Waypoint ANALYTICAL

Approaches to Reducing Fertilizer Costs

Current high fertilizer prices have forced growers to reassess their fertility program in efforts to reduce costs. Several factors must be considered when making decisions that will likely impact the nutrition and yield of the crop. A soil may have a substantial amount of nutrient but when taking the physical condition (i.e. compaction, texture, slope, etc.) into account the availability of that nutrient may be hampered. Fertilizers rapidly increase the concentration of a nutrient in the soil solution. Soils, and especially those physically compromised, will free nutrients into soil solution at a slower rate. During rapid vegetative growth the nutrients in the soil solution can quickly become exhausted given the high uptake at this stage of development. It is important to bear this in mind when making the decision to reduce the dose of fertilizer applied. Below, is a list of options a grower or consultant can consider that can help them make the most practical or economic decision. These options are not intended to guarantee or maintain historic yields. They can be used individually or, better still, customized in combination.

Suggestion 1: Eliminate the maintenance application on high or very high testing soils.
A common recommendation philosophy involves maintaining high soil test levels. For example, a recommendation for a minimum recommended amount of P_2O_5 or K_2O will be applied to those areas that are already high. The purpose of this maintenance recommendation is to keep soil test levels so as to not drawdown the nutrient. It also serves as a buffer that can help the grower absorb the impact of not applying fertilizer in years when the costs for fertilizer are very high. It functions as a type of bank account that can be withdrawn from when there will be little to none deposited. Not applying fertilizer for a year should not drastically reduce the soil test levels.

Suggestion 2: Only apply the amount of nutrient that will be removed.
In this approach, we consider the yield of the crop and the amount of fertilizer per unit historically harvested. If 200 bushels of corn were harvested per acre, we determine the amount of P_2O_5 removed by multiplying 200 by the factor 0.375. This factor is the pounds of P_2O_5 removed per bushel. Approximately 75 lb of P_2O_5 per acre will be removed. It is a simple approach and it will not deplete the soil. However, the method should be implemented with yield maps so as to not over apply or under apply fertilizer.

Suggestion 3: Decrease the application by a certain percentage.
The only thing taken into account here is the grower's budget. It is very simple but very little to no work is involved. It is most often used when information regarding yield and fertility is not available or there is no time to consider it.

Suggestion 4: Band and split the fertilizer applications.
Improved timing and placement are factors that greatly increase the efficiency of fertilizers. Broadcast applications of fertilizer at pre-plant are about 50-60% efficient at most. A significant reduction in fertilizer costs can be made when applying the fertilizer close to the roots and in anticipation of major nutrient uptake. Too much fertilizer is often lost, fixed, or simply not reached by the plant roots when it is broadcast.

Suggestion 5: Concentrate applications on the most responsive or best performing areas.
Reducing the rate on sections of the field that don't perform and placing it on areas that are more productive can increase the return on investment of fertilizer applications. This concept can be transferred to planting density as well. Knowledge of the field and yield maps are important here. Better performing areas don't always have the highest or most optimum soil fertility numbers on paper. But soil fertility is more than pH, organic matter, macro and micronutrients. Topsoil depth, weed/pest/disease pressure, soil tilth, moisture retention, etc. all play a role in the complete fertility of the soil. I have seen cases where the lesser performing section of the field had a better looking soil report than the other half of the field that performed better. The reason was that the better performing area had greater soil tilth and consequently more nutrient removal had occurred in that area.

Suggestion 6: Select a crop with lower fertilizer inputs.
If possible, consider planting a crop that requires little to no amendments. Leguminous crops, such as soybeans, will likely be a grower's easiest choice. Peanuts are another option if you are in the correct region in the South.

Along with these suggestions, CULTURAL practices that improve the quantity of an available nutrient should not be overlooked.

Alleviate compacted soils. Soil fertility is not just about what the numbers on the paper say. Available soil volume is equally important. For example, soil 1 has all the soil nutrients and pH in the optimum range yet it is compacted 6 inches below the surface. Soil 2 has medium soil test levels but is not compacted. A medium phosphorus in a non-compacted soil will provide more phosphorus than a compacted high testing soil. Compacted soils mean low soil volume which result in low nutrient If sub-soiling is allowed, be sure the soil is dry enough to crack and do not go deeper than just below the hard pan. Sub-soiling moist soil will slice and going much deeper than the hard pan can create a deeper area of compaction. Plant something immediately into subsoiled fields so that roots help keep the new soil passages open.

Cover cropping is a cultural practice that can help build nutrient levels, remediate compacted soils, maintain available soil volume, conserve potentially leachable nutrients and release nutrients. A leguminous crop will obviously fix atmospheric nitrogen, but it will also take up other nutrients in their ionic form (K^+, Mg^{2+}, Fe^{3+}, Fe^{2+}, etc.) that the crop requires so that it is more quickly and efficiently utilized. These ionic forms leach from the cover crop residue in the necessary form. The crop will not need to exert as much effort to uptake these. Grasses, non-leguminous forbs and brassicas can provide a similar function but without the nitrogen fixation. Keep in mind that many grass cover crops will provide a slower nutrient release if allowed to mature due the higher carbon to nitrogen ratio. A significant contribution of grass and other cover crops is to draw nutrients from deeper in the soil profile and transfer them to the topsoil.

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