

Glyphosate Additives on Soybeans

Purpose:

To evaluate possible crop response to the inclusion of foliar fertilizer in a glyphosate herbicide application on Roundup Ready soybeans. Of particular interest were potential effect on plant stress, enhanced weed control and effect on crop yield.

Methods:

This project assessed the following three foliar fertilizer additives to glyphosate on soybeans: "Oligosol Crop Booster", "Alpine Fortified" and "UAP Green With Envy. One litre/ac (2.4 L/ha) of the foliar fertilizer was added to the 1.0 L/ac (2.4 L/ha) rate of glyphosate and applied at the first to third trifoliolate growth stage. Three main sites were set up (2 in Essex and one in Chatham-Kent) with the following treatments:

1. Untreated
2. One application of Oligosol Crop Booster
3. One application of Alpine Fortified
4. One application of UAP Green With Envy

Up to six secondary demonstration sites per county were established with the following treatments:

1. Untreated
2. One application of the product for the county (Oligosol Crop Booster – Essex, Alpine Fortified – Lambton, UAP Green With Envy – Kent)

Table 1 – Nutrient content of the foliar fertilizer products.

Nutrient	Oligosol Crop Booster	UAP Green With Envy	Alpine Fortified
Nitrogen	15%	16%	10%
Phosphorus	3%	8%	10%
Potassium	6%	3%	10%
Zinc	0.05%	0.05%	0.05%
Manganese	0.02%	0.05%	0.05%
Iron	--	0.10%	0.1%
Copper	0.05%	0.05%	--
Boron	0.02%	--	0.1%
Molybdenum	0.05%	--	0.0006%

A soil sample was taken at each plot and observations of growth and weed control were recorded. Yields were taken with a weigh wagon or yield monitor.

Results:

Observations of the crop after the application of glyphosate plus the foliar fertilizer from the cooperators showed no visible differences in crop colour or growth. Generally no differences in weed control between the treatments were observed. The Essex 2 site did see some improved weed control in the foliar treatments. Rainfall was extremely variable across the three county area. Many plots received timely rains but a few did not. The results of the soil samples showed that the plots were done on a range of soil pH, fertility and organic matter levels. The plots were established on a variety of soil types following a number of different crops.

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The main sites were established to compare the products at the same location. The yield data, Table 2, did not show a significant yield increase with any of the foliar products. The Essex 1 site included an experimental UAP product and the Kent site had an extra treatment using another Oligosol product. The harvested area of the Essex 1 plot was 0.2 ha (0.5 acres) per treatment and the area of each Kent plot treatment was approximately 0.6 ha (1.5 acres).

Table 2. Main Plot Yields

Treatment	Essex 1		Essex 2		Kent		Avg Diff
	Yield (bu/ac)	Difference (bu/ac)	Yield (bu/ac)	Difference (bu/ac)	Yield (bu/ac)	Difference (bu/ac)	
Untreated	41	-	31.6	--	57.3	--	--
Crop Booster	41	0	34.0	+1.8	57.1	-0.2	+0.5
Alpine Fortified	41	0	34.2	+2.0	56.9	-0.4	+0.5
Untreated	--	--	32.7	--	--	--	--
Green With Envy	40	- 1.0	30.8	+1.1	56.4	-0.9	-0.3
Untreated	--	--	26.7	--	--	--	--
UAP Experimental	40	- 1.0	--	--	--	--	--
Oligosol	--	--	--	--	60.1	+2.8	--

Each county in the St. Clair District Soil and Crop Improvement Association (SCDSCIA) was given a foliar product to put in their secondary sites. Tables 3 to 5 contain the yield results. The Crop Booster in Essex showed no difference in yield with the treatment.

