volume 1 issue 2

LIQUID VISIONS

an eNewsletter from Tessenderlo Kerley, Inc.

Include Sulfur in Your Starter Fertilizer Program

By Tom Fairweather
Director of Agronomy Services

The 2009 corn planting season is just starting and already some companies are muddying the waters by sending out misleading information. Take for instance a flyer published by a company in the Midwest claiming polyphosphates and thiosulfates should not be used in starter fertilizers. They begin by comparing the characteristics of their product vs. competitive products, some containing thiosulfates.

Thiosulfates

They state, "As a general rule, fertilizers containing thiosulfates should not be placed in contact with the seed." They fail to say is that ammonium thiosulfate (ATS) is not recommended to be placed with the seed. ATS can release some ammonia which is toxic to a germinating seed, but it is perfectly OK to place it a couple of inches away from the row either in a 2 X 2 or 2 X 0 position. This has been a popular practice for years. Tessenderlo Kerley's potassium thiosulfate (trade name KTS^{R}) can be applied with the seed and is recommended by the company at rates of 2 to 4 qts per acre in a pop-up or in-furrow application.

Fertilizers are salts, and they can cause seedling injury when applied at rates greater than 5-8 lbs/acre N + K. For sandy soils or when conditions are dry, the lower end of this range should be used when placing on the seed.

Pop-up starters are designed to supply a small amount of nutrients to the struggling seedling for the first 2 to 3 weeks after germination when root development is minimal. This practice has been shown to be very beneficial, especially in minimum or no-till practices. In most cases, about one to two pounds of sulfur is all that is needed until the soil warms. If more is required, then it can be placed to the side of the seed row *on* or *below* the surface. Research has shown that surface application of starters to the side of the row is just as effective as a 2 X 2 placement and can be done without the extra cost and weight of application equipment.

Salt Index

Our friends claim that their products have low salt indexes, and fertilizers with salt indexes over 20 should not be used as pop-up fertilizer. The salt index concept has been misused ever since it was first proposed back in 1943. The method used was cumbersome, time consuming and not very popular. So a simplified procedure was developed in the 1950's and is used by many agricultural labs today.

Neither method takes into account toxic ion effect or the rate of application, which is very important, when a fertilizer is to be placed on the seed. For example, anhydrous ammonia has a salt index of 47

continued on page 2

(old method), considered low compared to some other fertilizers, but we know that placing only a small amount of ammonia near the seed can cause considerable damage. The old method normally gives lower salt index numbers than the new method. This discrepancy can be misleading and was recently pointed out in a paper by Murray and Clapp[1]. However, this has not stopped some companies from taking advantage of this situation and using numbers from the older method when it benefits them most. Many of the fertilizers used today, like UAN, 10-34-0, ATS, KTS^{R}, and magnesium thiosulfate (MagThio^{R}) were not available for evaluation in the 1940's, so the salt index numbers for these fertilizers are based on the newer method. For instance, our friends claim their 9-18-9 product has a calculated salt index of 16.7. We recently had it tested using the newer method by a well respected agricultural lab in the Midwest. The salt index was more than double what they reported – instead of 16.7, it was actually 40. In the table below, work by Gelderman at South Dakota State University shows the effect of three fertilizers on seed germination at different rates.

Table 1. Influence of seed placed liquid fertilizer on soybean stands. Gelderman, et al, 1995.

Rate of P2O5 applied to 30" rows	Liquid Fertilizer Grade		
	10-34-0	7-21-7	9-18-9
Lbs/A	% Stand		
0	100	100	100
12.5	92	94	34
25	80	59	9
50	47	26	2

Orthophosphate vs. Polyphosphate

This argument has been brought up before and is perpetuated by those promoting orthophosphate products saying that it is immediately available while hydrolysis of polyphosphate (APP or 10-34-0) is too slow and not available to the seedling. APP contains at least 30% orthophosphate, so a good portion of it is immediately available. They also fail to mention the hydrolysis of polyphosphate to orthophosphate happens in a short period of time, most of it will be converted to orthophosphate by emergence.

Hydrolysis of Polyphosphate to Orthophosphate, Chang and Racz, 1977

Soil Temperature	24 hour Polyphosphate Hydrolysis (%)
41 F	30-40 %
68 F	50-60 %
95 F	80-90 %

Sulfur

Sulfur deficiency is becoming more widespread across the country. Areas like southern Illinois where atmospheric deposition of sulfur has, in the past, supplied adequate amounts, are now beginning to see yield responses to applied sulfur. This, along with minimum tillage programs where the breakdown of crop residue has been substantially reduced makes sulfur an important consideration for any starter program. A broadcast application of fertilizer on fine textured soils may not meet early plant growth demand because of slow nutrient diffusion rate and a restricted root system. The whole purpose of starter fertilizer is to supply needed plant food at the right time, to the right location, with the right nutrients at the right rate of application. Including sulfur along with N, P and K makes for good fertilizer management. A starter fertilizer without sulfur is like a truck with three wheels. Yes, it's still a truck, but it won't take you where you want to go. So, don't be fooled by deceptive advertising. Follow recommendations based on valid local experience and research when making your decision about starters; and include Tessenderlo Kerley's KTS in your starter program.

1. Murray, T.P.; Clapp, J.C. *Current Fertilizer Salt Index Tables are Misleading*; Communications in Soil Science and Plant Analysis, Vol 35, Nos 19 & 20, pp. 2867-2873, 2004