

Application Guide



Tessenderlo KERLEY

GUARANTEED ANALYSIS

Nitrogen (N).....	12%
(As Ammoniacal Nitrogen)	
Sulfur (S).....	26%
Derived From: Ammonium Thiosulfate	

Density:

Density, lbs/gallon @ 60°F	11.10
Volume, gallons/ton	181.0

PRECAUTIONARY STATEMENTS

Avoid prolonged or repeated contact with eyes, skin and clothing. Chemical goggles or a full face shield should be worn. To protect skin, wear appropriate protective equipment, such as rubber or plastic aprons, rubber gloves and boots. Avoid breathing mist or vapor. Keep containers closed. Wash thoroughly after handling. May cause gastrointestinal distress if swallowed.

FIRST AID

In case of contact with eyes, immediately flush eyes with water for at least 15 minutes. Hold eyelids apart during irrigation to ensure thorough flushing of the entire area of the eye and lids. Obtain immediate medical attention.

In case of skin contact: Immediately flush skin with large quantities of water. Remove contaminated clothing under a safety shower. Obtain immediate medical attention.

In case of ingestion: If victim is conscious, give 2 to 4 glasses of water and induce vomiting by touching finger to back of throat. Obtain immediate medical attention.

In case of inhalation: Remove victim from contaminated atmosphere. If breathing is labored, administer oxygen.

If breathing has ceased, clear airway and start mouth-to-mouth resuscitation. If heart has stopped beating, external heart massage should be applied. Obtain immediate medical attention.

ENVIRONMENTAL HAZARDS

Keep out of lakes, ponds, rivers and streams. Do not contaminate ground water or surface water by cleaning equipment or disposal of waste. In case of spill, contain and maximize recovery. Exercise caution in area of spill for slippery conditions. Dispose of spilled material in accordance with regulatory requirements.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal. Do not store near acids or other acidic material. Dispose of spilled material in accordance with regulatory requirements.

THIO-SUL is the original nitrogen-sulfur plant nutrient solution instrumental in unlocking the full potential of your fertility program. THIO-SUL is a clear liquid containing 12% N and 26% S and is the most popular S-containing product used in the fluid fertilizer industry. THIO-SUL is compatible with N solutions and complete (N-P-K) liquid blends, which are neutral to slightly acid

in reaction. In addition to its wide adaptability for use in clear liquid blends, it is also well suited for use in suspensions.

THIO-SUL cannot be used with acidic (pH <6.0) materials.

See MSDS Sheet for additional information on safety and handling or visit our website at: www.tkinet.com

THIO-SUL IS NOT RECOMMENDED AS A FOLIAR SPRAY ON APPLES.

THIO-SUL is essentially noncorrosive and may be stored in mild steel, poly and aluminum vessels.

THIO-SUL aids in increasing crop yields and stretching fertilizer dollars by improving the Nitrogen-Sulfur balance and helps in maintaining necessary sulfur levels in sulfur deficient soils. THIO-SUL helps solubilize and aids in plant assimilation of other essential plant nutrients such as phosphorus and increases plant utilization of several micronutrients, i.e., zinc, manganese, iron and copper.

THIO-SUL contains nitrogen in the ammoniacal form and the sulfur is predominately thiosulfate. Thiosulfate sulfur is unique in that it exists in two oxidation states. This gives it enhanced pathways of availability more suitable to the sulfur uptake patterns of most plants. When applied to soils, THIO-SUL decomposes to give approximately equal parts of sulfate S (SO_4^{2-}) and elemental sulfur (S^0). The sulfate sulfur is immediately available for plant uptake, whereas the S^0 must undergo oxidation to SO_4^{2-} before it can be absorbed by plants.

Thiosulfate as a Sulfur Source. The advantage of thiosulfate, in comparison to other sulfur forms, is that the sulfur needed for plant growth becomes available over several weeks. When sulfur is applied totally in the sulfate form, some may be lost to leaching; the result of rainfall and/or irrigation water moving this form below the root zone. When elemental sulfur is applied, oxidation to a sulfate form must occur before it becomes available to the plant. Thiosulfate helps supply the plant's sulfur needs quicker than other sulfur forms.

THIO-SUL, a liquid fertilizer solution, has experienced major use in combination with UAN solutions and aqua ammonia in supplying the sulfur needs of crops.

THIO-SUL as a Nitrogen Stabilizer. University research has shown THIO-SUL acts as a nitrification and soil urease inhibitor when blended with UAN solution resulting in more nitrogen being available to the crop. THIO-SUL, when added to UAN solution at a 10 to 20% volume to volume ratio, delays nitrification resulting in a decrease of potential losses from nitrate nitrogen leaching. In addition, when THIO-SUL is added to UAN solution, urease inhibition occurs, stabilizing the urea component from potential losses due to ammonia volatilization.

