

Potassium deficiencies in corn and fertilizer recommendations



Potassium deficiencies have been observed in many Manitoba cornfields this spring. Some are showing visual deficiencies in spite of broadcast applications of potash (Figure 1). This can be attributed to the deficiencies to low soil test potassium levels (STK), cold dry soils with reduced diffusion and early root growth and use of the less efficient broadcast application method. Past Manitoba research indicates sidebanded K is some two times more efficient than broadcast application.

Figure 1. Typical potassium deficiency in corn. Note firing (yellowing and browning) on outside margins of lower leaves.

Some have wondered what typical yield response to applied potassium might be, and for that we rely on recent North Dakota studies¹². In response to increased grain corn production in North Dakota, NDSU researchers conducted 27 field experiments to gauge crop response to applied potassium (K) across a range of soil test K (STK) levels. These sites received broadcast potash (KCl) at rates to supply 0, 30, 60, 90, 120 and 150 lb K₂O/ac. Some individual site yield responses to potassium were very large (up to 50 bu/ac). NDSU researchers were able to further differentiate response related to clay mineralogy and have accordingly developed a Corn Potassium Recommendation Calculator³.

The following graphed summary illustrates average yield response grouped according to soil test ratings used by the Manitoba Agriculture Soil Fertility Guide⁴ in Figure 2.

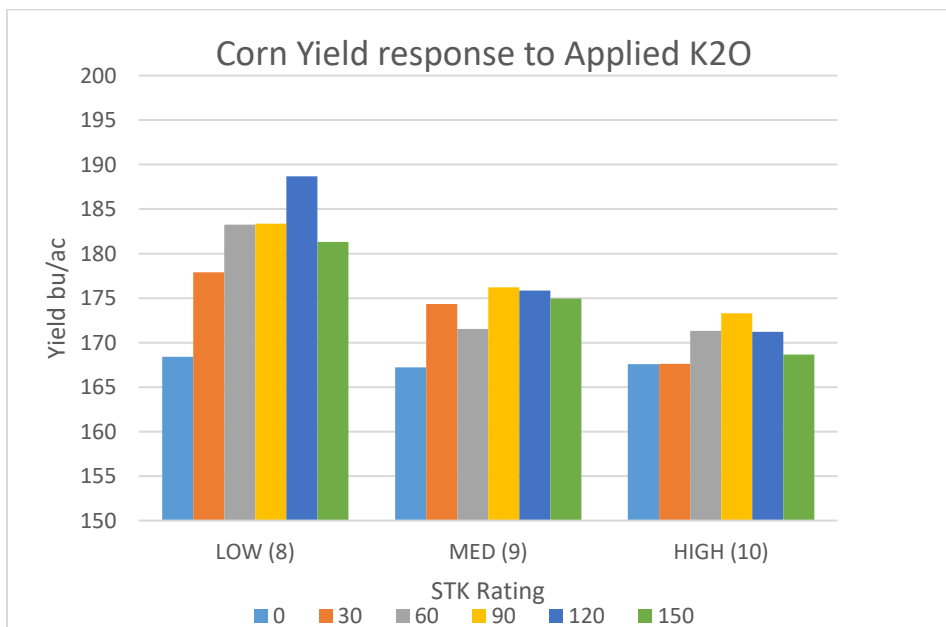


Figure 2. Average corn yield response to applied potassium. STK levels are as follows: LOW (8 sites) = <100 ppm, MED (9 sites) = 101-150 ppm, HIGH (10 sites) = >151 ppm

Grouping responses according to Manitoba STK ratings generally show greatest yield response at LOW soil test levels, with less yield response with increasing soil K levels.

Such data tends to support our current MB fertilizer recommendations³ for corn as follows:

Soil Potassium (ammonium acetate K test) ppm	Fertilizer potash (lb K ₂ O/ac)	
	Side banded	Broadcast and incorporated
0	100	200
25	90	180
50	80	160
75	75	150
100	65	130
125	55	110
150	50	100
175	40	80
200	30	60
200+	0	0

Visual assessments and tissue testing can help identify low potassium fields but a soil test is critical for proper rate recommendations. Corn exhibiting visual potassium deficiency will likely have reduced stalk strength at harvest with increased lodging, so such fields should be slated for earlier combining than other fields.

References:

¹ Breker, J. 2017. Recalibration of soil potassium test for corn in North Dakota. M.Sc. Thesis.

² Rakkar, M.K., Franzen, D.W. and Chatterjee, A. (2015) Evaluation of Soil Potassium Test to Improve fertilizer Recommendations for Corn. Open Journal of Soil Science, 5,110-122.

³ North Dakota Corn Potassium Recommendation Calculator. 2018.
https://www.ndsu.edu/pubweb/soils/corn_k/

⁴ Manitoba Agriculture. 2007. Soil Fertility Guide.

