

# Soil Test Summary for Missouri Emphasizes the Need for Soil Testing

By Manjula Nathan

Soil testing is a tool that allows growers to plan their nutrient and soil amendment (lime) inputs based on soil test levels. The soil test summary provides a valuable index of the soil fertility status of Missouri farmland by county, soil region, and cropping system, and identifies broad soil fertility trends in the state over years. The soil test summary provides invaluable information regarding soil test status at the county, soil region and at the state wide levels. These data will be helpful to researchers and educators for developing educational programs and working on state and federal regulatory programs.

For soils to be productive, they must be fertile. Soil tests indicate the relative capacity of soil to provide nutrients to plants. Therefore, the soil test summary can be viewed as an indicator of the nutrient supplying capacity of soils in Missouri. The value of statewide soil test summaries lies in calling attention to broad nutrient needs. Two major uses of soil test summaries are (i) to evaluate fertilizer and lime recommendations, and (ii) to encourage the proper use of fertilizer and lime.

The soil test summary of 23,600 agronomic crop soil samples analyzed by the University of Missouri Soil Testing labs for 2010 is presented in this report. The percentage of samples falling under very low, low, medium, high, and very high levels for pH, P and K were calculated by county, soil region, and cropping option. But only the summary by county and cropping option is presented. Soil test data summary and statewide trends are presented in graphical format.

## Soil Test Procedures and Rating:

- pHs: 1:1 (0.01 M CaCl<sub>2</sub>)  
Very low: <4.4 Low: 4.5-5.3; Medium: 5.4-6.0;  
High: >6.1
- P: Bray 1 P lb/acre  
Very low: <14 Low: 15-22; Medium: 23-45; high  
46-70; Very High:>71
- K: Ammonium Acetate Extractable K mg/kg  
Low: <65; Low: 66-110; Medium:111 -220; High:  
221-330; Very High:>331

