



## It's Time to Reevaluate Canola P Fertility!

Are you seed-placing your phosphorus (P) and basing application rates on seed safety rather than crop requirements? You may be leaving yield on the table. Recent research out of the University of Manitoba examining seed-safe rates of P and sulfur (S) in canola is showing that P applied at rates based on seed safety may not be adequate to maximize canola yields.

### How Much P and S Does Canola Need?

Hybrid canola has a high requirement for P and S for the entire growing season. According to the International Plant Nutrition Institute (April 2014), canola requires approximately 1.4 lbs of P<sub>2</sub>O<sub>5</sub> per bushel of canola and 0.6 lbs of S per bushel during a growing season. Of that total uptake, it is critical to examine the amount of those nutrients that are present in the seed and removed from the field with harvest. Canola will remove 0.8 lbs of P<sub>2</sub>O<sub>5</sub> for every bushel, and 0.3 lbs of S. To put this into perspective, a 45 bu/ac crop of canola will remove 36 lbs of P<sub>2</sub>O<sub>5</sub> and 13.5 lbs of S from your field. This is higher than the typical seed-placed rates of 20–25 lbs P<sub>2</sub>O<sub>5</sub>/ac and 10 lbs S/ac. Continued under-application of P and S will limit yield potential and deplete soil reserves.

Furthermore, both nutrients are important to have available to the plant for the entire growing season. Phosphorus is important for early-season growth and vigor, but continues to be used later in the season, ending up in relatively high concentrations in the seed. Sulfur is also used all year, but is critically important later in the season during flowering and seed set. It is important to note that S is not mobile in the canola plant. If S is not available in the soil later in the growing season, the plant is unable to mobilize S in the plant to reproductive structures, and significant yield reductions can result. For this reason a season long supply of both nutrients is critical to maximize yields.

### Can Adding More P and S Increase Yields?

The University of Manitoba study compared plant stands and yield of canola planted with seed-placed P and S from various products at two different rates. The **Low** rate was chosen to follow traditional or “safe” guidelines for monoammonium phosphate (MAP) and ammonium sulfate (AS) placed in the seed row at rates of 18 lbs P<sub>2</sub>O<sub>5</sub>/ac and 8 lbs S/ac. The **High** rates were then set at 35 lbs/ac of P<sub>2</sub>O<sub>5</sub> and 16 lbs/ac of S. Combination treatments of **Low MAP/High AS** and **High MAP/Low AS** were also included for comparison. Across all treatments, nitrogen was applied side-banded or mid-row. The study was conducted over three years (2010–2012) at six sites across Canada. The plots were seeded with various types of equipment, but the seedbed utilization was approximately 12% for all sites.

Study results showed a yield increase associated with increasing rates of MAP. Applications from **Low MAP/Low AS** to **High MAP/Low AS** resulted in a 2.4 bu/ac yield increase (Table 1). However, increasing rates of seed-placed fertilizer, in particular AS, negatively impacted seedling survival and resulted in decreased stand establishment. The effect on yield from decreasing plant population was limited because the study used high seeding rates, targeting 150 plants/m<sup>2</sup>. So even when high amounts of MAP and AS were applied in the seed row, surviving plant stands did not drop below critical levels.

### > FACT

Canola requires 1.4 lbs of P<sub>2</sub>O<sub>5</sub>/bu and 0.6 lbs of S/bu throughout the growing season.



However, the combination of high rates of AS and MAP did see a drop in yield, and was associated with the largest reduction in plant stands, suggesting that seed row toxicity with high seed-placed rates may negatively affect the yield (Table 1).

**Table 1.**

Treatment	Average Yield Increase (bu/ac) Compared to No Fertilizer	Average Plant Stand (plants/m <sup>2</sup> ) Compared to No Fertilizer
Low MAP/ Low AS	10.8	-7
Low MAP/ High AS	11.2	-10
High MAP/ Low AS	13.2	-5
High MAP/ High AS	10.8	-11

Visual P deficiencies are seldom present within a canola crop. If P deficiencies are visual, they can easily be missed during scouting. This study shows that current P application rates may not be sufficient to maximize yields. If P fertilizer applications do not replenish phosphorus that is leaving the field at harvest, soil test P values will decline and affect yields in upcoming crops. With both phosphorus and sulfur critical to maintain balanced crop nutrition, canola growers should consider products with higher seed safety or alternative application methods in order to apply sufficient rates of P and S to maximize yield.

## Higher rates of P and S Can Be Seed-Placed Without Compromising Stands

Seed-placed fertilizers give farmers the benefit of knowing nutrients are available at the start of the growing process. Particularly with some immobile nutrients, like P, the roots of the plant don't have to go very far to find the nutrients they require. However, that exact benefit can be the cause of a poor stand. Roots won't explore the soil close to high fertilizer concentration until the nutrient itself has

diffused into the soil. With P, in particular, farmers could apply some P in the seed row and some in a fertilizer band away from the seed to encourage roots to spread, but it would require a special seeding tool or an additional fertilizer application.

Included in the University of Manitoba's research was MicroEssentials® S15™. The amount of nutrient applied was the same as with the blends, but plants receiving an application of MicroEssentials S15 saw improved stands. Higher rates of P and S applied with blends accounted for a loss of 11 plants per square meter; however, the same rates of P and S applied with MicroEssentials S15 saved nearly 50 percent more plants, with a reduction of only six plants per square meter (Table 2).

**Table 2.**

Treatment	Decrease in Average Plant Stand (plants/m <sup>2</sup> ) Compared to No Fertilizer
High MAP/High AS	-11
High MicroEssentials S15	-6

## The Science Behind MicroEssentials® S15™

MicroEssentials® S15™ (13-33-0-15S) is a proprietary fertilizer specifically formulated for use on most crops. Through Mosaic's patented Fusion® technology process, N, P and S are fused into one nutritionally balanced granule. It provides both the P and S a canola crop requires, but with less toxicity, as it has lower levels of N than a traditional blend of MAP and AS has. MicroEssentials also provides two forms of S for season-long availability: sulfate S and elemental S. While the sulfate S is immediately available for early-season requirements, the elemental S slowly oxidizes and becomes available during the growing season, helping to supply the late season requirements of canola. This also helps lower the toxicity, making it safer to place in the seed row with canola seeds.



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