

PureGrade Liquid Plant Food

Manganese Deficiency and Glyphosate Resistant Soybeans

University research at Kansas State University and Purdue has shown that glyphosate resistant (GR) soybeans often respond to applications of manganese while the same varieties without the resistant gene do not. The glyphosate resistant gene seems to be responsible for causing manganese deficiencies in certain soybean varieties. Nutra-Flo's PureGrade EDTA Chelated Manganese can be either soil or foliar applied to remedy this deficiency.

The Problem

Several reasons have been identified that cause Mn deficiency in GR soybeans, which may account for the 'yield drag'.

- When glyphosate is sprayed on the leaves of GR soybeans it renders the Mn in the leaves unavailable. Soybeans exhibit yellowing that is sometimes referred to as "flash." Once the glyphosate is applied the Mn is immobilized and won't be translocated in the plant. New Mn is needed for plant use.
- Glyphosate translocates rapidly to the roots after being sprayed on the soybean leaves. Glyphosate becomes part of the exudate released from the roots into the rhizosphere. Glyphosate is toxic to soil organisms, especially reducing organisms, that solubilize Mn. Mn is immobilized and a deficiency results.
- Glyphosate stimulates fusarium rot on the roots of plants. This is considered part of the herbicide's mode of action. Fusarium builds up in the soil after several years of growing GR crops and may have a yield depressing effect.

MnEDTA Increased Yield by 15 Bushels per Acre Over the Glyphosate Only Treatment

Table 1. Effect of Mn sources on yield and herbicidal efficacy of glyphosate on glyphosate resistant soybeans.			
Treatment & Source of Mn	Rate	Yield bu/ac	Weed Control %
No Herbicide*	None	46	0
Glyphosate Only**	24 oz/ac	57	100
Glyphosate + MnEDTA	0.25 lbs Mn/ac	72	100
Glyphosate + MnSO ₄	0.5 lbs Mn/ac	70	93
Glyphosate + MnCO ₃	0.5 lbs Mn/ac	75	91
Glyphosate + AA Chelate	0.15 lbs Mn/ac	67	85

*Heavy weed pressure.
 **Applied as Weathermax® formulation at 24 oz/ac + ammonium sulfate.
 Source: Huber, Don, Fluid Journal, Fall 2007. Huber is professor emeritus in the Botany & Plant Pathology Department, Purdue University.

Note that glyphosate gave 100% weed control only with the EDTA source of Mn.
 Use 3 pints per acre of PureGrade MnEDTA.

Recommendations

Use PureGrade 6% EDTA Chelated Manganese (MnEDTA) for both soil and foliar applications.

Application of manganese to GR soybeans will be most successful on fields with high yield potential. Good results have been reported by tank mixing MnEDTA with glyphosate. There is no effect on weed control when MnEDTA is mixed with glyphosate. Most other sources of Mn interfere with glyphosate and reduced weed control is the result.

Use PureGrade MnEDTA at the following rate:

- **Apply 3 pints/ac for foliar applications or for tank mixing with glyphosate.**
- **More than one application may be needed.**