Figure 1. Soil pH Levels in Missouri by County - 2010

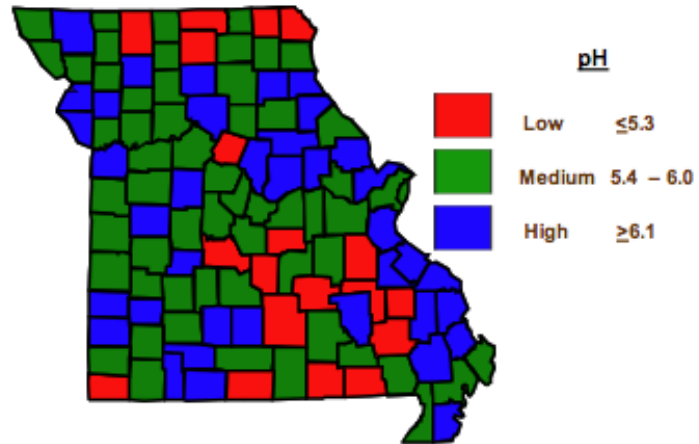


Figure 2. Soil Test P Levels in Missouri by County - 2010

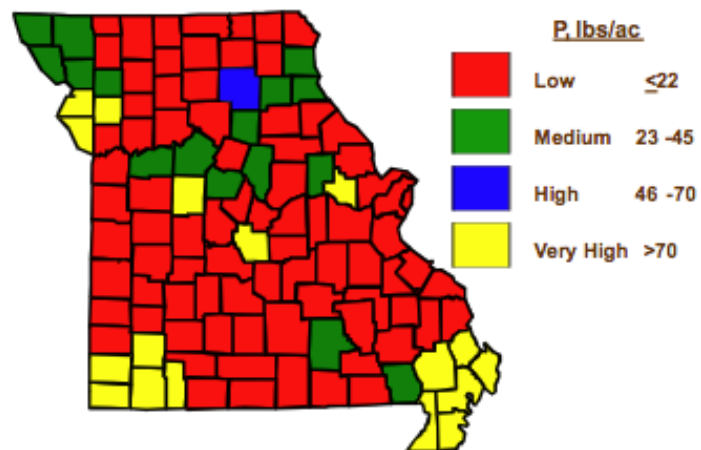
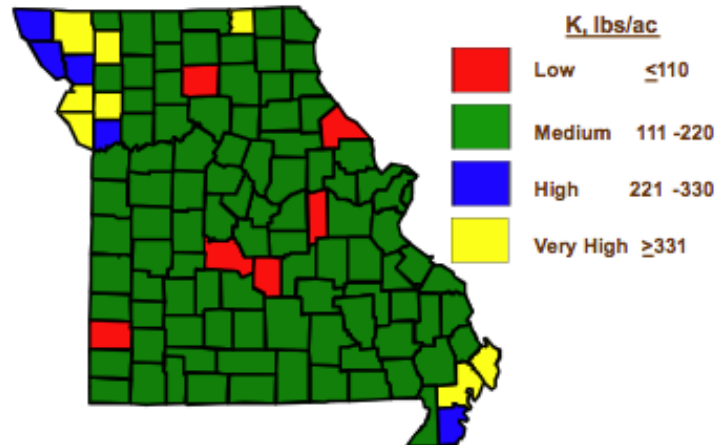


Figure 3. Soil Test K Levels in Missouri by County - 2010



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The majority of the samples received from Missouri counties had pH greater than 5.4 (Fig. 1). About 26% of the soils tested indicated that lime should be applied for economically viable crop production (pH <5.3; Fig. 1, Fig 6). Another 39% of the soils are likely to need lime (pH=5.4-6.0) to avoid profit loss.

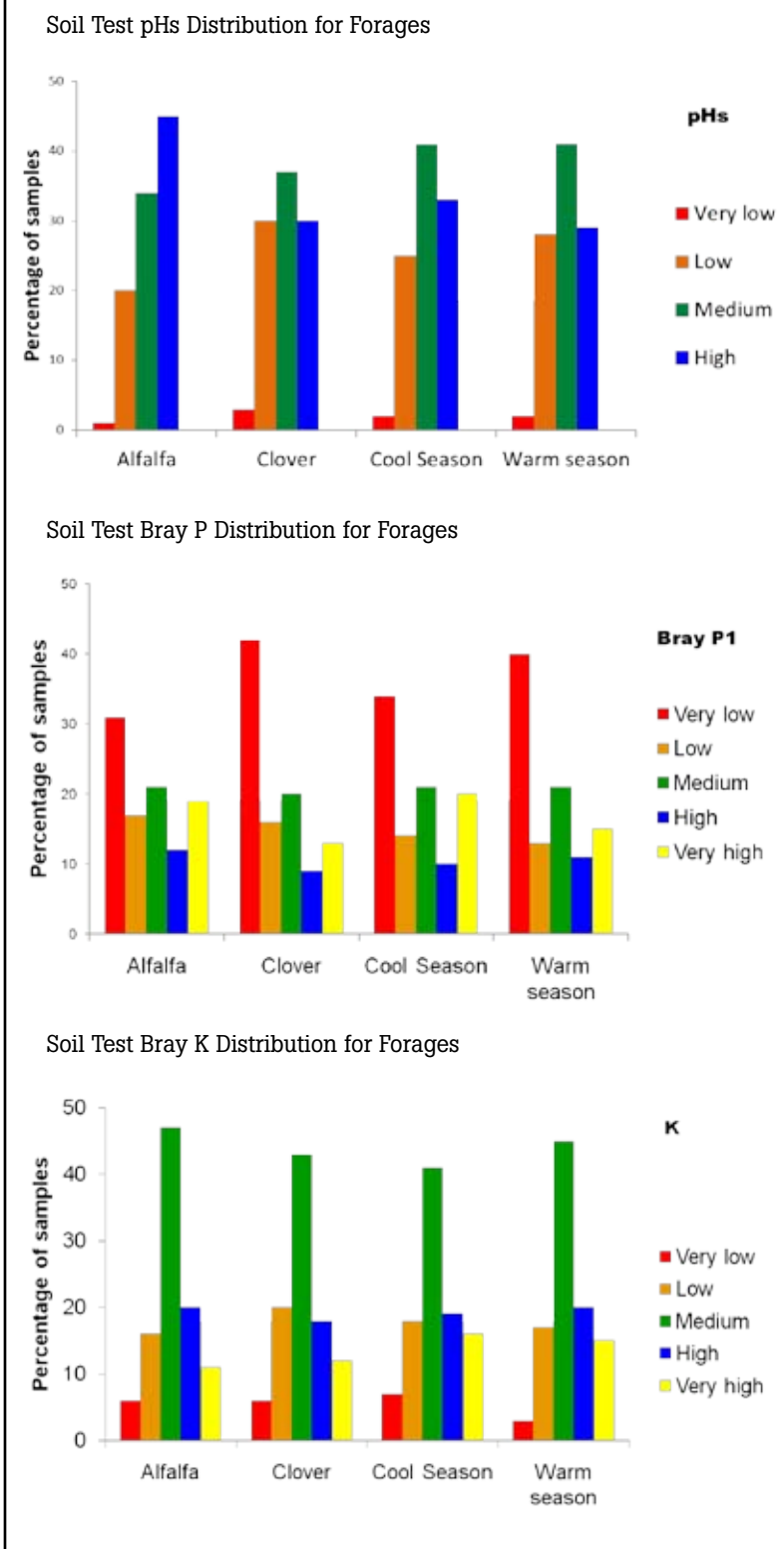
The majority of counties in Missouri have low P (< 22 lbs/ac) soils (Fig. 2). This is also evident from the statewide trend data presented in Fig. 6. About 48% of the P tests (< 22 lb P/ac) indicated that P fertilizer is essential to avoid profit loss by major crops. Another 23% of the P tests (23 - 45 lb P/ac) indicate P fertilizer is required for economic crop production.

