TIGERTECH
QUARTERLY NEWSLETTER
THE TIGER ADVANTAGE

INNOVATE, EXCEL, PERFORM | DECEMBER 2011

Welcome
Quarterly Tech Update

Welcome. Tiger-Sul's internal team of experts and specialists in the fields of chemistry, agronomy and biology continually focus on developing and producing outstanding, cost effective new and improved fertilizers using the latest technological advances available to them.

Through ongoing research, we continually invest in your future and ours. We believe that this investment will take you to the next level of performance and improved, cost effective agricultural results.

Our team of experts includes: Don Cherry, BS in Agronomy, Drew Taylor BS in Agriculture, and our newest member Wes Haun.

About the Editor
Wes Haun: Agronomist

Wesley Haun is a Tiger-Sul Research Agronomist conducting research on sulphur bentonite applications and presenting the research domestically and internationally.

Haun was formerly with Ohio State University Extension where he was an Extension Educator and oversaw applied research and educational programs in crop production, farm management and applicator training. In this role he planned, organized and conducted on-farm research projects associated with crop production. He also served as a source of agronomic and horticultural information for the State of Ohio.

He received a Bachelor of Science in Agriculture from the University of Tennessee as well as a Master of Science concentrating in Plant and Soil Science.

INSIDE

THE TIGER® TECH QUARTERLY NEWSLETTER

CONTACT INFORMATION

Corporate Headquarters
4 Armstrong Road, Suite 220
Shelton, CT 06484
203-635-0190 (phone)
203-227-8351(fax)

TIGER-SUL Products (Canada) Co. P.O. Box 126
275137 Range Road 263
Irricana, AB TOM 1BO, Canada 877-299-3399
403-935-4197 (direct)

TIGER-SUL Products LLC.
25 Byrne Drive
Atmore, AL 36502, USA
800-239-3647
251-202-3850 (direct)
251-368-4964 (fax)
Mailing Address:
P.O. Box 5; Atmore, AL 36504, USA

info@tigersul.com
www.tigersul.com

Plant Tissue Analyses Improve Knowledge Base of Plant Nutrient Status

Plant nutrients have a major impact on crop productivity

The level of plant available nutrients can be managed to optimize plant growth. When plant growth appears normal, we oftentimes assume all is well within the plant, until some abnormal visual symptoms appear.

At that point nutrient deficiency has adversely affected yield potential. A process is available to monitor a plant's nourishment during the growing season. Plant tissue analysis provides nutrient values of the plant at time the tissue samples were collected. This analysis can reveal any unseen deficiencies (hidden hunger), and/or confirm deficiency symptoms. Producers growing tree crops may be capable of utilizing the tissue analysis to develop nutrient management plan without using a soil test. Otherwise, it is suggested that soil samples be collected at same time as plant tissue samples for diagnostic and nutrient management purposes. This can be especially important for assessing plant available sulphur due to difficulty of a soil test revealing consistent SO_4^{-2} availability.

In the last 3-4 years there has been a significant increase in producers submitting plant tissue samples for laboratory analyses. Unfortunately, a significant amount of these analyses revealed some rather low values for several of the essential nutrients. Sulphur was among those with some low values.

A & L Great Lakes Laboratory in Fort Wayne Indiana reported in the 2009 growing season that 46% of corn leaf samples were below optimum levels for sulphur. Spectrum Analytic Labs in Washington Court House, Ohio reported in 2010 that sulphur content in plant tissue samples was below optimum in several crops; corn- 26%, soybeans-8%, wheat -12%, alfalfa-20%, and grapes- 29%. Granted, there is a possibility that a greater percentage of these samples were from fields that exhibited some deficiency symptoms and possibly influenced the results. It is obvious that plant tissue sampling needs to be part of a planned nutrient management program. Contact an agronomist or your Tiger-Sul Account Manager for further information how to collect plant tissue samples.

Difference in Tiger 90CR® Sulphur and Ammonium Sulfate

Enhance Nutrient Management Decisions

Tiger 90CR® (T90CR) sulphur and Ammonium Sulfate provide essential plant nutrients but the pathway that leads to plant availability is different. A greater understanding of both pathways of nutrient release will enhance nutrient management decisions.

When Ammonium Sulfate is applied and dissolves in soil moisture results in the ammonium and sulfate components becoming immediately available for plant uptake. No microbial interaction is required for this breakdown to occur. The sulfate ion is negatively charged and is subject to leaching if not absorbed by plant roots earlier in growing season.

Tiger 90CR® sulphur contains 90% elemental sulphur and 10% bentonite clay. The sulfur particles must be attacked by soil microorganisms to breakdown (oxidize) into sulfate (SO_4^{-2}) which can be taken up by plants. The clay added to the T90CR creates small particles due to its swelling capabilities when exposed to soil moisture that fractures the T90CR granule into very small particles. Sulphur oxidation reaction does require *(continued)*

(continued) time and is influenced by several factors including soil temperature, soil moisture, soil type, soil pH, population of microorganisms, and sulphur particle size. Research reports from Rothamsted Experiment Station indicated that sulphur mixed with triple-superphosphate and diammonium phosphate oxidized faster than sulphur alone. Researchers at the University of Minnesota reported that more rapid oxidation occurred when sulphur was mixed with nitrogen-phosphorus fertilizers than when mixed with triple-superphosphate. Some possibilities for these interactions could be enhanced nutrient supply, more favorable moisture conditions immediately around the fertilizer granule, or somewhat lower pH occurring from the dissolution of fertilizer materials.

Sulphur oxidation rates increase as sulphur particle size decreases. The particle size influence of soil applied sulphur conversion to SO_4^{-2} is shown in Table 2-0.

Oxidation rate is slow when particle size is larger than those passing a 60 mesh screen. Agricultural use elemental sulphur should pass a 16 mesh screen and 50% of that material should pass a 100 mesh screen. The smaller the particle size the greater the surface area which will result in more area for microbial activity and faster sulphate formation. There is an inverse relationship between surface area and sulphur particle size which translates into an oxidation rate that increases exponentially as particle diameter decreases. In Table 2-0 sulphur particles of 100 mesh resulted in 29-45% oxidized within 30 days and over 50% oxidized after 60 days. When application rates increase the sulphur surface area increases which provides greater contact potential for the sulphur oxidizing microorganisms and result in greater percent of plant available SO_4^{-2} transformed. Soils with low buffering capacity may experience the reverse and actually have less sulphur oxidized with increased application rates.

Soil applied T90CR granules will fracture some particles into the 100 mesh size to enhance sulphur oxidation when the clay absorbs sufficient moisture to expand. When managed as part of a planned nutrient management program T90CR is an excellent and economical source of plant available sulphur.

Particle Size of Sulphur (mesh/inch)	Incubation Time (days): 10		30		60		90		180	
Application Rate (ppm)	10	50	10	50	10	50	10	50	10	50
	Percent Sulphur Oxidized									
10 - 20	1	0.4	1	0.6	0	0.8	--	--	--	--
30 - 50	2	1.2	2	2.8	5	3.2	--	--	--	--
60 - 80	3	2.2	5	4.2	10	12.6	9	11.4	20	25.6
< 100	15	13.4	29	45.4	58	56.2	43	--	53	--

Source: Li and Caldwell, Soil Sci. Soc. Am. J., 30:370 (1966).

Table 2-0: Effect of Granule Size on the Rate of Oxidation of Elemental Sulfur Added to a Dorset Sandy Loam and Incubated at 30°C for Increasing Periods of Time ppm x 2 = lbs/ac