

Soybean Foliar Fertilization

Greg La Barge, Extension Agent, Agriculture and Natural Resources

Objective

To determine yield response of soybeans to foliar fertilization with manganese containing fertilizers on deficient soils.

Background

Cooperator:	Nate Andre	Fertilizer Rate:	See Table 2
County:	Fulton	Variety:	Garst 269RR
Soil Type:	Mermill loam	Planting Date:	May 25, 2002
Tillage:	No-till	Seeding Rate:	180,000 seeds/A
Previous Crop:	Corn	Row Width:	10-inch
Soil Test:	pH 7.1, P 33 ppm, K 77 ppm, Mn 7 ppm, OM 5.3%, CEC 12 meq/ 100g	Herbicides:	26 oz/A Roundup
		Harvest Pop:	150,000 plants/A
		Harvest Date:	October 8, 2002

Methods

A field area known to be manganese deficient was divided into plots 10 feet wide by 40 feet long in a randomized complete block design with six replications. Foliar fertilizer containing only manganese was compared to products containing other nutrients and growth regulators. The products and their label-reported concentrations of nutrient are included in Table 1.

Products were applied according to labeled rates. All products except the XBX were applied in 20 gallons of water per acre using a CO₂ sprayer and 10foot boom with TeeJet XR11004VS nozzles on 7/ 10/ 02 at 20 PSI. The XBX was applied in 10 gallons of water per acre on 8/ 9/ 02. Soybeans for the July application were in the R1 stage of growth with first flowers starting and six leaves. Table 2 lists the application treatments.

The products were used on this basis: Postman was used as a primary Mn source. Harvest More Urea Mate was used as a total foliar program. X-cyte and Stimulate are hormone-containing products intended to reduce stress and provide for more fruit set. Golden Harvest Plus 5-18-2 is very acidic and added to lower the acidity of the spray solution in combination with a lower rate of Mn product. XBX is an experimental product containing boron (B) since it is presumed that additional B may set more pods.

Table 1. Product Analysis Information.

Product	lbs/gallon	Analysis
Post-man	10.5	5% Mn Chelate, 2% S
Harvest More Urea Mate	Dry	5-10-27 with 4% Ca, 1.5% Mg, 0.15% B, 0.008% Co, 0.03% Cu, 0.5% Mn, 0.008% Mo, 0.5% Zn
X-Cyte	8.4	0.04% Cytokinin
Stimulate	8.4	0.009% Cytokinin, 0.005% Gibberellic Acid, 0.005% Indole-3-butyric acid
XBX	10	4.5% B
Golden Harvest 5-18-2	11.2	5-18-2 with 0.4% Mg, 1% S, 0.1% B, 0.1% Cu, 0.05% Co, 0.4% Fe, 0.4% Mn, 0.05% Mo, 0.8% Zn

Results

Table 2. Treatments and Soybean Yields adjusted to 13% Moisture

Treatment	Yield (bu/A)
Postman (3 qt/ A)	36.5
Postman (1 qt/A) + Ureamate (5 lbs/A)	36.4
Ureamate (5 lbs/ A)	34.1
Postman (1 pt/ A) + Ureamate (5 lbs/ A) + X-cyte (8 oz/ A) + Stimulate (2 oz/ A) + XBX (32 oz/ A)	33.9
Postman (3 qt/A) + Ureamate (5 lbs/A)	33.3
Postman (1 qt/A) + 5-18-2 (10 oz/A)	32.7
Postman (1 pt/A) + Ureamate (5 lbs/A) + X-cyte (8 oz/A) + Stimulate (2 oz/A)	32.7
Check	31.4
LSD (0.05)	NS
F	<1.0

Discussion

At the time of treatment application on July 10, plants in the treatment area showed foliar symptoms of manganese deficiency. The treatments were applied the day after a 0.5-inch rain shower and temperatures had cooled from the upper 90s during the previous 10 days to the low to mid 80s. All treatments including the check improved in coloration after this period and throughout the rest of the growing season. One may surmise that cooler temperatures and

moisture allowed enough root growth to tap available Mn soil reserves. Thus, there were no significant differences in yield among the treatments.

Soil phosphorus and potassium levels were less than optimum; however, no broadcast treatment was applied. At 10 meq/ 100g CEC, crop removal applications of 90 pounds K₂O (50 Bu/ A yield goal) per acre are recommended for soil test levels of 100-130 ppm K. At 75 ppm K soil test level 130 pounds K₂O are recommended. This lower potassium soil test level with no broadcast application may have limited yield potential particularly with the dry 2002 growing season resulting in less expression of the foliar treatments. Yield expectations are usually 50 to 60% more than what was experienced this year.

For additional information, contact:

Greg LaBarge
The Ohio State University
labarge.1@osu.edu