

Crop and Fertilizer Planning for Season 2012

I Fertilizer Planning

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Attaining **maximum economic crop yields** of quality produce is almost impossible without an adequate supply of essential plant nutrients. **An economic optimum fertilizer program** should aim at overcoming nutrient deficiencies in the soil, maintaining nutrients levels at a reasonably high level, avoiding excessive build up of nutrients and nutrient imbalances and minimizing impact of fertilizer nutrients on the environment. Important components of a sound fertilizer program are soil testing (at least every 2-3 years), identifying right sources of nutrients and their nutrient composition, and optimum rate, time and method of nutrients application.

Soil testing: Take soil samples from your fields if you haven't done the soil tests for the last 2-3 years. For basic soil tests and for micronutrients analysis, 0-15 cm or 6 inches soil depth is okay. Go for micronutrients tests, especially for zinc and boron, if you haven't tested your soils for micronutrients in the recent past. Remember sustaining crop yields with the application of NPK fertilizers alone may not be possible! You may wish to test alfalfa, soybeans and corn fields for nitrogen (N) and sulphur (S) too so that you are able to discount some residual/or fixed N from these crops next spring. Recommended sampling depth for N and S is 0-30 cm or 12 inches. For details on soil sampling and testing, please refer to Agronomy Guide for Field Crops (Section Soil Testing: <http://www.omafr.gov.on.ca/english/crops/pub811/9soil.htm>). You may also visit: [http://www1.agric.gov.ab.ca/\\$Department/deptdocs.nsf/all/agdex1341](http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/agdex1341) or refer to Soil Fertility Guide. The economic and environmental benefits from a sound fertilizer program, based on soil tests, could be many times the cost of soil testing.

Manure testing: Fertilizers, especially K fertilizers, are costly and manure contributes quite a bit of K and other nutrients. Testing manure to decide on the right rates of manure and fertilizers application could help in cutting down costs on nutrients application and obtaining maximum economic yields. For details on manure sampling and testing, visit: http://www.ageng.ndsu.nodak.edu/animalwastemanagement/manure_sampling_testing.htm.

Fertilizer application: This calls for efficient and rational use of fertilizer nutrients to get the most out of the dollars spent on fertilizers. A holistic approach to fertilizer application is desirable. Take soil and manure tests, targeted yields, crop removal of nutrients and soil test based fertilizer recommendations in to consideration while planning for an optimum fertilizer program. Refer to <http://www.omafr.gov.on.ca/english/crops/pub811/p811toc.html> for soil test based fertilizer recommendations and modify these recommendations based on location/or situation specific research. Choose fertilizers carefully by calculating cost per unit nutrients. If MAP (11-52-0) and TSP (triple super phosphate: 0-46-0) are sold at the same price, prefer to buy MAP that will give you more nutrients per dollar than TSP. N supply from MAP could be adjusted in the N fertilizers. While planning a fertilizer program, don't limit yourself to crop yield. Look for nutrient management practices that enhance crop quality as well. Sometimes, application of a nutrient may not improve crop yield, but may improve the produce quality to a

level where the produce fetches a premium price in the market, making the nutrient application economical. Fertilizers application decisions based on crop yield alone could therefore be faulty.

Perennial forages: Fall application of phosphorus (P) and potassium (K) to perennial forage crops is recommended. Make adjustments for the P and K supply from manure if you apply manure to forages in fall/or spring. Ideal time of manure application is when the temperature is at/below 10° C. Try to match the manure application with rain (within a day or two). Research at TBARS has shown that N as urea/or ESN to grasses could be applied in the fall (around September 25) as well. While the dry matter yields from one time fall application of ESN (105 kg N/ha) was only marginally higher than that from urea (105 kg N/ha) applied in two splits (70 kg in fall/or spring and 35 kg after first cut), protein content was 0.6-1.4 % point higher with ESN than that with urea. Fall application of N along with P and K application to perennial grasses would have no extra cost, but would save cost and time of an additional operation in the spring. If you choose to apply N to grasses in spring, go for a blend of ESN and urea in 25:75 ratio on N basis. This combination can more than meet extra cost of N from ESN with an additional advantage of higher protein in the hay. Application of 20 % of total N to grasses from ammonium sulphate is desirable to improve the dry matter yield and protein content of grasses. At TBARS, a linear increase in dry matter yield of timothy was recorded up to 105 kg N/ha, which means that economic optimum rate of N in grasses could be higher than the usually recommended 105 kg N/ha. You may choose to apply 60 kg ESN + 80 kg ammonium sulphate + 135 kg urea/ha to supply 105 kg N/ha to grasses in spring. The combination will also meet S requirements of grasses. ESN in the N fertilizer blends helps in early/better growth of grasses in the next spring(s).