THIO-SUL, when added to UAN solution or aqua ammonia, allows the plant the opportunity to better utilize the applied

nitrogen. Not only does THIO-SUL stabilize the nitrogen for plant use, but is an excellent source of sulfur as well.

THIO-SUL contains 1.32 pounds of nitrogen and 2.87 pounds of sulfur per gallon. THIO-SUL weighs 11.01 pounds per gallon.

GENERAL INFORMATION

THIO-SUL is an excellent source of soluble sulfur for plant nutrition. THIO-SUL is a neutral to slightly basic, clear liquid solution, containing 12% nitrogen and 26% sulfur. Each gallon of THIO-SUL contains 1.32 pounds of nitrogen and 2.87 pounds of sulfur. THIO-SUL is compatible with most liquid fertilizer materials. (See Tessengerlo Kerley blend sheets for further information.)

Nitrogen and sulfur are important components of proteins. Sulfur deficiency may affect the plant's ability to utilize nitrogen for protein synthesis. For best management practices and utilization of nitrogen and sulfur, apply THIO-SUL with enough UAN solution or aqua ammonia to make an N: S ratio of 5:1. Plant tissue analysis is recommended to determine crop's sulfur need.

Most crops need between 20 and 50 pounds of sulfur (8 to 18 gallons of THIO-SUL) per acre per year depending upon local growing conditions, soil type, fertilizer placement, crop and yield potential. For best results, follow soil and plant tissue analysis guidelines on sulfur nutrition for crops in your area.

GENERAL APPLICATION AND USE RECOMMENDATIONS

SEE CAUTIONS BEFORE APPLYING

SOIL APPLICATION

Row and Vegetable Crops (starter fertilizer): Apply THIO-SUL as a band application 2 inches to the side and 2 inches below the seed row at 1 to 3 gallons per acre by itself or in combination with other liquid fertilizers.

Row and Vegetable Crops (sidedress): Inject 6 to 12 gallons of THIO-SUL per acre to meet the crop's sulfur requirement. If injection applications are made close to the row (less than 12 inches), reduce application rate by half (3 to 6 gallons per acre). Avoid root pruning. For preplant soil injection application, Do Not apply THIO-SUL where it will be in direct seed contact.

Trees and Vines (soil injection and surface banding): Apply 5 to 10 gallons of THIO-SUL per acre early in the growing season for sulfur nutrition.

Trees and Vines (broadcast): Apply 15 to 20 gallons of THIO-SUL per acre in a broadcast spray by itself or mixed with water and/or other liquid fertilizers. For young trees and vines apply 5 to 10 gallons per acre. Prevent spray and drift from contacting drop foliage and tree bark.

THIO-SUL IS NOT RECOMMENDED AS A FOLIAR SPRAY ON APPLES.

FERTIGATION

SPRINKLER IRRIGATION

Row and Vegetable Crops: Apply 1 to 5 gallons of THIO-SUL per acre with the irrigation water. Apply at planting or wait until the crop is at the 3rd or 4th leaf stage. Repeat as needed every 7 to 14 days. THIO-SUL may be mixed with nitrogen solutions (UAN) and applied as needed during the season.

Trees (under): Apply 5 to 15 gallons of THIO-SUL per acre with the irrigation water every 7 to 10 days beginning at full leaf stage.

Trees (over): Apply 3 to 5 gallons of THIO-SUL per acre with the irrigation water every 7 to 10 days beginning at full leaf stage.

Vines: Apply 2 to 4 gallons of THIO-SUL per acre with the irrigation water every 10 to 14 days.

Alfalfa: Apply 5 to 15 gallons per acre of THIO-SUL with the irrigation water after cutting.

FLOOD AND FURROW IRRIGATION

THIO-SUL may be applied with the irrigation water. For best management practices, applications should be made when the crop may best utilize the nitrogen and sulfur. Apply 5 to 10 gallons per acre of THIO-SUL on lighter soils and 10 to 20 gallons per acre on heavier soils. Apply throughout majority of the crop's irrigation period.

Row and Vegetable Crops: Apply 5 to 15 gallons of THIO-SUL per acre per application with the irrigation water.

Trees and Vines: Apply 10 to 20 gallons of THIO-SUL per acre per application with the irrigation water.

Alfalfa: Apply 4 to 8 gallons per acre of THIO-SUL to seedling alfalfa with the irrigation water. Apply 5 to 15 gallons per acre with the irrigation water to an established crop.

