



Soil Facts

Ammonium Sulfate Liquor— A Potential Nitrogen Source for Crops

An Alternative Nitrogen Source

For more than 15 years, some North Carolina farmers have been using Mallinckrodt ammonium sulfate liquor (MASL) as an alternate source of nitrogen for crop production. Produced by Mallinckrodt Specialty Chemicals, the industrial by-product is registered with the North Carolina Department of Agriculture as a fertilizer. The liquid MASL is stored in large above-ground tanks at the chemical plant's Raleigh facility. At present, farmers can pick up MASL free of charge from the Raleigh site. The only expenses to the farmers are for transportation, storage, and application.

MASL is a nearly clear liquid that causes no staining or forage discoloration. It has a pH of 5.6 and contains 34 percent ammonium sulfate with no less than 7 percent nitrogen. MASL usually contains about 9 percent sulfur, which is particularly beneficial for some plants grown in deep, sandy soils. Other MASL ingredients vary, but a typical sample contains small amounts of several other elements.

Table 1. MASL Ingredients

| Element | Concentration (parts per million) |
|-----------|--------------------------------------|
| Calcium | 10.6 |
| Zinc | 7.3 |
| Iron | 6.2 |
| Potassium | 5.0 |
| Copper | 4.2 |
| Magnesium | 4.0 |
| Sodium | 0.5 |
| Manganese | 0.5 |

Because these nutrients are present in such small quantities, they do not affect plant growth when MASL is applied as a nitrogen source.

MASL weighs approximately 10 pounds per gallon; 200 gallons weigh 1 ton. Each ton contains 140 pounds of nitrogen. Therefore, to apply 100 pounds of nitrogen per acre, it is necessary to use 143 gallons of MASL. In contrast, a commercial 30 percent nitrogen solution contains 600 pounds of nitrogen per ton. Thus 4.3 times as much MASL must be used to obtain the same amount of nitrogen.

Field Tests on MASL

Field tests were conducted at North Carolina State University in 1974 using MASL on fescue, barley, and corn. Regular ammonium sulfate was dissolved in water to achieve the same nitrogen concentration as in MASL. Both liquid solutions were applied to fescue in March at rates of 0, 100, 200, and 400 pounds of nitrogen per acre with similar results. For example, when nitrogen from either MASL or ammonium sulfate was applied at a rate of 200 pounds per acre, fescue forage yields were 5.5 tons per acre. Both materials caused leaf burning, which was most severe at the highest application rates. Similar results have been reported on fescue at other test sites in North Carolina.

MASL and ammonium sulfate were also tested in the spring on barley. Nitrogen from either source produced a marked increase in growth compared to no nitrogen, but it caused leaf burning much like that experienced with fescue. In tests on corn, no apparent detrimental effects were observed from either material when sidedressed



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(banded) beside the row. Corn grain yields increased with greater amounts of nitrogen regardless of the source.

Protecting Environmental Quality

Thus MASL is just as effective as ammonium sulfate in improving crop yields and is no more likely to cause crop damage.

Also, Mallinckrodt has received no reports of adverse effects on animals that have consumed hay or forage treated with MASL.

Both MASL and commercial ammonium sulfate use will reduce soil pH. Ammonium sulfate forms two to three times more acid than a 30 percent nitrogen solution or urea containing the same amount of nitrogen. If MASL is used over a

long period of time, fields will need to be limed more frequently to offset its acidifying effects.

Using MASL for crop production rather than disposing of this by-product in some other way can save farmers money while helping to protect environmental quality.

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