

# Survey Says: Iron Is A Must For Southwest Superintendents

By *Connie Falk, Richard Ng, and John G. Mexal*

Usually Southwest soils are calcareous (contain high levels of calcium) and have pH values ranging from 7 to 9. They are typically deficient in iron (Fe), manganese, zinc, and copper. Iron-deficient leaves become chlorotic due to reduced chlorophyll production and leaves are nearly white in advanced stages of Fe deficiency. The most common means of correcting deficiencies is Fe applications (Waddington et al., 1992).

Despite the importance of using Fe to avoid chlorotic turfgrass, managers often use nitrogen (N) to ensure green turfgrass. Excessive application of N, however, increases mowing costs and susceptibility to environmental stresses and diseases — and may adversely affect rooting (Turgeon, 1991).

Yust et al. (1984) found that during cool, wet periods following application, turfgrass color was enhanced through Fe applications without N, but only lasting two to three weeks. Application following cool dry periods resulted in color enhancement that lasted several months. Iron chelate, compared to ferrous sulfate (FeSO<sub>4</sub>), produced the best overall results. Combining Fe

with N can result in acceptable turfgrass color with lower rates of N.

Since relatively small actual quantities of micronutrients are needed by turfgrass plants, toxicities may result from over application of Fe or complex interactions with other essential elements (Waddington et al., 1992). Small quantities of fertilizers can be sprayed as chelates or sulfate on the leaves of the turfgrass to combat micronutrient deficiencies, ensuring quick absorption (Snyder and Schmidt, 1974). Chelates are expensive, so they are more often used as foliar sprays, which allows low application rates. Furthermore, foliar sprays are often better in the Southwest because plants there have difficulty absorbing micronutrients from the high pH soil.

## The study

Large-scale copper mining was conducted on the Tohono O'odham Nation (TO) reservation, the largest in Arizona, in the 1970s. One result from the mining was a 100-acre settling lagoon containing a tailings stockpile of over 5 million tons of material whose arsenic (3 mg/kg) and lead (126 mg/kg) content is below the EPA limit for loading to agricultural soil, which is 41 mg arsenic/kg and 300 mg lead/kg. While these tail-

**TABLE 1**

### Characteristics of Superintendents and Golf Courses Surveyed

State	No.	SUPERINTENDENT				GOLF COURSE								
		Yrs as Super. in this course		Yrs as Super.		Age of golf course in years			Number of Acres			Soil pH		
		MEAN	SD*	MEAN	SD*	MEAN	MIN	MAX	MEAN	MIN	MAX	MEAN	MIN	MAX
AZ	56	2.75	7.06	10	11.45	16.5	.5	73	100	42	485	7.8	6.5	8.8
CA	7	3	1.63	6	4.65	20	5	42	165	85	240	7.5	7	8.1
CO	66	5.25	7.87	11	9.14	16.5	.6	92	110	8	400	7.45	5.5	8.2
NM	8	6	6.77	13.5	15.61	40	6	50	100	75	260	7.98	7.4	8.25
NV	14	2	5.15	9	8.85	11.5	2	43	132	70	300	7.8	5.8	8.4
UT	15	8	7.51	15	9.58	31	2	90	120	72.5	220	7.8	6.8	9
<b>Total</b>	<b>166</b>													

\*SD= Standard Deviation

ings contain no hazardous materials, they do have high amounts of iron (8 percent), and small amounts of other nutrients (2 percent sulfur, 4 percent magnesium, and 2 percent potassium and .8 percent copper) (Mexal et al., 2000). In addition, since cadmium, chromium and mercury are not present in the TO tailings, they would be suitable for land application if a beneficial use was found (Mexal et al., 2000).

In the event that the tailings are effective as a

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fertilizer, it would help clean up the landscape in the reservation area. In addition, the project could generate jobs and income for the tribe.

A niche for the TO tailings was thought to exist within the golf course market for several reasons. A local Helena Chemical Co. representative indicated that Ionate Co. products had been recently removed from the market (Blaeser, 2001). Ionate was an iron product derived from mining slag that had been treated with an acid to extract the iron. The acidification process also made the iron more available to plants because Ionate acidified the soil. However, the source material was high in lead and arsenic, and these heavy metal components were partially responsible for the dissolution of the company, which had operated in El Paso, Texas, since the 1950s (Blaeser, 2001).

Another reason the golf course market was targeted was because consumer branding, merchandising and advertising requirements were perceived as less challenging in the golf course market than in the home lawn care market.

The objective of this study was to assess the market potential of a new iron supplement fertilizer for use at golf courses in the Southwest. Superintendent use of and preferences for fertilizers, particularly Fe, in Southwestern golf courses were investigated through a mail survey to superintendents in Arizona, California, Colorado, New Mexico, Nevada and Utah during the summer to early fall of 2001.