DRIP IRRIGATION

Row and Vegetable Crops (drip tape and subsurface drip): Apply 1 to 2 gallons of THIO-SUL per acre per treatment with a full irrigation. Repeat application, as needed, every 7 to 10 days to provide adequate sulfur nutrition.

Trees and Vines (subsurface drip): Apply 2 to 4 gallons of THIO-SUL per acre per treatment with a full irrigation. Repeat application after 14 to 21 days, or as needed, to provide adequate sulfur nutrition.

Trees and Vines (drippers and mini sprinklers): Apply 6 to 12 gallons of THIO-SUL per acre with a full irrigation. For young trees and vines apply 2 to 4 gallons of THIO-SUL per acre with a full irrigation. Repeat application in 14 to 21 days.

TOPDRESSING

Pastures and Small Grains Only: Apply THIO-SUL along with nitrogen solutions (UAN) to provide adequate sulfur nutrition. For every 5 to 7 pounds of nitrogen apply 1 pound of sulfur. Application on small grains should be done before jointing (Feekes Growth Stage 5). See cautions. Tissue testing is recommended.

Alfalfa: Apply 5 to 15 gallons of THIO-SUL with a ground sprayer immediately after a cutting or during dormancy before regrowth has occurred.

STRAW DECOMPOSITION

THIO-SUL may be used as an aid to straw decomposition. The effectiveness depends on the time of application, soil moisture and spray coverage on the straw.

While temperatures are still warm, lightly disc or chisel the ground after harvest. Spray a mixture of THIO-SUL and water over the stubble. Wait at least 6 weeks before another field cultivation. Apply 3 1/2 to 4 1/2 gallons of THIO-SUL for every ton of straw to be treated. Example: 2.5 tons of straw per acre would require at least 9 gallons of THIO-SUL per acre. THIO-SUL should be mixed in enough water or UAN/water solution to supply a minimum of 20 gallons of spray solution per acre. To be effective, thorough spray coverage of the straw is essential.

CAUTION (APPLICATION)

Do not apply THIO-SUL directly on or below germinating seeds such as in a "pop up" fertilizer program. Reduced germination may result from dry soil conditions and when used in starter fertilizer blends.

Sprinkler irrigation - Application of THIO-SUL by sprinklers should be followed by 1 to 2 hours of additional irrigation to reduce the possibility of fertilizer injury. Always apply THIO-SUL with a full irrigation and avoid application during mid-day when temperatures are high.

Center pivot application of THIO-SUL at recommended rates is diluted with enough water that foliar burning is not normally a problem.

THIO-SUL should not be mixed with acids or other acidic material below a pH of 6.0.

DO NOT APPLY AS A FOLIAR SPRAY ON APPLES

TOPDRESSING

Do not topdress (by airplane or ground rig) with THIO-SUL when temperatures are above 70° F and relative humidity is below 30%. Some foliar burn may occur even under the best of conditions. When working with a new formulation or application method, always do a small test plot before treating the whole field.

A jar test is recommended when mixing with pesticides to check for physical compatibility. When mixing THIO-SUL or any liquid fertilizer with pesticides, always keep agitators running during filling and spraying operations. Failure to maintain agitation may cause separation of products, resulting in uneven spray application, which may result in phytotoxicity occurring to targeted crop.

SOIL INJECTION

Avoid pruning roots with injection equipment when applying THIO-SUL

Crop injury may result from unusual weather conditions, failure to follow label directions, or improper application practices, all of which are out of control of the manufacturer or seller. The directions on this label are believed to be reliable and should be followed carefully.

The application of THIO-SUL for purposes other than as a fertilizer is not recommended.

THIO-SUL Delivers Results!

- Slows down nitrification and prevents the accumulation of nitrate
- Slows nitrogen losses in starters
- Excellent source of sulfur
- May be mixed with liquid materials in the same manner as UAN or 10-34-0 (11-37-0)
- Versatile – may be used as a starter, broadcast, early topdress and through irrigation water
- May increase fertilizer efficiency. Keeps nitrogen in the NH⁴⁺ form (enhances phosphorus uptake)
- Inhibits nitrogen losses when applied as surface banding to pasture or wheat ground
- Helps reduce ammonium volatilization losses when mixed with UAN solution and aqua ammonia

PRODUCT ANALYSIS

Total Nitrogen (N).....	12%
(As Ammoniacal Nitrogen)	
Total Sulfur (S).....	26%
Derived From: Ammonium Thiosulfate.	
Density pounds per gallon at 60° F.....	11.10
Gallons per ton	181
Salting out temperature ° F.....	43°F to 45°F
Typical pH.....	7.2 –8.0

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