



Considerations for Fertilizer Use

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It is extremely difficult to obtain maximum economic yields without application of fertilizers, which are a costly input. Therefore, it is important to apply fertilizer nutrients from the right source(s), in right amounts and at the right place and time to maximize nutrient use efficiency and minimize environmental impacts. Even though there are 16 nutrients (C, H, O, N, P, K, Ca, Mg, S, Cu, Zn, Fe, Mn, B, Mo and Cl) that are essential for crop growth and development, you don't have to apply them all. You need to apply only those nutrients which are in low amounts in your soils. Therefore, a soil test is a prerequisite to planning a fertilizer program for crop production.

Carbon, Hydrogen and Oxygen (C, H and O): These nutrients are available from air and water and need not to be applied!

Phosphorus and Potassium (P and K): Apply P and K to each crop as per soil test based recommendations at seeding. P as 11-52-0 (MAP) can be safely applied up to 50 kg MAP/ha in the seed row. K is better applied broadcast and incorporated in the soil (seed drill will do the job of incorporating). Since P and K aren't lost like N (volatilization, leaching and denitrification), these could also be applied in the fall, especially to perennial forages.

Nitrogen and Sulphur (N and S): Sulphur has become as important as N, P and K. Apply S through ammonium sulphate and adjust the nitrogen in it in other fertilizer amounts. Given below are recommendations for N and S for important field crops:

Canola: Apply 150 kg ammonium sulphate/ha to supply 36 kg S/ha. This will also supply ~30 kg N/ha. Apply another 150 kg N/ha to canola; 100 kg N/ha through urea (= 217.4 kg urea/ha) and 50 kg N/ha

through ESN (=113.6 kg ESN/ha) to supply a total of 180 kg N/ha. All N and S should be applied at seeding. ESN should preferably be applied in the seed row and the other fertilizers could be broadcast incorporated at seeding. I would encourage canola growers to try applying 240 kg N/ha in a small area. We have obtained linear response to N application in canola up to 240 kg N/ha!

Spring Cereals: Apply 50 kg ammonium sulphate/ha to supply 12 kg S/ha. This will also supply ~10 kg N/ha. Apply another 70 kg N/ha to the cereals; 50 kg N/ha through urea (= 108.7 kg urea/ha) and 20 kg N/ha through ESN (=45.5 kg ESN/ha) to supply a total of 80 kg N/ha. All N and S should be applied at seeding. ESN should preferably be applied in the seed row and the other fertilizers could be broadcast incorporated at seeding. We have tried applying N @ 120 kg/ha to spring wheat in more than one experiments and didn't find any extra benefit as compared to its application @ 80 kg/ha.

Corn: Apply 100 kg ammonium sulphate/ha to supply 24 kg S/ha. This will also supply ~20 kg N/ha. Apply another 130 kg N/ha to corn; 87 kg N/ha through urea (= 189.1 kg urea/ha) and 43 kg N/ha through ESN (=97.7 kg ESN/ha) to supply a total of 150 kg N/ha. All N and S should be applied at seeding. ESN should preferably be applied in the seed row and the other fertilizers could be broadcast incorporated at seeding.

Test manure and deduct N contribution made by manure application from the total amount of N. In the absence of manure test, you can deduct 10 kg N/ha for every 1000 gallons of liquid manure/and 10 MT solid manure/ha. You could also try a higher rate of N application (200 kg N/ha) to corn in a part of the corn acres.

Soybean and first two years of alfalfa (seeding and first harvest year): Apply 100 kg ammonium sulphate/ha to supply 24 kg S/ha. This will also supply ~20 kg N/ha. Apply another 25 kg N/ha through urea (=54.3 kg urea/ha) to supply a total of 45 kg N/ha. From the second harvest year, apply 150 kg ammonium sulphate + 32.6 kg urea/ha to supply 45 kg N + 36 kg S/ha.

Grasses/Grassy Pastures: Apply 100 kg ammonium sulphate/ha to supply 24 kg S/ha. This will also supply ~20 kg N/ha. Apply another 120 kg N/ha to grasses; 80 kg N/ha through urea (=174kg urea/ha) and 40 kg N/ha through ESN (=91 kg ESN/ha) to supply a total of 140 kg N/ha. All N and S should be applied in the spring as early as possible.

Other considerations:

We have tested fall vs. spring application of N in grasses and spring wheat and found that fall application of N was as effective as its spring application.

Our soils are deficient to marginal in boron (B). Therefore apply 1 kg B/ha to all crops. Canola growers may try a higher rate of 2 kg B/ha. B helps in pollination of crops.

Apply 7 kg Zn (Zinc)/ha to corn even when soil test indicates sufficient levels of Zn in the soils, because

corn is extremely sensitive to Zn deficiency and in the cold springs Zn availability to crop plants is restricted.

Iron (Fe), Copper (Cu) and Manganese (Mn) are usually sufficient in our soils. However, if the soil tests show Mn deficiency, apply 2 kg Mn/ha (= 8 kg Manganese Sulphate/ha) as spray application at tillering when the canopy starts covering the ground. Soil application of Mn was not found to be effective. Copper deficiency can be corrected by soil application of copper sulphate up to 5 kg/ha.

Chlorine (Cl) requirements will be met through 0-0-60 (MOP) and need not to be applied.

Liquid fertilizers could be advantageously applied at seeding.

Apply lime at recommended rates to correct soil acidity; prefer dolomitic lime stone if the soil tests indicate Magnesium (Mg) deficiency. Remember nutrient availability is generally maximum at the neutral soil pH (6.5-7.5). Mg deficiency can also be corrected by application of K-Mag (0-0-22-10.8-22).

Sulphur and micronutrients could be blended with other fertilizers before application.

Any questions please feel free to contact me at tssahota@lakeheadu.ca or 807-707-1987.

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There are over 650 Certified Crop Advisers (CCA) in Ontario. Each CCA has demonstrated their knowledge about Ontario crop production by passing the required exams. In addition, they have the crop advisory experience, the education, the commitment to continuing education and have signed a comprehensive code of ethics, which places the grower's interests first.

This industry driven program helps ensure that Ontario crop producers are well served by those providing their crop production advice. This article was written by one of those CCA's.