The majority of counties in Missouri have medium K (112-220 lb K/ac) soils (Fig. 3). About 60% of the K tests (Low :< 110 lb K/ac + Medium: 111-220 lb K/ac) indicated that K fertilizer would be required to avoid profit loss by major crops (Fig. 6).

Soil tests summarized by Missouri soil regions showed that the majority of samples from soil regions Ozarks and Ozarks border had a higher percentage of soils falling under the low (<5.1) to medium (5.2-6.0) pH ranges (data not presented). The majority of samples received from the same soil regions had a higher percentage of low P (<22 lb/ac) soils. The soils in the Ozarks and Ozarks boarder region are highly weathered, highly acidic and are inherently low in soil P. The soil test summary of P by soil region reflects a similar pattern. On the other hand, Bootheel region had a higher percentage of soils testing high in pH (>6.1) and P (>45 lb/ac). As observed in soil test distribution by county (Fig 3), the majority of the samples from all soil regions had medium soil K levels (112 - 220 lb K/ac)..

The soil test summary by cropping options (Fig 4 and 5) shows that a higher percentage of the soils tested for corn, soybean, wheat, and alfalfa had high pH (>6.1). Alternatively, the soils tested for forages mainly cool and warm season grass pasture/hay had a higher percentage of soils testing in low (<5.1) to medium (5.2-6.0) levels of pH (Fig 4). A similar trend is observed with soil test P for cropping options (Fig 4). About 40 - 45% of the soils tested for cool season and warm season grasses tested very low in P (< 14 lb P/ac) indicating a dire need for testing

