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THE OHIO STATE UNIVERSITY Bulletin Extension

Most Asked Agronomic Questions

Bulletin 760

Chapter 7

Soil Testing

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1. Should I take a soil sample more often than every three years?

Soil testing once every three years is adequate for most agronomic crops unless specific nutritional problems are suspected in a field.

When new fields are established, it is a good policy to soil test on an annual basis so that background data can be established. Likewise, annual testing should be done on existing fields if their background history is unknown.

You will also want to soil test annually whenever a high cash value crop is grown. In addition, frequent soil testing is recommended for fast growing crops like vegetables because small differences in soil test levels can greatly influence their performance.

2. What yield goal should I put on soil tests?

The following factors should be considered when determining yield goals: (1) The soil productivity index. This has been determined on a relative scale for all Ohio soils. Refer to the publication *Ohio Soils With Yield Data and Productivity Index*, Bulletin #685 (Agdex #524), for guidelines on soil productivity indexes in Ohio. (2) Drainage classification of a soil. Refer to the appropriate soil survey report for your county.

. (3) Weather patterns for a given area. Information concerning these patterns is normally available from the local weather bureau. For additional information on climate and its influence on crop production, refer to pages 1-4 of the *Ohio Agronomy Guide, 13th ed.* or to the Agronomy Department Publication Series 211, "Ohio Crop and Weather Summary".

. (4) Relative inputs of pesticides.

(5) Management ability of the producer.

. The yield goal that you choose should be in the range of 100-125 percent greater than the long term yield average for a given field. Traditionally, most farmers are not able to increase yield levels more than 10-20 percent per year. If a unrealistically high yield goal is given on the soil test form, the resulting recommendation may be for more fertilizer than the crop can actually use and thus part of the fertilizer input may be wasted.

3. Why do state labs and private labs not agree on many of their recommendations?

. Most state labs base their fertilizer recommendations on growth response curves developed by their local college of agriculture; thus, recommendations from state labs are backed up by locally conducted research. Because private labs are not obligated to base recommendations on such local research data, their recommendations can sometimes differ from those of a state lab.

4. Why are some soils more productive than others?

There are several factors that determine how productive a soil will be. One of these factors is soil nutrient availability. The CEC (Cation Exchange Capacity) is a relative index for the ability of a soil to retain cations. In general, the greater the CEC of a mineral soil, the greater is its capacity to hold cations on its exchange complex, and thus the greater is its nutrient supplying power.

Another important factor in determining soil productivity is the available water. In fact, the supply of available water is usually the dominant parameter in most Midwest soils. It is related to many important soil properties: soil texture, soil compaction, rooting depth, CEC. etc.

The CEC of a soil is often a good indicator of the relative amount of available water. Soils with low CEC values (<10) are usually sandy and have a relatively low water holding capacity while CEC's in the range of 10-20 are normally silt loams and . have a high water holding capacity. Clay loams and clays typically have CEC values between 20 and 30; these soils have an intermediate amount of available water. When CEC values exceed 30, the soil is usually an organic soil or a muck soil.

5. Different soils seem to respond differently in terms of crop yields. Should we be paying more attention to soil types when fertilizing agronomic crops to maximize returns on our inputs? What management differences do you recommend for different soil types?

Yes. We should pay close attention to soil type when determining fertilizer needs because it affects both the nutrient supplying power and the water availability of the soil and thus, our potential yield levels.

How a soil should be managed for general crop production depends on several soil parameters: slope, drainage classification, texture classification, previous crop residue, etc.

In general, different soil types do not necessitate the need for changes in fertilizer management practices. There is an exception to this general rule soils with high CEC values often have a tendency to fix K; therefore, they have a greater need for row application of K. Refer to pages 10-16 of Ext. Bull E-2567, *Tri State Fertilizer Recommendations for Corn, Soybeans, Wheat & Alfalfa*, for a discussion of the K recommendations for various soils.

6. How can we get a handle on phosphorus and potassium released from the soil?

A soil test provides a relative index of the amount of P or K that is available from the soil for plant growth. In most cases, this information is adequate for determining the nutrient availability for a crop.

In order to get additional details on the total amount of P or K released from a soil, one would have to

obtain mineralogical information as well as weather data so that the relative weathering rate of the given soil could be determined.

7. Based on soil test reports, what is the lowest level of N-P-K that can be economically applied?

Reducing fertilizer rates below the levels recommended by the OSU Extension Service will usually result in a decrease in your overall economic return/fertilizer dollar. Our fertilizer recommendations are based on soil test results and yield goals, and they always take into account the economic value of the fertilizer application. These economic values are accessed according to the expected crop response to the fertilizer additions as well as to the need for maintaining fertility levels in a field.

8. Discuss nutrient ratios and nutrient imbalance.

The desired concentration of a nutrient element should fall within the sufficiency range for that element. Typical sufficiency ranges for corn, soybeans, alfalfa, and sugar beets are presented in Table 24, page 18 of *Tri State Fertilizer Recommendations for Corn, Soybeans, Wheat & Alfalfa*, Ext. Bull. E-2567. As long as nutrient concentrations are within the guidelines outlined by this table, optimal growth would be expected. When the concentration of one or more nutrients strays below or above the limits of the sufficiency range, the growth pattern of the plant may change, often resulting in lower yields.

The balance among elements should also be considered when interpreting a plant analysis. Interrelationships among elements should be investigated when dealing with suspected deficiencies. For example, the ratio of potassium to magnesium, the ratio of zinc to phosphorus, and the ratio of manganese to iron can be helpful in diagnosing suspected magnesium, iron, manganese, or zinc deficiencies.

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