In 2007, a field study was conducted by Purdue University in Indiana to evaluate the performance of Wolf Trax Mn DDP in soybeans. Standard grower practices were also included for comparison purposes. The results of this study demonstrate that Mn DDP applied with starter fertilizer or as an in-season foliar application increased soybean yield as compared to the control treatment plots and plots that received starter fertilizer only.

BACKGROUND
Manganese (Mn) deficiency is prevalent in soybeans grown in several areas in North America. Often soil-applied Mn alone is ineffective at correcting Mn deficiency because chemical and biological reactions in the soil render Mn unavailable. Foliar applications of Mn can be effective at correcting Mn, but glyphosate has been shown to reduce Mn availability when tank-mixed or sprayed within 7 days of Mn application. Therefore, combinations of enhanced soil-applied and foliar applications of Mn DDP may offer a solution to Mn deficiency in soybeans.

Wolf Trax DDP Nutrients feature three proprietary technologies that ensure effective delivery of nutrition:

EvenCoat™ Technology
Fertilizer coating technology allows for blanket-like distribution and more points of interception for young roots.

PlantActiv™ Formulation
Physically and chemically designed – the Wolf Trax DDP particle size is optimum for plant uptake.

FlexUse™ Application
In fields with severe deficiencies or crops with high demand, DDP Nutrients can be applied multiple times in a season.
METHODS
A field site was chosen that was known to result in Mn deficient soybeans at the Pinney Purdue Agricultural Center in Porter County, Indiana. The soil series was a Sebewa clay loam with high soil P (30 ppm Bray-P), low soil Mn (12 ppm), 5.1% organic matter, pH of 6.5 and CEC of 22.3 meq/100 g. ‘Becks 31NRR’ soybeans were planted in 30” rows on May 10th at a plant density of 145,000 seeds/acre. Plots were 4 rows wide and 91 feet long. Each fertilizer treatment (Table 1) was replicated six times in a randomized complete block design (Table 1). Grain yield was harvested from the center two rows and yield was corrected to 13% moisture content. All data was analyzed by analysis of variance and treatment comparisons were made with single-degree-of-freedom contrasts.

<table>
<thead>
<tr>
<th>Treatment Name</th>
<th>Starter Fertilizer Application Rate</th>
<th>Starter Mn Rate</th>
<th>Mn DDP Application Rate</th>
<th>Foliar Mn DDP Rate</th>
<th>Foliar Mn DDP Application Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Starter</td>
<td>10-34-0 10 gal/ac</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Starter + Mn DDP</td>
<td>10-34-0 10 gal/ac</td>
<td>Mn DDP 8 oz/ac</td>
<td>Mn DDP 10 d post glyphosate 3 oz/ac 1 qt. + 3.4 lbs AS/ac</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Starter + Mn DDP w/ foliar Mn DDP</td>
<td>10-34-0 10 gal/ac</td>
<td>Mn DDP 8 oz/ac</td>
<td>Mn DDP 10 d post glyphosate 3 oz/ac 1 qt. + 3.4 lbs AS/ac</td>
<td></td>
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</tr>
</tbody>
</table>

Starter fertilizer with Mn DDP was applied at seeding, 2” below and 2” to the side of the seed row, and glyphosate was applied at the 4th true leaf stage in soybeans.

RESULTS
Grain yield and seed weight were highly correlated (r=0.97) and both parameters were significantly increased by Mn DDP soil-applied with a starter fertilizer; as a foliar application; or as both application methods combined (Figure 1). Starter fertilizer without Mn DDP had no significant effect on soybean yield or seed weight (Figure 1). The combined application of Mn DDP did not provide any additional benefit over either treatment alone (Figure 1).

Figure 1. Grain yield (bu/ac) and thousand kernel weight (g) of soybeans treated with Mn DDP.

SUMMARY
The results of this study demonstrate that a soil application of Mn DDP with starter fertilizer is a beneficial addition to current grower practices in soybeans that are prone to manganese deficiencies. While no further benefit was observed when Mn DDP was also applied as a foliar application, under the conditions of this study, both soil and foliar applications of Mn DDP were effective agronomic tools for satisfying the crops requirement for manganese. Mn DDP offers growers flexible application options for the growing season.