The United States has an estimated 16,365 golf courses and 26.4 million golfers (GCSAA, 2000). At the time of the survey, there were

**TABLE 2**

**Most commonly used brands by state**

Brands	Total	AZ	CA	CO	NM	NV	UT	# of respondents who use this product	
								G	FRT
Ferromec® AC Liquid Iron	70	26	2	23	3	7	9		
Milorganite	64	19	2	27	3	4	9		
Fe 8%® iron chelate	56	19	1	30	2	3	1		
Roots® 1-2-3	52	12	1	31	3	4	1		
Ironite™	43	24	1	4	5	2	7		
ironROOTS 2™ concentrate	30	6	0	20	2	2	0		
Sulfate	20	11	0	5	2	0	2		
Agriplex 2™ micro-mix	19	4	1	10	1	3	0		
Ruffin liquid	10	1	0	9	0	0	0		

**TABLE 3**

**Price sensitivity for Greens (G) and Fairways, Roughs, & Tees (FRT)**

State	Very Price Sensitive		Moderately Price Sensitive		Somewhat Price Sensitive		Not Sensitive		No Answer	
	G	FRT	G	FRT	G	FRT	G	FRT	G	FRT
	# of respondents concerned about price									
AZ	9	21	19	15	15	13	7	0	7	6
CA	3	5	3	0	1	0	0	0	0	1
CO	3	15	12	24	26	14	17	4	8	9
NM	2	5	1	0	3	3	2	0	0	0
NV	2	3	5	10	4	0	2	0	0	0
UT	3	5	4	9	5	1	3	0	0	0
Mean	3.67	9	7.33	9.67	9	5.17	5.17	0.67	2.5	2.67

1,974 golf courses in the six-state Southwestern region: 336 in Arizona, 1,058 in southern California, 246 in Colorado, 100 in New Mexico, 116 in Nevada and 118 in Utah (*golfcourse.com*). Although there were 1,058 courses in Southern California, only 88 golf courses from one association in Southern California were surveyed. Generally, these states and regions were selected because they have soil conditions that most likely require Fe applications.

**The results**

From 876 surveys mailed, 166 were returned, an average 19 percent return rate across the six states. Colorado's return rate was highest at 28.5 percent, and California and New Mexico had the lowest return rates of 8 percent each.

Superintendents tend to stay at the same golf

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course for more than two years and some have had more than six years experience (Table 1). Most of the golf courses have been operating for more than 10 years but a few of them were less than six months old at the time of survey. Most golf courses ranged from 100 acres to 130 acres for all states except for California, which had a mean size of 165 acres. The soil pH reported was similar in all states, averaging 7.5.

Almost all the superintendents in the six states indicated they apply fertilizer containing Fe to their golf courses. Only 11 of the 166 respondents indicated they do not include Fe in their fertilizer.

Because green grass is vital to golf course appearance, it is no surprise most superintendents (107 of 166) rated it as very important. Only four rated golf course appearance as "not important."

Suppliers that superintendents use were investigated to identify the manufacturers, brands and distributors in highest demand. United Horticulture Supply (UHS) was the distributor cited most often by respondents, followed by Golf Enviro Systems, Simplot Partners, Wilbur Ellis Co., Helena Chemical, American Pride Co-Op, LESCO and The Scotts Co. and The Andersons. Simplot, Wilbur Ellis, Helena, LESCO and Scotts and The Anderson all engage in custom blending of products.

The question of whether organic matter could be added to the TO materials arose after an interview with a local superintendent, who indicated he preferred iron supplements that contained other nutrients. Regarding interest in using fertilizer that not only contains Fe, but also organic matter, 122 of 166 superintendents were either interested or very interested.

The top nine brands of most commonly used fertilizer products in the six states were identi-

fied. The top two popular iron source products were Ferromec AC Liquid Iron and Milorganite. Use of these two products ranged from 29

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percent (New Mexico) to 65 percent (Utah) of the respondents (Table 2).

The superintendents were asked to rank the criteria for selecting fertilizers for greens, fairways, roughs and tees. In both cases, effectiveness was ranked the most important, followed by ingredients, solubility, price and availability. Size of package and advertising were ranked least important. When asked to rank reasons for switching brands, effectiveness was again ranked highest. Company recommendation and size of package were less important.

Most superintendents had low ratings for price sensitivity for greens (Table 3). But for fairways, rough, and tees, most superintendents were price sensitive to moderately price sensitive.

Most superintendents indicated they might try a new product once or twice a year. The local university superintendent said he does not try a product unless the product has been tested by an independent source and reported in a scientific journal (Erhard).

*Falk is a professor of agricultural economics and agricultural business at New Mexico State University. Ng completed his MS in agricultural economics at New Mexico State University. Mexal is a professor of horticulture at New Mexico State University.*



### QUICK TIP

The professional seed division of The Scotts Co. announces the launch of its new Web site:

[www.scottsproturfseed.com](http://www.scottsproturfseed.com). Turf managers, sod producers, landscape, sports field and golf course architects and builders, and other turf professionals will now have easy access to printable specification sheets on more than 55 turf seed varieties and 20 blends and mixes. In addition, the site provides information on new developments at Scotts, such as the new Thermal Blue, the first selection in the Hybrid Bluegrass Series.

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