

# University of Idaho Cautions About Chelation

Glyphosate-nutrient Combination Helps Grower Pile Up More Yield by Ron Butler

GROWER MARK SPENCER OF SCOTTSBLUFF, Neb., says he had already found the detour around glyphosate-locked nutrients by the time the University of Idaho Extension freshened up its Southern Idaho Fertilizer Guide for Sugar Beets last winter and added a glyphosate caution.

"I've been using a different approach to nutrition, with a unique foliar-applied zinc and manganese in a tank-mix with glyphosate. Last year we had about four tons more beets per acre plus great weed control," says Spencer. "The usual antagonism between the glyphosate and the nutrients did not seem to occur."

Spencer worked with his crop adviser, Rob Ford, field development agronomist with Simplot Grower Solutions, on the use of a new zinc/manganese nutrient formulation called Sysstem-Ready. Unlike other common micronutrient forms, such as EDTA, amino acid, sugar complexes or other formulations, Sysstem-Ready is

formulated with a phosphite ion that has high systemic properties. Sysstem-Ready also has been designed to prevent nutrients from becoming the target of glyphosate chelation, a common problem with many nutrient formulations.

"With this approach, the plant is not dependent entirely upon soil nutrients during those early days of intensive cellular development," Ford explains. "The plant can absorb the zinc and manganese through tissue and move them wherever they are needed for critical growth stages."

Since that timing coincides with an early application of glyphosate, Spencer was able to enhance his crop's nutrition while protecting it from weeds and avoiding the cost and compaction of an additional trip across the field.

"Glyphosate tolerant sugarbeets have been a huge step forward in production, and now we have a complementary nutrition program to make it work all the better," says Spencer. "A

more vigorous crop with more yield and without hand weeding cost is just what we needed."

Sysstem-Ready was developed by Agro-K Corporation in Minneapolis as part of a Sysstem Series that includes other compatible nutrients such as calcium, magnesium and potassium. It's the zinc and manganese that sugarbeets need most and earliest. Ford says multiple applications help keep up the nutrient sufficiency all season long.

## MIDWEST LESSONS

Much of that Midwest research the University of Idaho cited was conducted by an Idaho native, Dr. Don Huber, plant pathologist and professor emeritus in the Botany & Plant Pathology Department of Purdue University. Dr. Huber is one of several experts in plant physiology and metabolism who have studied how nutrients enter, translocate and act upon the plant, how they interact with one another, and how they



Mark Spencer, a sugarbeet grower from Scottsbluff, Neb. Spring couldn't come soon enough for Spencer and other farmers around Scottsbluff, or for that matter wherever sugarbeets are produced, after a tough winter.



impact the surrounding soil rhizosphere. Much of his research has focused on how glyphosate can monkey wrench several of those processes.

"Glyphosate interferes with the plant's ability to pick up zinc or manganese from the soils," says Dr. Huber. "That's unfortunate because early nutrient uptake is critically important for sugarbeet root growth, but also for resistance to soil-borne diseases like Fusarium and Rhizoctonia. Any lag in the period when the crop needs manganese and you have increased disease susceptibility and reduced yield potential."

He notes that plant tolerance to stress and many pathogens is dependent on a full sufficiency of micronutrients to maintain important physiological processes. It's this balance Spencer says he set out to accomplish when he started using the new foliar manganese and zinc.

Spencer has about 600 acres of his own ground plus additional acreage he custom-farms for others. He always has at least 100 acres of sugarbeets, and often more than that depending on the rotations. In 2008, he split a field with the Sysstem-Ready and liked the result. Last year he used it on all his beets, plus his corn and dry beans.

"It's not just the increases in the tons and the sugar," says Spencer. "The beets didn't seem as stressed. They matured faster, stayed greener and looked more vigorous. We sprayed Sysstem-Ready after a hail storm, and it seemed like they came back quicker. In some fields, you can't really see that there will be more yield, but if you pull a few feet of row and weigh them, you'll see the difference."

#### LIMITED SOILS

The Spencer fields are west of Scottsbluff and toward Torrington, Wyo. Ian Crawford, another

Simplot field development agronomist, notes that he has seen similar results among the growers he works with in Idaho.

"They are using Sysstem-Ready in both Roundup Ready and conventional crops in addition to their sugarbeets," says Crawford. "The vitality and the yield increases are getting a lot of attention. But there is another important aspect of nutrient management in our region of the country.

"Our high pH soils in the western U.S. have us at somewhat of a disadvantage from the beginning because they're already limited in zinc



Dr. Huber is a retired plant pathologist and professor emeritus in the Botany & Plant Pathology Department of Purdue University.

and manganese," says Crawford. "This nutrient system makes good agronomic sense based on those reasons, too, not just because we're using glyphosate. It's particularly important if we have cool, wet conditions like we've had the past couple of years. We need a fertility program that helps overcome these limiting factors."

He notes that in the rush to adopt glyphosate-tolerant sugarbeets, now at 95 percent of total acreage, producers may be overlooking the important aspects of nutrition related to the herbicide's impact on plant disease defense systems.

"The work that Dr. Huber and others have done is very important," Crawford adds. "Many

pathologists rarely research or talk about plant nutrition and the impact of disease when nutrients are deficient. It's an area we need to look at more closely. Nutrition isn't just about NPK. It's about understanding roles and interactions of all nutrients in relation to diseases."

