

Fertility value of unharvested crops

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The adverse harvest conditions in fall 2019, resulted in considerable acreages of soybeans, dry beans and potatoes left in the field unharvested. Some soybeans may yet be spring combined, but farmers are asking now about the fertility value of these crops if they remain unharvested.

The nutrient content of these crops has been measured and reported from recent studies¹ (Table 1). These values could be scaled up according to the expected yield of the unharvested field. But the actual contribution to the following crop may vary based upon the rate of decomposition and the timing of uptake by the following crop.

Table 1. Plant nutrient equivalent content of dry beans, soybeans and potato tubers¹.

Crop	C:N Ratio	Total N content	Total P ₂ O ₅ equivalent	Total K ₂ O equivalent
Dry beans	13:1	3.5 lb/cwt	1.1 lb /cwt	1.9 lb /cwt
Soybeans	8.3:1	3.8 lb/bu	1.2 lb/bu	1.2 lb/bu
Potatoes	37:1	32 lb/100 cwt	16 lb/100 cwt	60 lb/100 cwt

The release of phosphorus and potassium will not be sufficient to act as “starter fertilizer”, but will act to replace soil reserves. Generally, potassium is soluble and readily available, whereas some phosphorus will be slower in availability. A reasonable contribution may be for 80% of the phosphorus and 90% of the potassium to be available for crop growth².

In contrast, nitrogen (N) in the seed or tuber is in organic compounds and needs to be decomposed by soil microbes before becoming available for crop use in mineral form as ammonium (NH₄⁺) or nitrate (NO₃⁻). The rate of release is controlled by the carbon to nitrogen ratio (C:N) of the substrate and the rate of microbial activity.

When the C:N ratio is less than 20:1, decomposition proceeds rapidly and nitrogen release will be available for crops. But when C:N ratio is greater than 20-30:1, there will be some immobilization of soil N by soil microbes before N release eventually occurs.

So based on C:N ratios, one might expect full N release from the low C:N ratio dry bean (13:1) and soybean (8:1) crops, but incomplete or delayed contribution from potatoes (37:1). It may be reasonable to assume only 30% of the potato N to be available for short season crops like wheat or canola and 50% to be available for corn.²

An example of the nutrients availability for 2020 from unharvested medium crop yields is in Table 2.

Table 2. Estimated nutrient availability to 2020 crops from unharvested dry bean, soybean or potatoes.

Crop and estimated yield	Available N	Available P ₂ O ₅	Available K ₂ O
	Lb/ac		
Dry beans 20 cwt/ac	70	18	34
Soybeans 30 bu/ac	114	29	32
Potatoes 300 cwt/ac	29 @ 30% available 48 @ 50% available	38	162

Farmers are accustomed to the fertility impacts of these crop’s straw residues but may wish to account for the nutrient contribution of seed or tubers. An assessment of the yield potential along with these estimates may be useful to that end.

References:

¹Heard, J. and D. Hay. 2006. Nutrient Content, Uptake pattern and C:N Ratios of Prairie Crops. http://umanitoba.ca/faculties/afs/MAC_proceedings/proceedings/2006/heard_hay_nutrient_uptake.pdf

²Rosen, C. University of Minnesota. 2019 personal communication.