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Sampling Soils for Fertilizer and Lime Recommendations: Frequency of Soil Sampling

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Summary

The appropriate frequency for soil sampling may vary from 1 to 4 years, depending on crops grown, crop rotation, soil texture and the approach used for sampling. Sampling once every 1 to 2 years is appropriate in situations where significant short-term change in soil test values may occur or when there is a need to establish a soil fertility history. Once a history of soil test information is established, sampling once per crop rotation, not to exceed 4 years, is appropriate. Compared with whole-field composite sampling or traditional sampling of 15 to 20 acre blocks, intensive soil sampling enables improved nutrient management by providing information to better match inputs to soil and crop requirements, so sampling once every 4 years is appropriate. Refer to the summary table for suggested sampling frequency guidelines.

Summary table

Sampling situation	Suggested sampling frequency
Need to establish soil test history	1 to 2 years
High nutrient inputs or high nutrient removal by crops	1 to 2 years
2-year rotation	2 or 4 years
3-year rotation	3 years
4-year rotation	2 or 4 years
Rotation greater than 4 years	2 times per rotation; sampling interval not to exceed 4 years
Established forage	3 years
Intensive sampling (zone or grid)	4 years

Introduction

Soil sampling is a management tool used to determine the status of soil pH and available nutrients, which is used to determine the appropriate amounts of lime and nutrient inputs needed for the crop(s) grown. Collecting soil samples representative of the area sampled is the first step toward sound nutrient management. Soil pH and nutrient levels change over time, depending on nutrient inputs and removal of nutrients in harvested portions of a crop.

Soil pH and nutrient levels are in a dynamic state of change immediately after lime or nutrient additions. Therefore, the preferred time to sample soils to assess the nutrient status is either before lime and nutrients are applied or after the soil has had sufficient time to equilibrate.

As a nutrient management tool, soil sampling provides the greatest benefit when samples are collected during the same time of the year and at the same point in a crop rotation each time.

Within a 4-year time frame, the appropriate frequency of soil sampling depends on: how closely an individual wants to track soil nutrient changes, crop(s) grown, cropping rotation, soil texture, and the approach used for sampling fields.

Tracking change: Build to and maintain optimum soil test levels over time.

The goal of nutrient management and soil testing is to maximize return to nutrient inputs while minimizing negative environmental impacts. Minimizing variability in soil test values over time enables stability in nutrient management over time. Stability is attained by tracking soil test values relative to crop production practices that will affect changes. Frequent sampling improves an individual's familiarity with the soil fertility conditions in a field and with how quickly changes are taking place. When initiating a soil sampling and testing program, sampling every 1 or 2 years results in an understanding of how soil test values are changing in relation to nutrient management practices more quickly than sampling

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every 3 or 4 years. Once an adequate history of soil test values is established by sampling at least two times at 2-year intervals, sampling once every 3 or 4 years provides sufficient information for stabilizing soil test values.

Crop grown: Nutrient removal and change in soil test value varies with crop.
Changes in soil nutrient status generally occur most rapidly with crops requiring relatively large nutrient inputs and/or crops that remove relatively large amounts of nutrients. When these types of crops are grown, soil sampling every 1 to 2 years is important for acquiring information necessary to maintain stability of soil fertility conditions. Compared with field crops, potatoes and vegetable crops generally have greater nutrient requirements. When most or all of the above-ground portion of the crop is removed one or more times a year, such as corn silage or hay crops, greater crop removal of soil nutrients will occur than with most other field crops. Therefore, more frequent soil sampling is beneficial for tracking changes in soil nutrient availability for crops.

Crop rotation: Soil sample at the same time during a crop rotation.
Collecting soil samples at the same time during a crop rotation is the best approach for establishing soil sampling intervals. Comparing soil tests from samples taken at different times in a crop rotation may create difficulty in understanding nutrient changes that have occurred. In a 2-year rotation, such as corn-soybean, the appropriate sampling frequency is every 2 or 4 years. For 3-year rotations, such as corn-soybean-wheat, sampling and testing every 3 years is appropriate. For 4-year rotations, sampling once every 4 years is acceptable, but only after establishing a soil test history by sampling at least two times at 2-year intervals. When a rotation is longer than 4 years, soil samples should be collected at two consistent points in the rotation.

Soil texture: Changes in soil pH and potassium level occur more quickly in sandy soils, so more-frequent sampling of these soils is encouraged.
Change in potassium availability for crops and soil pH occurs more rapidly in sand, loamy sand and sandy loam soils because of leaching losses of potassium, calcium and magnesium. Sampling once every 2 years is encouraged for sandy soils.

Sampling approach: Information obtained through intensive soil sampling is useful in understanding and managing a field's nutrient status for up to 4 years. After the initial intensive sampling is completed, samples should be collected every 3 to 4 years from representative grids or zones as guides for modifying nutrient management.
The availability of global positioning system (GPS) technology has enabled users to geographically mark and return to the same soil sample locations or areas, thereby minimizing some of the variability from one sampling event to the next. Information this technology provides in conjunction with intensive soil sampling can be used for the development of soil fertility and nutrient management maps. The two most common intensive soil sampling approaches are grid sampling and zone sampling.

Grid sampling involves the collection of 6 to 10 soil cores around specific grid points or within specified grids across a field. The grid size most commonly used is 2.5 or 3 acres. The grid sampling approach provides useful information about the variability of soil test values in fields and serves as a basis by which lime and nutrient inputs can be more closely matched to variations in soil fertility across a field. Using grid sampling appropriately to plan for and apply nutrients minimizes the potential for overfertilization and adverse environmental effects.

Zone sampling includes the identification of specific management zones on the basis of one or more properties, such as topography, soil type, drainage, soil color, yield maps, management history or observations of past crop growth. Management zones will vary in size but are typically around 5 to 8 acres. For any given field, the size of management zones should average about 6 acres with no single management zone exceeding 10 acres. Using GPS or some other means to record management zone boundaries used in soil sampling enables site-specific application of nutrients and/or lime. Within each zone, 15 to 20 soil cores should be collected to form a composite sample. Like the grid sampling approach, zone sampling can provide more detailed information (compared with traditional soil sampling areas of 15 to 20 acres) about variability in the field. More detailed information allows producers to apply nutrients and/or lime where they are needed and at variable rates.

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