Technical Bulletin

RUFFIN-TUFF® Zinc 10% Zinc Efficiencies

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Goal

Many people talk about building soil test levels for zinc. Our goal with Ruffin-Tuff Zinc 10% is to supply the crop with the level of zinc that is required during the growing season. That is why we do not recommend using Ruffin-Tuff Zinc 10%, at 10 pounds of actual zinc, to build soil test levels. The key is how much zinc is absorbed into the plant, not how much zinc you apply to your field.

Soil Testing Analysis

The main misconception about zinc soil testing analysis is the form of zinc extracted by a soil analysis. Many people think that a soil test report with 1 ppm of zinc means that all of the 1 ppm is available to the plant.

The most common lab extraction method used is DTPA. DTPA extractions include all of the water soluble zinc in the soil, but also extract a majority of the insoluble zinc or the zinc that is "tied-up in the soil". Although this is not a complete extraction of all zinc in the soil, it represents the total level of zinc, not just the available level of zinc. Therefore, soil test levels will not be lowered by soil tie-up.

Crop Removal

Many times, zinc application recommendations call for 10 pounds per acre. Why apply 10 pounds if the crop only removes 0.5 lb of zinc? This is due to the fact that zinc can be tied up in the soil very easily by many factors including free calcium level, high phosphorus level and

organic matter. Below is an example of crop removals by a corn crop.

	Yield (bu/a)		
	150	**200**	**250**
Grain	.15	.20	.25
Stover	.27	.37	.45
Total	.42	.57	.70

Zinc Efficiencies

Recommended rates of Ruffin-Tuff Zinc 10% are based upon the *proven* concept of metals being more efficient when chelated or complexed. That is, the application of Ruffin-Tuff Zinc 10%, a complexed product, results in the same amount of micronutrient metal in the plant as an inorganic source of the same nutrient when applied at a ratio of 7:1. This efficiency could vary depending on soil conditions and type.

A complex is usually defined as an organo-metal complex where the micronutrient is either held by covalent or ionic bonding where the strength of these bonds is enough to prevent immediate reaction of the metal with outside sources that tend to "de-activate" or "tie-up" the

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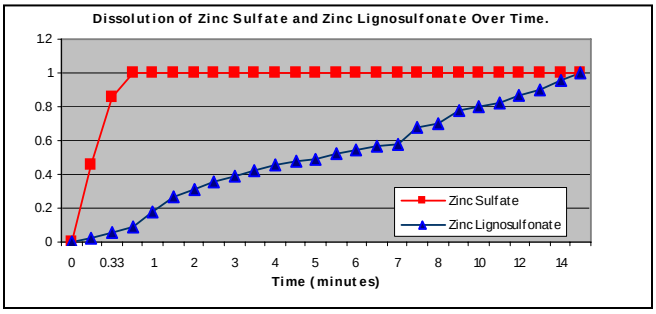
metal through the formation of insoluble compounds.

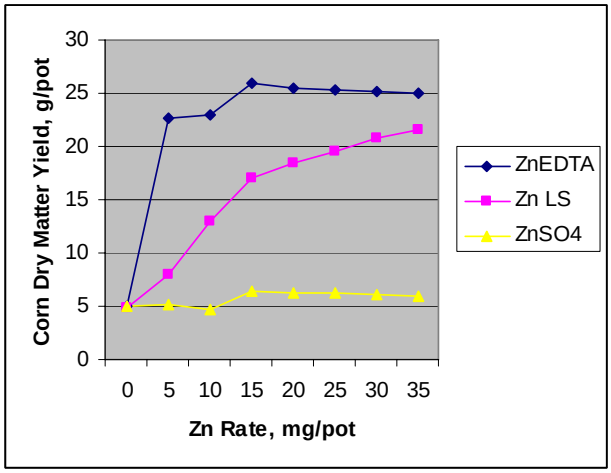
Normal zinc sulfates may be "de-activated" rather quickly since they are not being "protected" in the soil. An insoluble compound will not release the metal into the soil solution where plant uptake primarily occurs.



The amount of zinc applied was equal. Materials were applied to a slowly agitated solution (60 rpm) of de-ionized water. Dissolution was measured using electrical conductivity measurements of the solution.

Many competitors say that there is no difference between zinc sources. However, many times, these same companies sell liquid products as well and also make rate recommendations off of efficiency claims. For example:

	Soil Sample Rec.	Use Rate (qt/a)	Actual 'Zn' Applied	Efficiency Ratio
20% Zn Complex	10 lb	1-4	2.22 lb (4 qt)	5:1
10% Zn Chelate	10 lb	1-4	.96 lb (4 qt)	10:1



Source: Goos, NDSU 1999

This bulletin provides some technical information and is not intended to give complete information for all applications. Always read and follow label directions.