Table 3. Yields of Secondary Sites - Essex

Nearest Town	Untreated Yield (bu/ac)	Crop Booster Yield (bu/ac)	Difference (bu/ac)
Comber	50.7	49.9	- 0.7
Kingsville 1	32.6	32.6	0
Kingsville 2	39.7	40.1	+ 0.4
Average			+ 0.4

The six Kent sites showed a few bushels one way or the other which is typical of the amount of yield variation one would expect to see in these types of plots. When averaged across all plots in the county there was no yield difference between the treated and untreated plots.

Table 4. Yields of Secondary Sites – Kent

Nearest Town	Untreated Yield	Green With Envy Yield	Difference (bu/ac)
Chatham	55.2	53.8	- 1.4
Rutherford	48.0	48.0	0
Thamesville S	35.1	34.2	- 0.9
Florence V1	34.1	34.8	+ 0.7
Florence V2	44.9	41.1	- 3.8
Croton	38.9	37.4	- 1.5
Average			- 1.1

The Lambton site results were similar to the other two counties. One of the sites however did show a significant yield increase to the foliar treatment. The cooperator was unable to explain the reason for this and it is unlikely that this could be repeated. The yield with the Alpine Fortified at this site is similar to the other yields but the yield of the untreated check is quite low. It is possible something in the untreated treatment caused it to yield poorer.

Table 5. Yields of Secondary Sites – Lambton

Nearest Town	Untreated Yield	Alpine Fortified Yield	Difference (bu/ac)
Watford	43.1	45.1	+ 2.0
Inwood	49.9	49.8	- 0.1
Sarnia	45.1	44.8	- 0.3
Bothwell	58.8	60.3	+ 1.5
Oil Springs	47.9	48.0	+ 0.1
Croton	37.3	52.3	+ 15.0
Average			+3.0 (0.6)*

* the number in brackets () is the average without the Croton plot

Summary:

The project was only conducted for one year so that should be taken into consideration when looking at the results. The project was initiated because some of the SCIA directors and their neighbours were being encouraged to add a foliar additive to their glyphosate application. They wanted to know if there was any benefit to the foliar application.

The yields from the main plots and the secondary plots did not show an advantage to the addition of any of the foliar fertilizers. The variation in yield of the treated versus untreated was within the range of variability you would expect in these types of plots, except for the Croton plot. The results are similar to the results of a foliar project that the Middlesex and Elgin Soil and Crop Improvement Associations conducted from 1997-1999. A foliar product with a similar nutrient content was applied to soybeans at different crop stages. The average yield on 33 plots for the untreated treatments was 48.3 bu/ac, and the treated yield was 47.3 bu/ac giving a difference of negative one bushel per acre. No yield advantage to the foliar fertilizer application.

The bottom line on the SCDSCIA project is that the product cost of ~\$2.50-\$5.00 per acre did not return any increased yield. No additional application cost would apply as the product was tank mixed with the glyphosate.

The major source of nutrient uptake for plants is through the roots. Generally, soil and tissue samples are analyzed to determine if sufficient levels of nutrients are present in the soil to grow a crop. Any deficiencies are usually corrected with a fertilizer application to the soil. Micro nutrient deficiencies are usually corrected with soil or foliar fertilizer applications depending on the nutrient and the crop. The approach is a targeted one. This project is not based on a targeted approach. Also the time the nutrients were applied is at a stage when the crop does not have much leaf surface area to take up the nutrients. Although the application timing was better with the Middlesex and Elgin project it did not achieve the desired result. Also, at a 2.5 L/ha (1L/ac) rate 0.56 kg/ha (half a pound per acre) or less of nitrogen would have been applied and much less of the other nutrients.

Next Steps:

The project received funding for one year and will not be continued.

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Project Contacts: For further information on this project please contact:

Adam Hayes, Soil Management Specialist – Field Crops, OMAFRA, Ridgetown,
519-674-1621 adam.hayes@omafra.gov.on.ca or
Horst Bohner, Soybean Specialist, OMAFRA, Stratford, 519-271-5858
horst.bohner@omafra.gov.on.ca