Assessing the Impacts of MAP (11-52-0) Placed in Furrow with Soybean Seed

(Final Report)

Purpose:

Soil test values for Phosphorus (P) and Potassium (K) have been on the decline in Ontario as fertilizer prices increase and rotation times between crops like corn and soybeans, which have high nutrient requirements, are shrinking. In some cases, the decline in soil test values is leading to yield limitations.

In order to provide soybeans with adequate nutrients, while considering the real world constraints of fertilizer cost, equipment capabilities, and ease of application, new approaches to fertilizer use must be assessed.

The typical way to apply fertilizer to a soybean crop has been to broadcast and incorporate it. This requires extra passes across the field. Many of the air seeders being used today have the ability to apply fertilizer in the seed trench at seeding time. This could potentially save time for farmers. However, current recommendations dictate: “do not apply fertilizer in contact with soybean seeds, due to their sensitivity to fertilizer salts.”

Figure 1: Untreated soybeans (left) compared to soybeans with 50 lbs MAP (right) added in furrow with the seed. The picture was taken in early June, with the fertilized beans having a darker green appearance and a slightly more developed leaf canopy.

Methods:

It was determined that applying 50 lbs/ac of MAP fertilizer in furrow with soybean seed would provide the best chance of producing a positive yield response, while limiting the amount of fertilizer burn caused. The study included 16 sites over four years, from 2009 to 2012. These locations had a range of soil tests, from low response sites (soil tests of 16P and 120K and greater) to high response sites. Stand counts were taken to assess stand losses due to fertilizer burn on seed, as well as yields taken at year end to determine economic returns. Each plot was 20' wide by at least 1000' long and was replicated 3 times. Plots were planted with a Kearney 15" vacuum planter.

Results:

Table 1: Response of Soybeans to In Furrow Starter Fertilizer Placement

Average Results of 16 Sites	Treatment		Difference
	Untreated	25P IF	
Stand Count (Plants/Acre)	144008	142382	**-1626**
Yield (Bu/Ac)	50.9	52.3	**1.4**

Using 50 pounds of MAP with soybean seed in the furrow appeared to be a reasonably safe practice. The stand loss was insignificant, on average, at roughly 1600 plants per acre. The highest stand loss recorded during the study was 38,000 plants. Prolonged dry weather after planting with fertilizer in the furrow seemed to create conditions where stand loss due to fertilizer burn were more likely.

The yield gains for the added MAP was 1.4 bushels per acre, on average. Yields ranged from 1.1 bu/ac to 6.2 bu/ac when adding MAP in furrow. Application costs of MAP at 50 pounds an acre are about $17/acre. An average yield gain of 1.4 bu/ac at a selling price of $12/bu represents a gain of $17/acre. Therefore the application of 50 lbs/ac of MAP in furrow was a "break even" proposition in this study. If soil tests values are low, however, yield gains have been more significant.

Yield gains from added MAP fertilizer did not come only in locations with poor P soil test values. Placing MAP in the furrow also stimulates growth in root mass, which can help nutrient uptake. This might help to explain why yield gains have been recorded in fields which have higher soil tests.

Summary:

This study shows that placing MAP fertilizer in furrow with soybean seed is a reasonably safe practice. It must be noted however that placing fertilizer with soybean seed can cause seed burn when the weather remains dry after planting or in sandy soils. Higher rates of MAP with seed should be avoided as the risk for seed burn increases. Some growers have reported lower yields when adding MAP in furrow, this is likely due to seed burn. This method of fertilizer application can save time and money in operations that

Figure 2: Untreated (left) soybeans versus 50 lbs of MAP in furrow (right). Notice the difference in root mass, as well as the advanced state of plant development for the plant treated with fertilizer.

have the necessary equipment. This practice is probably best suited for fields with low soil test values because the yield gains will likely outweigh possible stand reductions. Sandy soils are more prone to fertilizer burn so no fertilizer should be placed in furrow in those fields.

A number of conclusions have been made upon completion of this 4 year study:

- Placing 50 lbs of MAP fertilizer in furrow with soybean seed is a reasonably safe practice. Placing larger quantities of this fertilizer in furrow with soybeans will cause stand losses and should be avoided.
- Average stand loss was 1600 plants with 50 lbs/acre of MAP in furrow
- Placing MAP in furrow appears to stimulate root growth
- Average yield gain at 16 sites over 4 years was 1.4 bu/ac, which at $12/bu soybean prices is a break even scenario
- Yield responses are greater at sites where the soil test values are considered “low”

Next Steps:

This information will be used in various reports, articles and presentations. This study is complete; however some alternative fertilizers may be tested in the future.

Acknowledgements:

We would like to thank the cooperators who lent their time and land to the project. We would also like to acknowledge AAC, OSG and OSCIA for their support of this project.

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