incorrect to assume that the use of liquid fertilizers is only for courses with high budgets and large staffs. The Heron Lakes Golf Complex demonstrates that this is simply not the case. Heron Lakes is a 36-hole municipal golf course adjacent to the Columbia River in Portland, Ore. Along with Chris Gaughan, superintendent Jesse Goodling first tried liquid fertilization over a decade ago when he decided to change his fertilizer program and revert back to the use of elemental products. Following research con-

ducted by Dr. Roy Goss in the 1970s, Jesse turned to sulfate materials — primarily iron sulfate — for use on greens and fairways. However, with a public facility that receives far more play than a private or resort course, most of which occurs during the active growing season, the task of completing fertilizer applications with minimal golfer disruption became a major issue. Enter the cluster-nozzle applicator.

Cluster-nozzle applicators consist of a nozzle mounted relatively high in the air that provides a spray pattern approximately 25 feet wide. Calm conditions are required for the application of fluid fertilizers when using the cluster-nozzle technique. Goodling has been able to successfully control organic matter production without the use of growth regulators, reduce disease pressure, and combat weeds (he has successfully controlled clover with 8 ounces of iron sulfate per 1,000 square feet) with only minimal player disruption.

The use of iron sulfate at high rates requires a large volume of water — nearly 10 gallons of water per 1,000 square feet — to act as a carrier.

Goodling has found it is necessary to use seven tanks to fertilize just one of the two courses at Heron Lakes. The premixing station at Heron Lakes expedites the filling process and, when combined with cluster-nozzle applicators, allows Goodling to further reduce the time it takes to spray fairways. Of course, premixing tanks can be equally valuable components of green fertilization programs.

Like Gaughan, Goodling also reports a significant saving in overall costs, with the initial 1,100-gallon premixing tank and proportioner heading into its second decade of use. Both Eugene Country Club and Heron Lakes Golf Complex are located in western Oregon, where the mild climate, compared to the severe summer conditions experienced east of the Cascade Mountains, allows *Poa annua* to thrive. To gain a better perspective on how premixing tanks are used in areas that experience greater weather extremes, we now move to eastern Oregon.

SUNRIVER RESORT

The Sunriver Resort is a 36-hole golf facility located in one of the most



The combination of a large tank (up to 1,600 gallons) and a proportioner allows for rapid spray tank filling and the use of less-expensive macro- and micronutrients.



Focused applications only to fairways will greatly minimize issues with excess growth in roughs during the spring months in cool-season areas.

pristine areas in the country. The use of premixing tanks has been commonplace on the Meadows Course for nearly a decade and on the Woodlands Course for the past two years. Superintendent Ryan Wulff has less experience with this form of liquid application but no less enthusiasm for the process

than the previous two superintendents. Sunriver Resort has two 200-gallon sprayers that are used to complete spraying operations on both courses. Wulff applies the growth regulator Primo™ every three to four weeks, with light rates of urea and micronutrients added to each application. Liquid appli-

cations are made from June through September and supplemented with the application of a complete granular fertilizer in the spring and fall. As a result of incorporating a liquid-fertilization program with the use of premixing tanks, Wulff has observed the following benefits:

- Savings of approximately \$6,000 to \$7,000 annually on fertilizer costs.
- Eliminating the spring flush of growth on rough perimeters.
- Reduced golfer disruption and increased labor efficiency.
- Afternoon mixing the day before saves time in the morning.
- Reduces the chance of fertilizer being thrown into lakes, which is particularly important given the extensive water features found on the facility.

Wulff succinctly sums up his experience with premixing tanks and liquid application techniques — “It’s a no-brainer.” Now let’s move north into the eastern portion of Washington State.

