



Manage Nutrition for Profit Advantage

Questions Worth Answering about Your Soil Testing Program



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Regular soil testing is one of the best tools you can use for determining which nutrients are present and how much will be available to your crops. Soil testing can predict which nutrients and how much needs to be added for plants to reach their yield potential. Decades of improving lab chemistry techniques and extensive field calibration provide a measure of confidence in knowing what is happening in the soil. Nevertheless, there are several things worth considering before samples are sent to the lab and after the results are returned. Here are some questions and responses.

Do my soil samples adequately represent my fields?

Getting a good soil analysis is totally dependent on submitting a representative sample. Considering that the rooting zone of an acre consists of well over 1,000 tons of soil and that the laboratory will only analyze a tablespoon of this soil, the importance of getting a representative sample is obvious. A soil analysis can only be as good as the sample that was sent to the lab. The greatest errors in soil testing typically occur as a result of taking a poor sample.

Why do I often need to add more nutrients than I harvest in crops?

Whenever crops are removed from the field during harvest, the nutrients in the harvested portion of the plants are also removed, thus leaving the soil a bit more depleted than before. Replacing these harvested nutrients is a bare minimum for maintaining soil fertility levels. However, due to a variety of chemical and biological reactions that make many nutrients less available to the plant, the addition of more nutrients is usually required than just the amount harvested. Failure to replenish the soil supply of nutrients will result in a gradual depletion of soil fertility and can ultimately lead to diminished crop yield and quality.

But where is the fertilizer that I added last year?

In a perfect world, all the added fertilizer would be taken up by the crop and used for growth. Unfortunately, there are many soil reactions that reduce the availability of applied nutrients... whether the nutrients are added as fertilizer, manure, or from other sources. Since these reactions differ for each nutri-



Soil testing techniques and procedures continue to evolve. But the goals of the individual grower must be considered in making recommendations.

ent, carefully consider where last year's fertilizer is and decide what practices you can adopt to improve fertilizer efficiency, boost yields, and avoid undesirable losses. Although there are many practices that can improve fertilizer recovery, nature will always remove a portion of the added nutrients and keep some from being available to crops.

How much fertilizer should I add?

General fertilizer recommendations are based on the results of the soil analysis and the expected crop response. But the goals of each grower need to be considered in making a specific fertilizer recommendation. One common approach for making recommendations, especially for phosphorus (P) and potassium (K), is called the “**sufficiency**” concept and is based only on the predicted crop response to each added nutrient. Fertilization occurs only when there is a good chance that there will be a profitable response that year. This could be compared to adding just one gallon of gasoline to the car in order to get to the store and home again.

The other common approach to P and K fertilizer recommendations is the “**build and maintenance**” concept. With this system, nutrients are added in excess of the minimum crop requirement in order to build the nutrient concentrations in the soil to the point where they will not be limiting. This is similar to the concept of “keeping the gas tank full.” Once nutrient concentrations reach the target range, (the blue zone in **Figure 1**) only enough additional is needed to maintain soil levels...to “top off the tank.”

So, what is the right amount to add?

There is no one correct answer to this question. The “sufficiency” approach may be best for a farmer who is pinched for cash and can only meet the minimum nutrient requirements for a given year. Also, if the land is leased for short periods of time without sharing of build-up costs, then the long-term benefits of nutrient building may not be realized.

When a longer period of time is available, it is often a wise investment to build and maintain soil fertility levels to where they will no longer be a limiting factor. In these conditions, it may be possible in some years to reduce fertilizer application rates and draw on the nutrients already in the soil. There is more flexibility and allowance for good and bad years when there are already adequate nutrients present in the soil.

Consider the value of the crop and compare the costs of potential yield loss with the expenses associated with fertilization. The most appropriate philosophical approach will vary from farm to farm, thus the final decision is best left to the grower and his/her trusted advisers. Some soil testing labs have recognized the importance of providing this flexibility and offer P and K recommendations based on both the sufficiency and build and maintenance approaches. The graph (Figure 1) shown here provides an example of P recommendations based on the “sufficiency” and “build and maintenance” approaches for Kansas crop production.

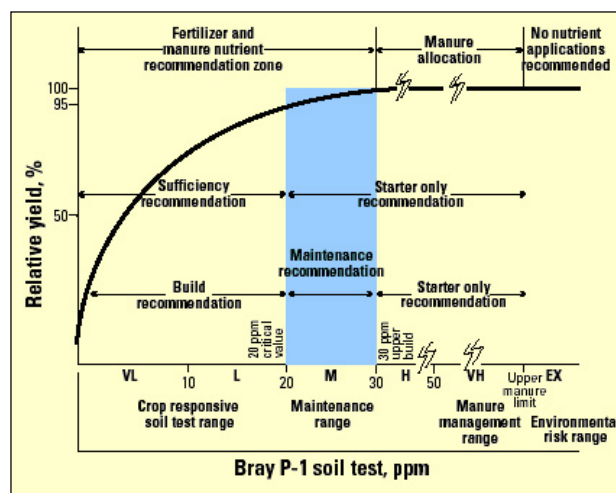


Figure 1. Example of P recommendations based on the “sufficiency” and the “build and maintenance” approach for Kansas crop production. Source: Leikam et al. 2003. Better Crops with Plant Food, Vol. 87, No 3, p. 6-10.

Click here for link [>more<](#).

Once a representative soil sample has been properly analyzed, there are still many specific decisions concerning matters such as placement, source, and timing that must be made in order to use nutrients to their full advantage. Now is the time to make these decisions and prepare for the coming year. ■

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