Soil Testing 101

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Crop Nutrient Management Meeting

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Smith Center

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


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Considerations

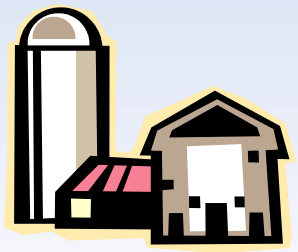
- Recommended sampling depth:
  - 0-6 inches = pH, P, K, Zn, Fe, B.
  - 0-24 inches = Nitrate, Cl, S.
- Where in the field?
- When?

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

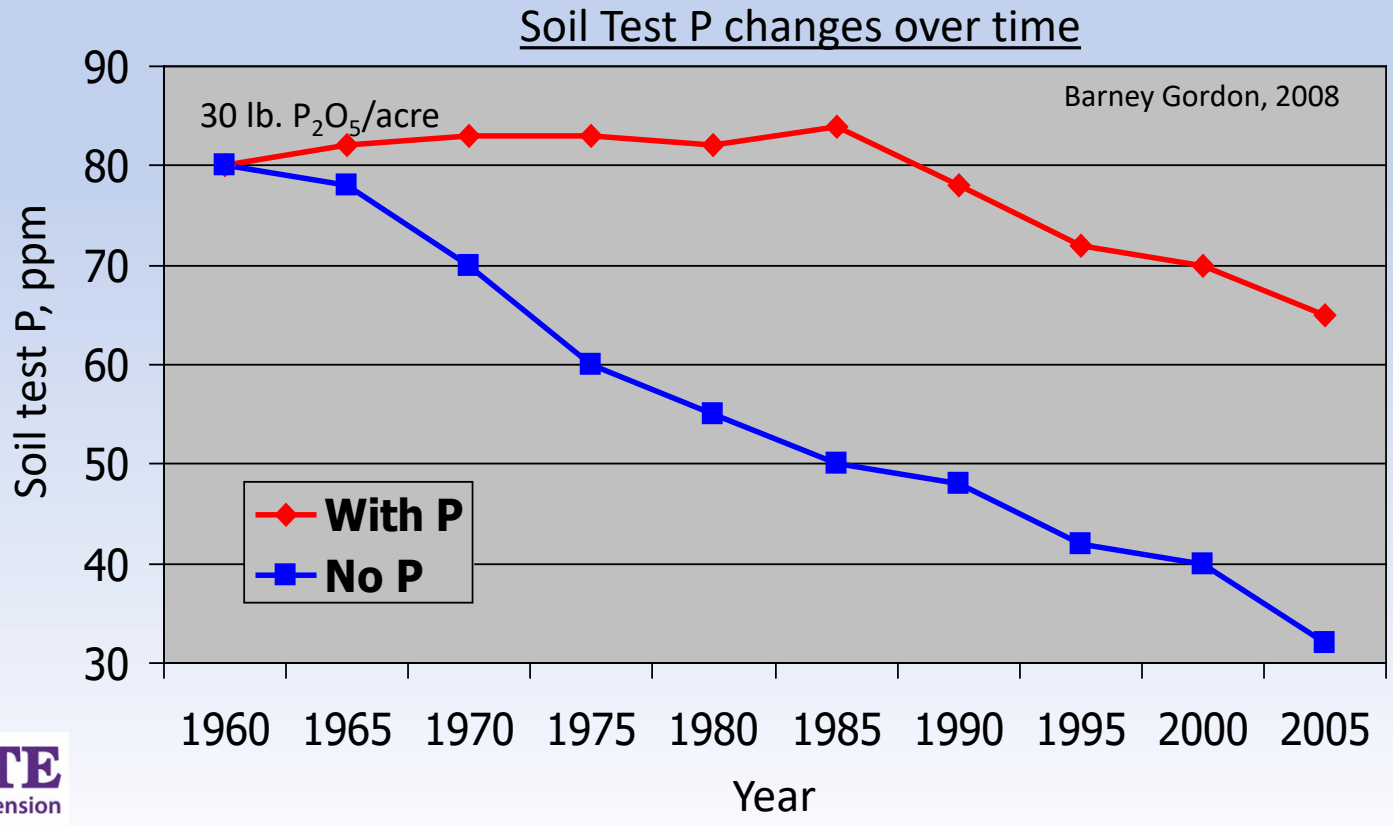
- For corn and sorghum, late winter or early spring is ideal.
- For wheat, before planting in the fall.
- Only reason to measure N before soybeans is for required environmental monitoring.

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

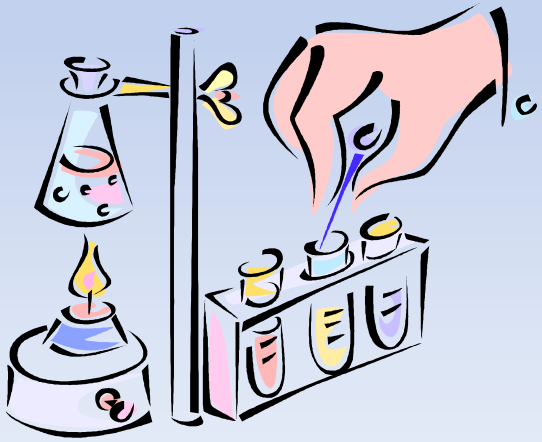
- Ideally hermetic bags avoiding potential contamination.
- Preferably should not be dried before submitting.
- Precautions:
  - Do not apply any heat
  - Protect from contamination
  - No microwaves

NOT Useful soil tests

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

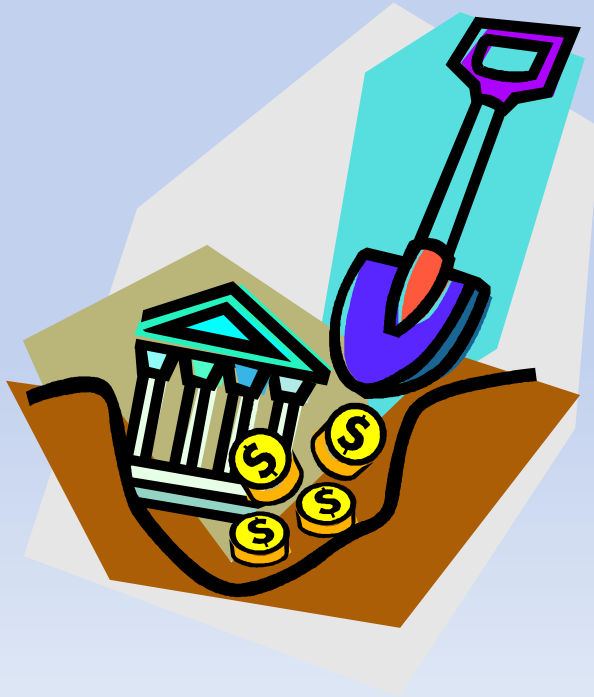
  Not useful in Kansas:

  - 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

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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:

KSU Soil test interpretations and recommendations

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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