**Figure 4. Soil Test Summary for pHs, P and K Distribution for Forages**

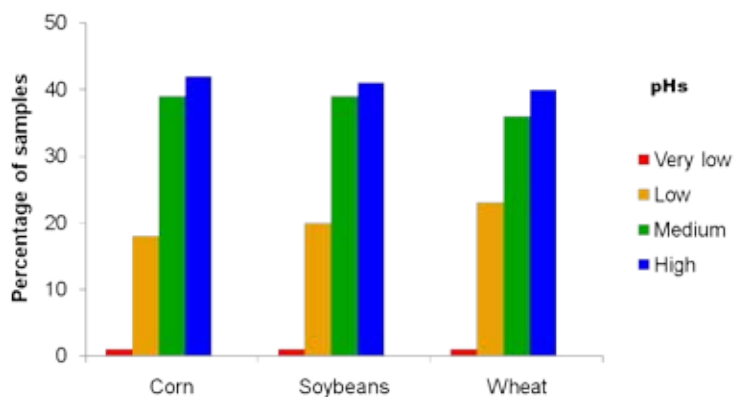


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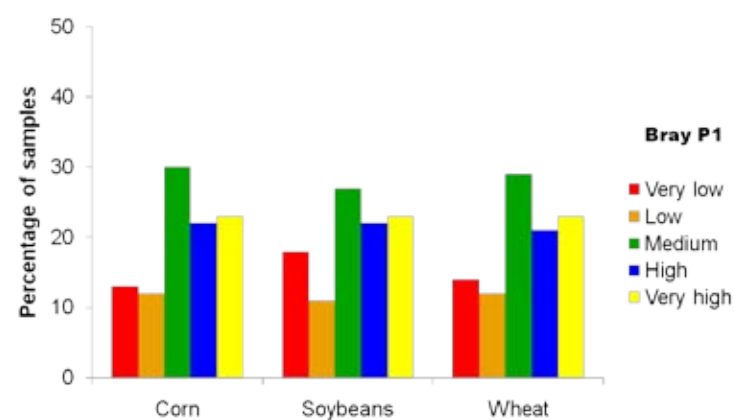
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**Figure 5. Soil Test Summary for pHs, P and K Distribution for Corn Soybeans and Wheat**

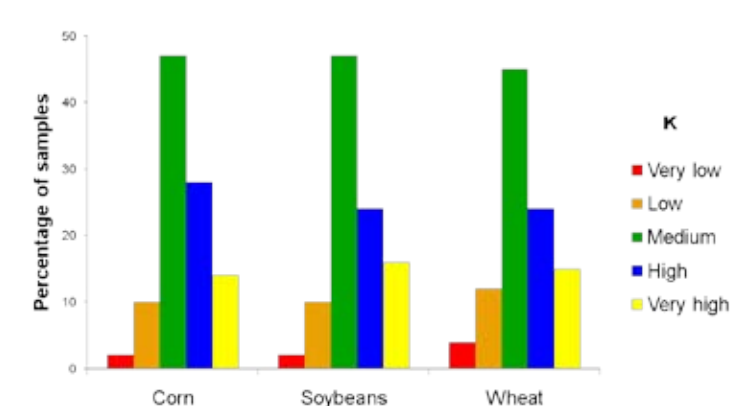
Soil Test pHs Distribution for Corn, Soybeans and Wheat



Soil Test Bray P Distribution for Corn, Soybeans and Wheat



Soil Test K Distribution for Corn, Soybeans and Wheat



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soils and applying P fertilizer per soil test recommendations. Irrespective of the crop options, the majority of samples received by soil testing labs had medium soil test K levels (112-220 lb K/ac, Fig 4 and 5).