TBARS is yet to test fall application of **ammonium sulphate in alfalfa**. Spring application of ammonium sulphate @ 100-150 kg/ha, depending upon the degree of sulphur deficiency in soils, along with **boron (B) @ 2 kg/ha**, in soils low to deficient in B, helps to attain maximum economic yields of alfalfa over longer periods. We didn't observe any toxicity of B at this rate at TBARS/or in our growers' alfalfa fields. Higher rates of these two nutrients are especially advisable if you are planning to have three cuts. Manure application in alfalfa fields, very high to excessive in available K, could be omitted/and saved for soybean/or other crops. Even otherwise, alfalfa doesn't respond much to manure provided it is supplied with adequate amounts of fertilizer nutrients. It adds enough organic matter to soils at its own because of leaf drop and frost kill of top growth after harvesting.

Spring Cereals: Adjust the soil test recommendations for nutrient contribution from manure/and rotational crops. Since N in manure is mainly in the ammonia form that isn't so readily available in cold springs making adjustments for N from manure in cereals isn't recommended (based on TBARS research) though you could adjust P and K supplied by the manure. Additional N from manure helps to increase grain and straw yield and also grain protein content (at least 1 % point) in cereals. Though we didn't get higher grain yield of wheat by using ESN as compared to urea, yet we found that entire amount of N (70 kg/ha) from ESN could be applied in the seed furrow without any harmful effect on crop growth or yield. Apply 50 kg ammonium sulphate/ha to spring cereals to overcome the risk of S deficiency and adjust N from ammonium sulphate while

applying N from other sources. N application rate to cereals following alfalfa, soybean and well fertilized corn could be reduced to 35-40 kg N/ha. Application of N to cereals could be totally omitted if the soil nitrate N test is above 20 ppm! It is desirable to apply a starter rate of N and P in the seed row for proper root development and an early crop start. If you use MAP (11-52-0), as a starter fertilizer, take care not to apply P at rates higher than recommended.

Corn: loves high fertility fields! Apply abundant amounts of manure to corn fields, but take care not to excessively build up P and K in the soil. In addition to P and K, make adjustments for N contribution from manure as well (for a total N supply of 150 kg/ha), because manure N will be available to corn due to its longer growth duration than cereals and peak nutrients uptake by corn in warm months. Application of part N as ammonium sulphate @ 100 kg/ha is desirable to sustain N supply little longer and to cover the risk of S deficiency. Corn is the most sensitive crop to zinc (Zn) deficiency. Therefore don't forget to apply at least 7 kg Zn/ha to corn.

Soybean: Apply P and K to soybeans as per soil test based recommendations making adjustments for nutrients supplied by manure. This year's data from TBARS indicated that solid dairy manure applied last fall @ 50 t/ha, increased soybeans grain yield by ~870 kg/ha (~20 %) as compared to no manure application. At this rate of manure application, soybeans didn't respond to the applied nutrients (N, P, K and S).

Canola: N requirements of canola are about the same as that of corn (150 kg N/ha; apply up to 100 kg N/ha at seeding and the rest a month later). Go for the same mix of N from urea and ammonium sulphate as that for corn. Apply P and K as per soil test. In addition, apply at least 1 kg B/ha to canola. Boron helps in pollination and seed setting and minimizes the risk of pods abortion/and unfilled pods. Dry weather in particular limits B availability from soil sources.

Planning for crops and crop varieties will be dealt with in the second part of this article. Stay tuned to the next issue of Northwest Link!

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