Soil Testing 101

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Crop Nutrient Management Meeting

January 24, 2023

Lincoln

K-STATE Research and Extension
Post Rock District

Why soil sampling and testing?

- Determine how much fertilizer to apply ?
- Determine how much nutrient is available from the soil?

Why soil sampling and testing?

- Estimate probability of nutrient response.
- Determine the amount of plant available NO_3-N.
- Identify fertility trends.
- Estimate long-term nutrient sufficiency.
- Estimate long-term average nutrient rates.
- Diagnosing problems / problem solving.

Probability of Fertilizer Response

P Test Level, ppm	Probability of Response
<5	85-100%
6-12	60-85%
13-20	30-60%
20-30	10-30%
>30	0-10%

Potential limitations

- Variability in test results.
- Time and work to take samples.
- Time to get results back from lab.
- What tests are needed?

Overview

- Proper soil sampling
- Taking soil samples
- Proper sampling depths

Proper soil sampling

- Consistency in depth of sample.
- Appropriate number of subsamples.
- Proper care of collected samples.
- Attention to details.

Basic tools

- Soil probe
- Bucket
- Bag


DCD771
CAUTION

Considerations

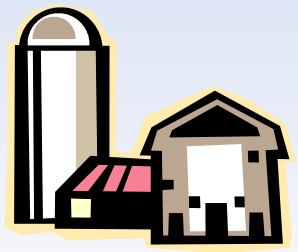
- Recommended sampling depth:
  - 0-6 inches = pH, P, K, Zn, Fe, B.
  - 0-24 inches = Nitrate, Cl, S.
- Where in the field?
- When?

Types of soil sampling: WHERE in the field

- Simple random – good in homogeneous fields.
- Systematic – follow some pattern to cover different areas.
- Stratified – by management zones.
- Composite – mixing all sample units.

WHEN to Take Samples

- Sampling can take place during any period of the year.
- However, it is best to sample a field at about the same time of year. Be consistent.
- Wait a minimum of thirty days to sample after applications of fertilizer, lime, or sulfur.



WHEN to Take Samples for N, S and Cl

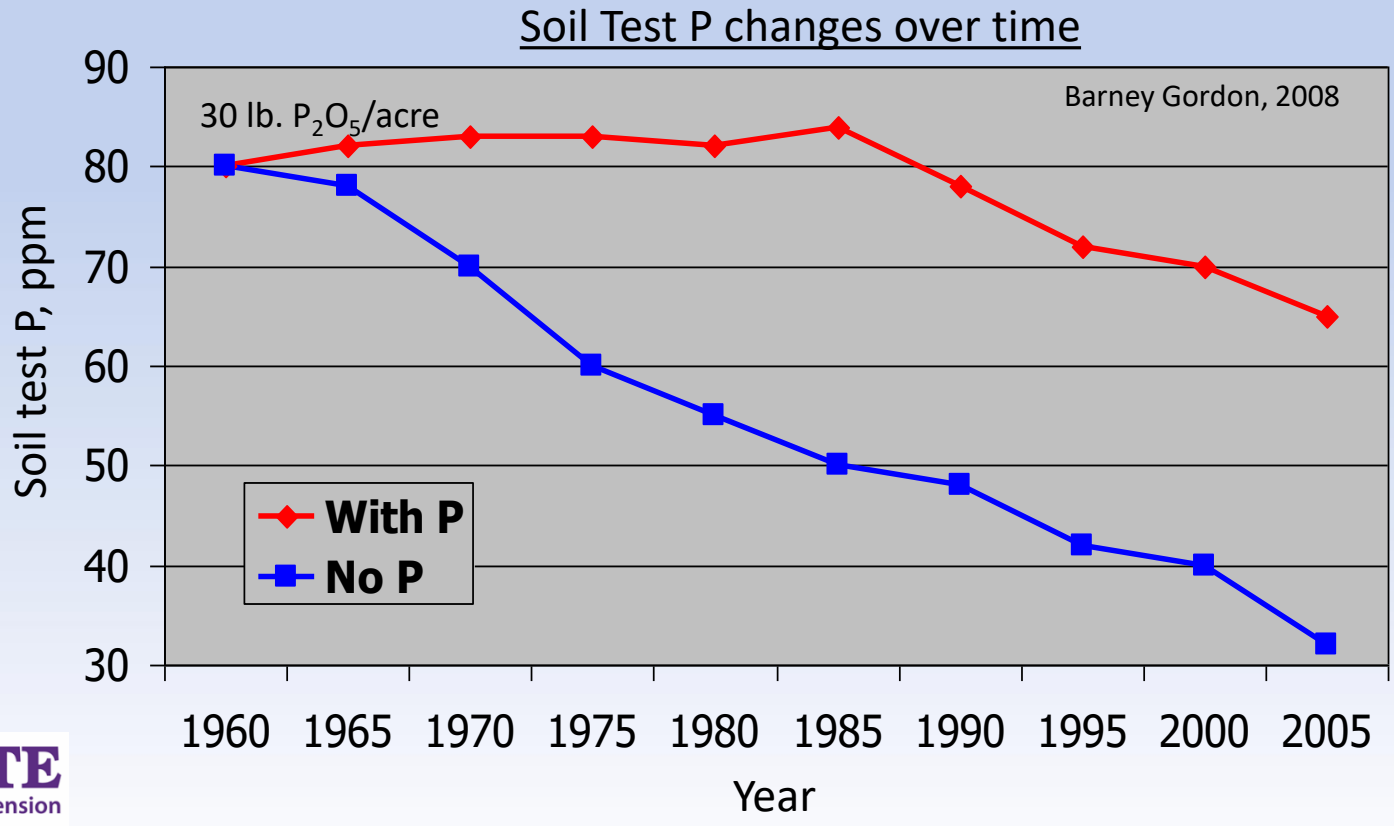
- For corn and sorghum, late winter or early spring is ideal.
- For wheat, before planting in the fall.
- Only reason to measure N before soybeans is for required environmental monitoring.