#### NUTRIENTS & DISEASE

In his recent paper "Ag Chemical and Crop Nutrient Interactions – Current Update" presented at this year's Fluid Fertilizer Foundation Forum, Dr. Huber notes that glyphosate "inhibits plant enzymes responsible for disease resistance so that plants succumb from pathogenic attack. This also predisposes Roundup Ready and non-RR plants to other pathogens." He says that by inhibiting enzymes in the plant pathways, the glyphosate makes the plant "highly susceptible to various ubiquitous soilborne pathogens" such as Fusarium, Pythium, Phytophthora and Rhizoctonia.

He notes that glyphosate also is a potent microbiocide and is toxic to important beneficial soil organisms that facilitate the availability of soil minerals crops need. "It is not uncommon to see Cu, Fe, Mg, Mn, Ni and Zn deficiencies intensify and show in soils that were once considered fully sufficient for these nutrients," he continues. "Increasing the supply and availability of [those nutrients] have reduced some of the deleterious effects of glyphosate on these organisms and increased crop yields."

Dr. Huber notes that one of the positive steps growers can take is to provide adequate nutrient availability for full functional sufficiency, which is what Spencer has done. Dr. Huber says that residual glyphosate in RR plant tissues can immobilize most traditional sources of foliar-applied micronutrients for 8-15 days, an obstacle that has left many sugar beet crops

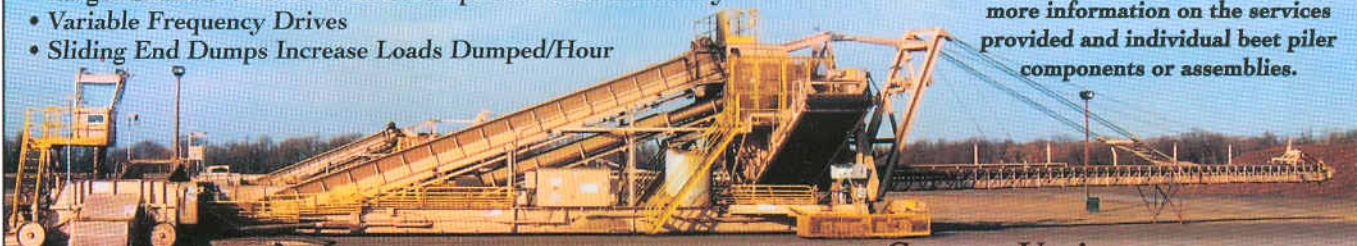
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## CAUTIONS ABOUT CHELATION

nutrient deficient.

"The expense of an additional trip across the field for foliar application frequently deters micronutrient fertilization for optimum crop yield and quality," Dr. Huber notes. "There are newly available micronutrient formulations (nutrient phosphites) that maintain plant availability without impacting herbicidal activity of the glyphosate in a tank-mix, and plants have responded well from these micronutrient-glyphosate mixes. Simultaneous application of some micronutrients with glyphosate might provide an efficient means to overcome deficiencies in lower fertility soils, as well as mitigate the reduced physiological efficiency inherent with the glyphosate-tolerant gene and glyphosate immobilization of essential nutrients in the plant."

Dr. Huber says foliar manganese may be more effective when applied in combination with the more mobile zinc, even when zinc levels may appear sufficient. The zinc will help detoxify sequestered glyphosate in some tissues.

### PROFIT VS. MUSH

Until this year the winters have been warmer than usual overall, and that pattern could return once El Nino settles down. During the 2008-09

winter some locations saw piles of sugarbeets reduced to mush as *Rhizoctonia* harbored in some beets ran rampant. Making sure the beets are nutritionally sound and better able to resist the disease is a key to preserving their integrity over the winter.

Ford says one way to maintain sufficiency is with two applications of the phosphite-active System-Ready zinc and manganese. The first is ideally when the plants are about four or five inches tall and it's time for glyphosate. The second dose of nutrients can go with a later glyphosate application, when it's time for the usual potash application. Some producers "top off" the zinc and manganese even later and add boron.

"With or without glyphosate, the point is to maintain that nutrient sufficiency so the plant's defense and development systems are fully contributing to the vitality and yield of the crop," Ford adds. ■

*Editor's note: Butler writes about agricultural technology for Creative Communications Network in Liberty, Mo. Email ron@ccnmarketing.com. Visit [www.agro-k.com](http://www.agro-k.com) or call 800-328-2418.*

## GLYPHOSATE RESISTANT VARIETIES

The recent introduction of glyphosate-resistant sugar beets in 2008 has raised concerns from growers on the possible affects that this may have on nutrient uptake. Manganese, zinc and iron deficiencies in glyphosate resistant soybeans and corn have been documented in the Midwestern states.

Suspected causes of the deficiencies include the binding of soil micronutrients to glyphosate and gene-alterations that reduce manganese uptake by roots.

While micronutrient deficiencies in glyphosate-resistant sugarbeet cropping systems have not been identified or thoroughly researched at this time, growers should still be aware of this phenomenon.

*"Southern Idaho Fertilizer Guide for Sugar Beets"*

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