MANITO GOLF AND COUNTRY CLUB

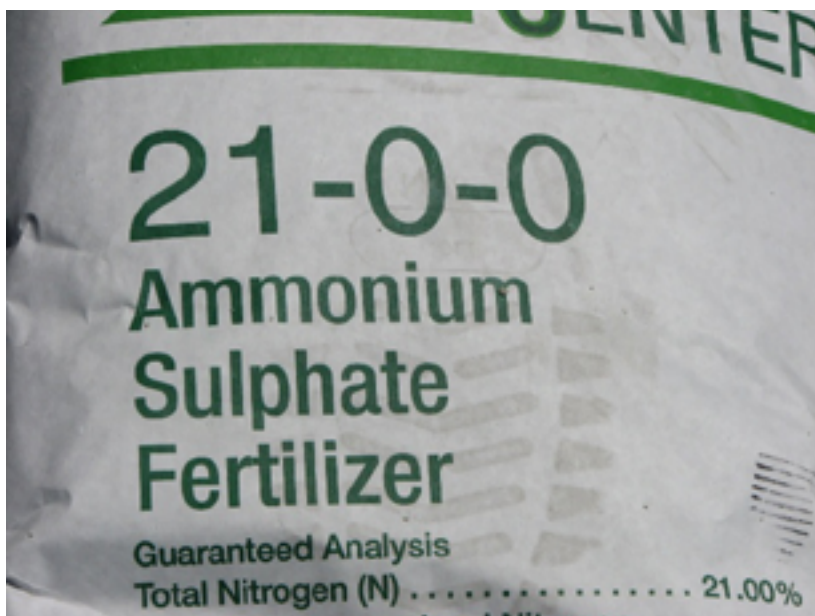
Manito Golf and Country Club is located in Spokane, Wash., where *Poa annua* thrives but can be known to struggle during the summer and winter months. Manito was having trouble staying ahead of play when applying any form of liquid to the fairways. In 2005 superintendent Tim Ansett was preparing for a major maintenance facility renovation. He decided to include a premixing tank and proportioner in the pesticide/fertilizer storage building. A containment system was designed to prevent any possible movement of products and minimize contamination issues. Ansett and assistant superintendent Shane Cox report outstanding results with no issues regarding player interruption. Fairway conditions have improved and the “flush” growth that was common when granular materials were used in the spring has been eliminated. Although the use of granular materials is still part of the program at Manito, the reduction in their use has significantly reduced

line-item costs in this area of the operation.

Let’s make one last stop in western Washington on our tour of the Pacific Northwest.

OVERLAKE GOLF AND COUNTRY CLUB

While Overlake Golf and Country Club is one of the higher-budget golf courses in the Pacific Northwest, its primary focus is on maintenance “down-the-middle.” In 2008, superintendent Scott Stambaugh was ready to install premixing tanks. Upon learning



Elemental fertilizers may require more frequent applications at light rates, but if growth regulation is being used regularly, they offer a less-expensive way to fertilize large acreages.

that several golf courses with 1,100-gallon premixing tanks wished they had slightly higher volume, Stambaugh decided to purchase a larger 1,500-gallon model. Current superintendent Cory Brown reports that the premixing tank and proportioner have been extremely beneficial at Overlake, where 300-gallon sprayers are used to apply Primo™ every two weeks throughout the growing season. Growth regulators, urea or ammonium sulfate, micronutrients, or wetting agents are often added to the spray application at very low rates. As can be noted in the photo of a fairway at Overlake, the use of fluid applications of fertilizer focuses improved turf

growth and playing conditions on the “down-the-middle” portion of the golf course. As at other courses, nitrogen fertilizer overlap into the roughs has been eliminated. Reduced rough growth has also reduced the need to mow and manage clippings, allowing these saved hours to be used elsewhere.

SUMMARY

The concept of applying fertilizers in liquid form, combined with the occasional use of granular materials, has produced significant benefits for golf

courses of every type and budget in the Pacific Northwest and other portions of the country. In addition to the economic benefits noted in the previous examples, the advantage of targeting fertilizer applications has reduced environmental risk while enhancing playing conditions and improving pace of play. This is especially true during the spring months when granular applications can cause major issues with excess growth along the edges of fairways. As the previous examples illustrate, the use of low-cost soluble

fertilizers premixed in a large storage tank has resulted in improved fairway conditions at a lower cost. Those that have incorporated liquid fertilization as part of their operation will confirm that they are not mixed up at all when it comes to premixing tanks.

[LARRY GILHULY](#) has been the director of the West and Northwest Regions of the Green Section for the past 30 years. Although his regional boundaries have been mixed up over the years, this is one topic he feels is solid for every type and size of maintenance operation. For more information, he can be contacted at lgilhuly@usga.org.