Number of Cores and Acres per Sample

- 15-20 subsamples per sample submitted to laboratory.
- A smaller number can introduce variability into the results from different sampling years.
- There is no rule for the number of acres to include in a single sample. Depends on the local situation. A treatable area of 5-20 acres is ideal.
- Very small sampling areas, such as residential landscape plants and some small gardens may use fewer cores per sample.

How often should I sample?

- Every 2-4 years or every rotation.
- Every year to develop history.



How to prepare samples for shipment to the lab

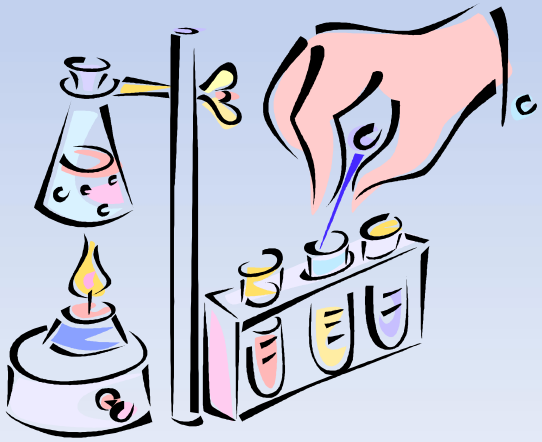
- Ideally hermetic bags avoiding potential contamination.
- Preferably should not be dried before submitting.
- Precautions:
  - Do not apply any heat
  - Protect from contamination
  - No microwaves

NOT Useful soil tests

- There is no value in running tests that have no calibration-interpretation for the region.

  Not useful in Kansas:

  - Bray P-2
  - Copper
  - Manganese
  - Magnesium
  - Cation Percentage of CEC



Useful soil tests

- Profile Nitrate-N
- Bray P-1 Extractable P
- Olsen Extractable P
- Mehlich III Extractable P
- Exchangeable K
- DTPA Extractable Zn
- Chloride
- Soil pH
- Lime Requirement / Buffer pH
- Soil Organic Matter

K-STATE Research and Extension

KSU Soil Testing Laboratory
2308 Throckmorton Plant Sciences Center
1712 Claflin Road
Manhattan, KS 66506-5503

Tel: 785-532-7897 Fax: 785-532-7412
www.agronomy.ksu.edu/soiltesting

Knowledge for Life

Soil Test Report

Billing Account #: 30

Sample Information:
Sample ID: Gasper 1

Prepared For:
Sandra Wick
Post Rock Ext Dist - Mitchell
115 S. Hersey
Beloit, KS 67420

swick@ksu.edu

Send Copy To:
[redacted]

Order Number: 5143
Lab Number: 002687

Received: 10/20/2016
Reported: 10/24/2016
County:
(where sample was taken)

Results

Analysis	*Value Found*	*Analysis*	*Value Found*
Soil pH (1:1, soil:water)	6.3	Buffer pH	6.4
Organic Matter (LOI), %	2.4 %	Nitrate (NO3) surface or 1st sample	19 ppm
Phosphorus (P) Mehlich-3	36 ppm	Potassium (K)	500 ppm
Zinc (Zn) DTPA Extraction	0.5 ppm		

