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DIGGING INTO RESEARCH



Assessing soybean rotational benefits

CATEGORY [soils and fertility](#) | September 22, 2018

Soybeans provide similar rotational benefits as pea and lentil on subsequent wheat and canola crops – but keep an eye on phosphorus fertility.

Nutrient uptake, removal and rotational benefits have been frequently studied for pea and lentil in western Canada. Research at the University of Saskatchewan compared nitrogen (N) and phosphorus (P) uptake of soybean with pea and lentil, and their impacts on the subsequent wheat and canola crops.

In 2014, three short season soybean varieties, three pea varieties (2 yellow and 1 green), and three lentil varieties (small green, large green, and small red) were grown on wheat stubble at Rosthern, Saskatoon, Scott and Yorkton, Saskatchewan. Soybeans were double inoculated and also received a fungicide seed treatment. Pea and lentil were inoculated with *Rhizobium* inoculants. Seeding date was late May to early June. No fertilizers were applied, based on adequate soil test analysis.

In general, grain yield of soybean, pea, and lentil at the four sites was at or above the provincial average yield levels for each crop in Saskatchewan in 2014, which were 19 bushels per acre for soybean, 34 bushels per acre for pea and 1371 pounds per acre for lentil.

At harvest soybean had higher grain N than pea and lentil at three of four site years. Soybean grain P was generally higher than pea and lentil at all four site years. Overall, among the three crops, soybean had high concentrations of N and P in the grain, while lentil had relatively high N and P concentrations in the straw. This indicates that P removal in soybean grain is higher than pea and lentil and should be considered in fertility planning.

Rotational effects

The following year in 2015, hard red spring wheat was sown on the three different pulse stubbles at Rosthern, Saskatoon, and Scott sites. Canola was sown at the Yorkton site. Rosthern and Saskatoon were selected for monitoring of soil-available N and P using plant root simulator (PRS) ion exchange resin membrane probes throughout the growing season.

Prior to seeding, soil test results found that soybean, pea and lentil stubble had similar soil N and P supply rates at both sites. Over this one rotational cycle, soil nutrient supply, N and P uptake, and yield of wheat and canola were similar on soybean, pea and lentil stubbles.

The researchers suggested that these pulse crops provide similar short-term rotational benefits. However, they cautioned that higher N and P concentrations in soybean grain across the sites indicated greater potential for crop removal and soil depletion over the long term. Soybean growers are advised to consider P removals when soybean rotations are used over a longer period and compensate for those higher removals by balancing P fertility over the long-term cycle of the rotation.

Xie, J, Schoenau, J., and Warkentin, T.D. 2018. Yield and uptake of nitrogen and phosphorus in soybean, pea, and lentil and effects on soil nutrient supply and crop yield in the succeeding year in Saskatchewan, Canada. Can. J. Plant Sci. 98: 5–16 (2018)

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