

Fall Fertility Strategies for Next Year's Pulse Crop

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Fall is a good time to review fertility strategies for pulse crops planned in next year's crop rotation. Building a longer-term fertility management plan across a cropping system is recommended, particularly for nutrients such as phosphorus. Annual crops, including pulses, uptake significant amounts of phosphorus in a growing season, of which about three-quarters is contained in the grain that is removed at harvest, so plan ahead. The key is to manage your fertilizer program throughout all crop rotations for long-term sustainability.

Dr. Jeff Schoenau, Professor and Ministry of Agriculture Strategic Research Chair, at the University of Saskatchewan recommends that growers should have both a short-term and long-term fertility management strategy. Soil testing in the fall is a good way to determine what the nutrient requirements will be for your pulse crop in the spring. Consider the planned crop rotation, expected yields, and crop nutrient removal over time. The amount of nutrients removed by the crop is going to be variable depending on crop type and yield. Associated with the variable moisture and its influence on yield, removal rates will vary from region to region.

For longer-term fertility planning in rotations containing pulses, it is important to be thinking about crop removal of nutrients like phosphorus and potassium. Research with faba beans and soybeans show that these crops have high phosphorus uptake, and remove appreciable amounts of phosphorus from the soil. Although these crops are rather good scavengers of nutrients and are not always that responsive to phosphorus or potassium fertilizer, they still remove significant amounts from the soil that are exported off the field in grain harvest. Pulses also establish beneficial relationships with soil organisms like *arbuscular mycorrhizal fungi* that act to extend the root system and further increase phosphorus uptake. The nutrients removed from the field within the harvested grain need to be replaced to maintain fertility of the soil over the long-term.

Fall is also a good time to consider banding nutrients such as phosphorus and potassium, particularly if fall fertilizer pricing is good and harvest is finished early enough to complete the operation. Broadcasting alone is not recommended for phosphorus, as the fertilizer will remain near the surface, stranding some of it, making it unavailable for crops in the spring. It can also contribute to loss of phosphorus in runoff. It is important to balance input and removal over the entire crop rotation cycle to maintain phosphorus fertility.

Some pulse crops like peas can tolerate only small amounts of seed row placed fertilizer. If additional fertilizer is required, that may mean applying additional phosphorus and potassium

fertilizer in a separate band at the time of seeding, pre-seed banding, or applying higher rates of fertilizer to the previous crop and relying on carry-over into next season.

As some pulses are more sensitive to seed row placed fertilizer than others, Dale Risula, Provincial Specialist, Special Crops, Crops and Irrigation Branch, Saskatchewan Ministry of Agriculture encourages growers to check the maximum limits of how much fertilizer phosphorus and potassium can be applied with the seed for various crops in the spring.

Maximum Safe Rates of Seed-Placed Phosphorus	
Crop	Actual Phosphorus (Pounds per Acre)
Peas	15
Lentils	20
Chickpeas	20
Faba Beans	40
Pinto Beans	30
Soybeans	20
Canola	25
Cereals	50

Nutrient Removal Rates (Pounds per Bushel)				
	Nitrogen	Phosphorus	Potassium	Sulphur
Peas	2.3	0.7	0.7	0.3
Lentils	2	0.6	1.1	0.2
Chickpeas	-	0.36	-	-
Faba Beans	3	1.2	0.9	0.1
Soybeans	3.8	0.85	1.4	0.2
Canola	1.6	0.8	1.4	0.25
Wheat	1.5	0.57	0.33	0.1

Adapted from: Saskatchewan Ministry of Agriculture, Canadian Fertilizer Institute, Jeff Schoenau, University of Saskatchewan

For example, field peas are very sensitive, while faba beans can tolerate higher levels of seed-placed fertilizer. Depending on target grain yield, most pulses can remove more phosphorus than can be safely placed with the seed.

Sulphur is another important macro-nutrient for pulses, and could be a limitation on sandy, highly leached soils of low organic matter, or where soil supplies of available sulphur are low.

Growers also need to think about field nitrogen levels, and for pulse crops, are typically looking for fields with lower soil available nitrogen to maximize the contribution of biological nitrogen fixation. Fields with too much nitrogen can reduce the nitrogen-fixing ability of pulse crops, and the overall benefits of growing a legume in rotation.

Fertilizing After Your Pulse Crop

For crops following pulses in rotation next spring, the yield of this year's pulse crop can be a good indicator of what the expected nitrogen contribution will be to the following crop. Schoenau's recent research shows that there was little difference between field peas and soybeans in terms of nitrogen contribution to the following crop. Generally a higher pulse crop yield will mean growers can also expect a little more nitrogen contribution from the pulse crop stubble the next year. Although straw yield tended to be a more reliable indicator of nitrogen contribution than grain yield in the research, most growers get good grain yield information from the combine. There are also nitrogen benefits derived from below-ground contributions of the stubble and improved nitrogen uptake by the following crops.

Use the fall to get prepared for grain legume crops next spring, and other crops in rotation. Get a head start on short-term and long-term fertility planning, particularly for nutrients such as phosphorus and potassium. Developing a long-term fertilizer strategy for the rotation to address phosphorus removal helps ensure maintenance of phosphorus fertility through the entire crop rotation over several years.