Wheat (Target pH of 6.0) Yield Goal: 55.0 bushels / Acre

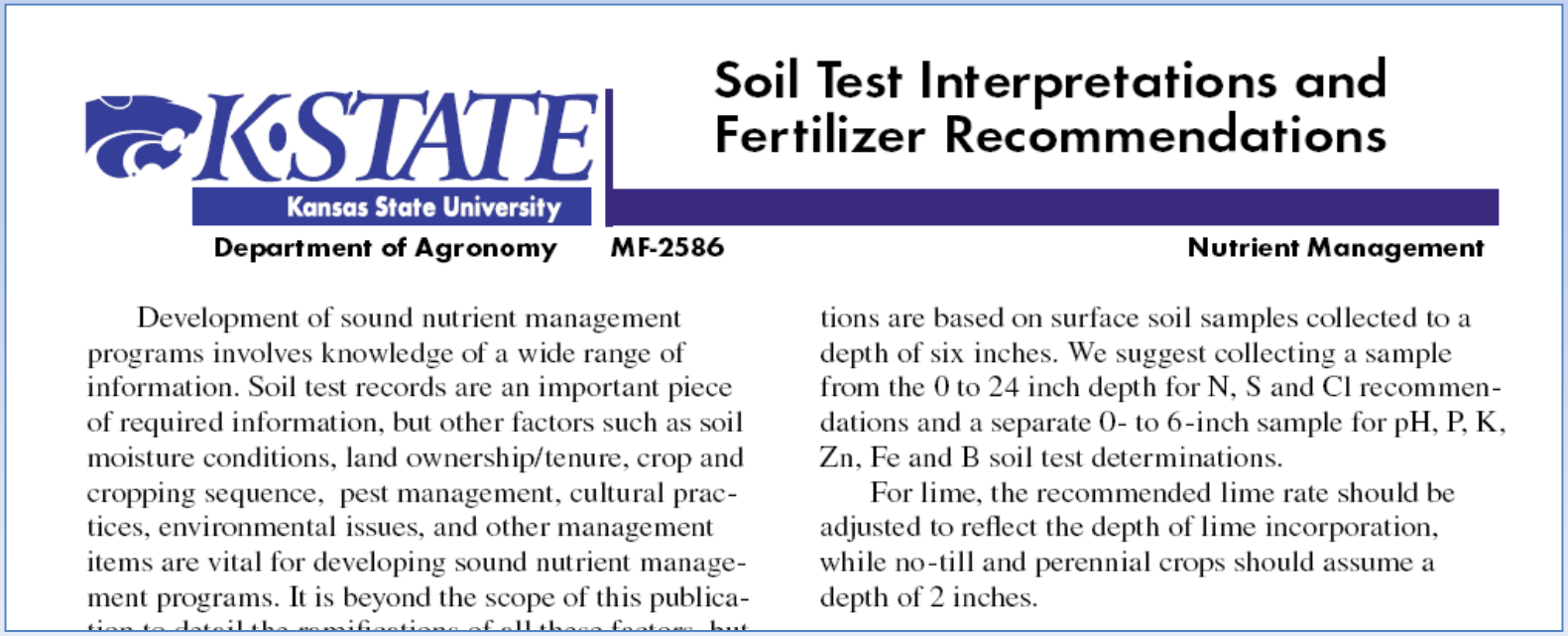
Nutrient Graph

Nutrient		Very Low	Low	Medium	Optimum	Above Opt	Very High
pH	6.3	4.7	5.5	6.0	7.0	8.5	
P	36	7	14	20	40	100	
K	500	41	81	130	161	300	
Zn	0.5	0.3	0.6	1.0	2.0	4.0	

Lime ECC	Nitrogen, N	Phosphorus, P2O5	Potassium, K2O	Zinc Zn	Sulfur S	Boron B	Chloride Cl
All Nutrient Units in lbs / acre		Suff	Suff				
0	40	0	0	0			

Comments:

Soil test interpretations and recommendations



K-STATE
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Soil Test Interpretations and Fertilizer Recommendations

Department of Agronomy MF-2586 Nutrient Management

Development of sound nutrient management programs involves knowledge of a wide range of information. Soil test records are an important piece of required information, but other factors such as soil moisture conditions, land ownership/tenure, crop and cropping sequence, pest management, cultural practices, environmental issues, and other management items are vital for developing sound nutrient management programs. It is beyond the scope of this publication to detail the ramifications of all these factors, but

tions are based on surface soil samples collected to a depth of six inches. We suggest collecting a sample from the 0 to 24 inch depth for N, S and Cl recommendations and a separate 0- to 6-inch sample for pH, P, K, Zn, Fe and B soil test determinations.

For lime, the recommended lime rate should be adjusted to reflect the depth of lime incorporation, while no-till and perennial crops should assume a depth of 2 inches.

Summary

- Soil samples should be representative of the field.

- Recommendations were developed based on calibrations for specific soil depths. **Sampling depth is important.**

- Take lots of cores.

- Profile nitrogen can be a source of nitrogen for the following crop as well.

Summary

- Yield goal is a key factor for current recommendations, be realistic about yield potential.

- Recommended sampling depths:
  - 0-6 inches = pH, P, K, Zn, Fe, B.
  - 0-24 inches = Nitrate, Cl, S.

- Sampling technique presents the greatest chance for errors in results.

Questions?

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