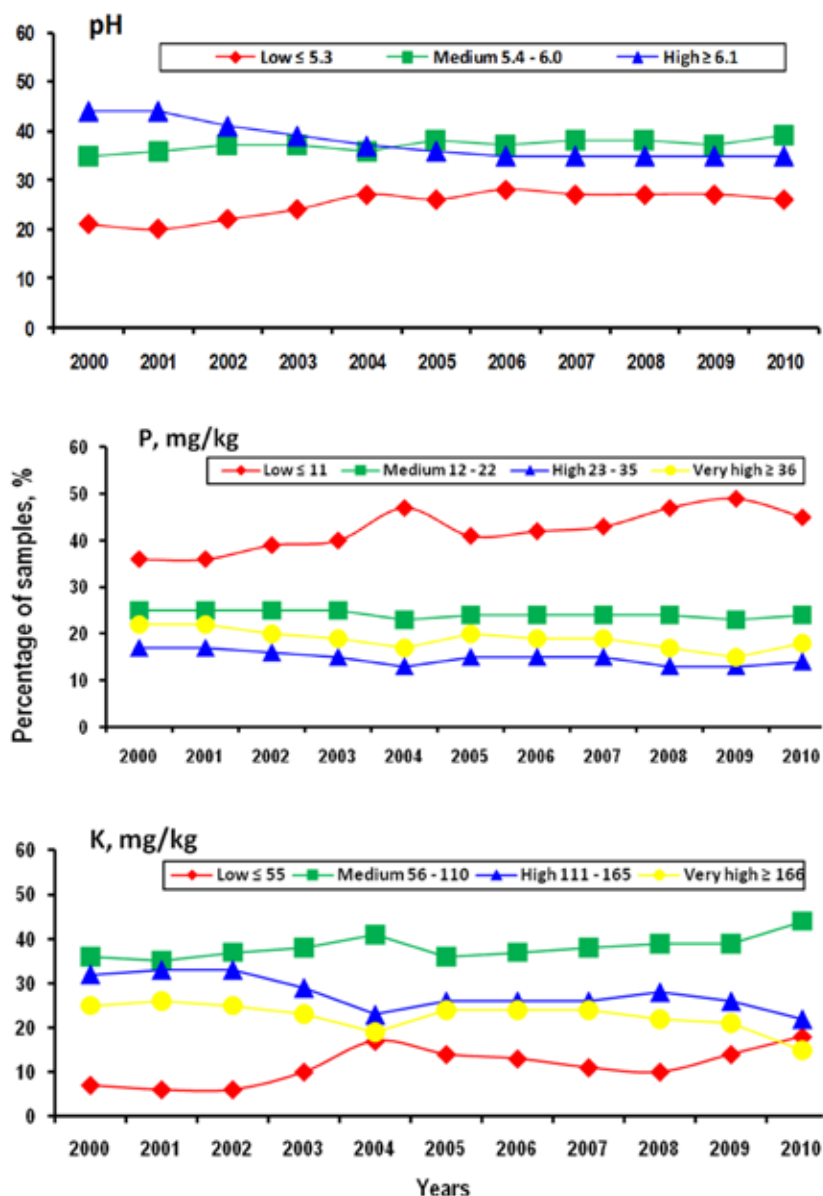
### Summary:

The soil test summary provides invaluable information regarding soil fertility status at the county, soil region and state levels. A higher percentage of adequately fertilized soils occur in the intensively cropped Bootheel region. Conversely, the highest percentage of low fertility soils occurs in the highly weathered Ozarks region. Soil test data summary by cropping options clearly indicates that corn, soybean, and wheat fields are better managed than the forage crops.

The statewide trend observed in the past decade of the steady increase in the number of soil samples being tested as low for pHs, P and K emphasizes the need for producers to tests these soils frequently and apply fertilizer and lime as per recommendation to avoid potential yield losses and depletion of essential nutrients for plant growth and economically viable crop production.

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Figure 6. Trends in Soil pH, P and K in Missouri Soils (2000-2010)



NOTE: The above figure has P and K in units of mg/kg and the rest of the data for P and K are provided on lb/ac units. Please note the trends remains the same independent of units. The conversion of mg/kg to lb/ac is by multiplying by 2.

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