

Thiosulfates: A Reliable Source For Sulfur in Agriculture

Thio-Sul (ATS) is one in a line of proven products marketed by Tessenderlo Kerley.

Thiosulfates, primarily ammonium thiosulfate (ATS), have been used in agriculture for nearly a half century. Thiosulfates differ from sulfates in that they have an additional sulfur (S) atom in place of oxygen in their chemical structure. ATS has been the flagship of the Tessenderlo Kerley, Inc.(TKI) product line since its inception. The major use of ATS has been as a source of liquid sulfur in combination with urea-ammonium nitrate (UAN) solution for both improved nutrient-use efficiency (NUE) and better crop yields.

In the brief space we have here let's take a look at a couple of other products we've developed and marketed to help growers more effectively produce crops.

Potassium thiosulfate

In November 1989, TKI began researching the possibility of using potassium thiosulfate (KTS) as a soluble source of potassium (K) for drip irrigation. The product was made commercially available in the spring of 1991. KTS is a clear solution containing 25 percent K_2O and 17 percent S with a neutral to slightly basic pH. California had several hundred thousand acres of drip and micro sprinkler-irrigated crops with many of the soils low in K. When drip irrigated or micro-irrigated both row crops and permanent crops would, in a relatively short time, become K deficient. In vineyards, soil application of dry K fertilizer was also difficult, time consuming, and often, because of improper equipment, fertilizer was spread outside the wetted zone where it could not be effectively used by the crop. KTS has proved it lends itself well to this environment. On prune trees in



Table 1. Foliar potassium cotton trial.

Treatment	Rate/A	Yield lbs lint/A
Control		1,306
5-0-20	2.0 gal	1,573 *
5-0-20 + PGR IV***	2.0 gal + 8.0 oz	1,544 *
5-0-20 + Pix***	2.0 gal + 8.0 oz	1,639 *
5-0-20	2.0 gal	1,477 **
5-0-20 + PGR IV***	2.0 gal + 4 oz	1,620 **
5-0-20 + Pix***	2.0 gal + 4 oz	1,615 **

* 2 weeks after first bloom

** 2 and 4 weeks after first bloom

*** plant growth regulator

Northern California, KTS introduced through irrigation water was twice as effective as K knifed into the soil at the drip line of the tree. Research by the University of California has shown that the addition of 4.5 lbs/A of K_2O as KTS with a little nitrogen (N), foliar-applied at bloom, consistently increased cotton yields (Table 1).

Calcium thiosulfate

In 2000, TKI began production of calcium (Ca) thiosulfate (CaTS). It

contains 6 percent Ca and 10 percent S with a neutral to slightly basic pH. It was initially developed for the irrigation market to improve water infiltration in slowly permeable soils, but other applications soon developed. Slow water infiltration is a major problem in California, causing losses of over \$500/A for orchards because of standing water and water running off the fields. Application of CaTS to irrigation water lowers the sodium absorption ratio and increases electrical

Table 2. Effect of foliar application of MagThio in combination with fungicides on potatoes.

Treatment	Rate/A	Applications	Yield tons/A
Control			29.65
MagThio + Reason	1.0 gal + 5.5 oz	2	32.71 *
MagThio + Headline	1.0 gal + 6.0 oz	2	32.70 *
MagThio + Tanos	1.0 gal + 6.0 oz	2	32.82 *
Magnesium sulfate + Reason	1.0 gal + 5.5 oz	2	31.30 *

* timing: first row close, second full canopy

conductivity of the water improving water infiltration. Other applications for CaTS have included:

- 1) providing a source of Ca and S nutrition for cotton,
- 2) reducing bitter pit in apples,
- 3) combating blossom end rot in tomatoes, and
- 4) minimizing tip burn in lettuce.

Magnesium thiosulfate

Magnesium thiosulfate (MagThio) is the latest product in TKI's line of thiosulfate materials. It contains 4 percent magnesium and 10 percent S with a neutral to slightly basic pH. It has the same characteristics of other thiosulfates where low salt-out temperature is desirable under cool

weather conditions. Research on crops has been limited, but results so far are encouraging. In field trials on potatoes, MagThio applied as a foliar spray in combination with fungicides has produced positive yield responses (Table 2). It can also be blended with KTS, liquid urea, and some UAN solutions, depending on the type of rust inhibitor they contain. Other crops on which MagThio is being tested include citrus, melons, apples, beans, and grass seed. Additional thiosulfates formulations currently being studied include zinc and manganese.

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