An Initial Compilation of Soil Analysis Data in the Southern Great Plains

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Introduction

Demands on soil related information have been significant worldwide and are still increasing. Soil testing and its interpretation have been seen as essential components in the development of sustainable soil management and/or remediation decisions. Compilation of soil analysis data is valuable in assessing the effectiveness of fertilizer programs and for monitoring longer term changes in soil nutritional status. This poster summarizes data and provides an initial evaluation from 5055 soil sample analyses in 178 locations covering approximately 20,000 acres. Data will continually be added into the database as new analyses are provided by producers.

Objectives

- Compile available soil analysis results from producers in the Southern Great Plains
- Investigate trends by
  - Location (Oklahoma, rest of the Southern Great Plains
  - Soil analysis categories (pH, organic matter content, nutrient concentrations) across soil types

Materials and Methods

Data Sources

- Soil analysis data from Kansas and Oklahoma producers were collected and compiled from 178 locations, comprising 19 counties in northern and southwest Oklahoma and 3 counties from south central Kansas.
- Compilation includes macro- and micronutrient concentrations as well as soil pH, organic matter content, and cation exchange capacity data.
- Data are from soil samples collected primarily at 0 to 15 cm depth with some from 0 to 30 cm.
- Number of samples per location ranges from 2 to 126 depending on location size.

Data Evaluation and Analysis

The following evaluation and analysis were generated:

- Maximum and minimum report values
- Mean and range of pH
- Mean and range of phosphorus (P)
- Mean and range of potassium (K)
- Mean and range of organic matter (OM)

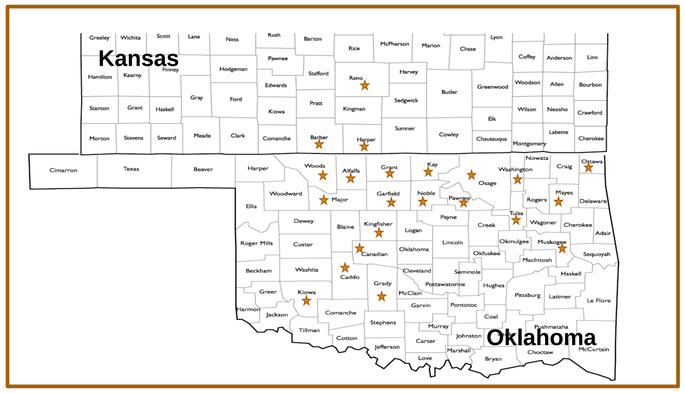

Figure 1. Locations of soil analysis data sources by county

Results

Table 1. Average, minimum, and maximum soil test values for soil pH phosphorus, potassium, and organic matter for the 178 fields.

Soil analysis	Average	Min	Max
Soil pH	6.12	4.6	7.7
Phosphorus (ppm)	28	3	93
Potassium (ppm)	193	28	545
Organic Matter (%)	1.8	0.5	3.5

- The 178 fields in the southern Great Plains on average had a soil pH of 6.12, phosphorus (Mehlich 3 phosphorus, M3P and Bray 1 phosphorus, B1P) was 28 ppm while soil test potassium (STK) averaged 197 ppm. Percent organic matter (OM) was 1.9%.
- On the average the primary components of soil fertility were acceptable. However, the 178 fields had pH range of approximately 1.6 units, percent OM range of about 1.5%, phosphorus and STK had lower ranges of 3 and 28 ppm, respectively.

Table 2. Mean and range of pH and phosphorus per region.

Region	No. of fields	pH mean	pH range	P mean (ppm)	P range (ppm)
NW	76	6.24	2.04	26.35	48.42
SW	9	6.18	2.88	15.78	34.38
SE	73	6.14	1.28	30.04	51.94
KS	20	5.53	1.55	35.60	67.20

- Of the 178 fields, 158 were from Oklahoma (mostly from northern region of the state) and 20 were from Kansas.

Results

- Soils in Kansas and Oklahoma tends to be more acidic with 168 out of the 178 locations having average pH below 7.0 and 81 locations having maximum pH of 6.9 or less.
- Critical values for P sufficiency is 32.5 ppm in Oklahoma and 20 ppm for Kansas. Sixty-three percent of the Kansas and Oklahoma soils were above the critical sufficiency value. Mean P concentration from all locations ranged from 5 to 92.7 ppm and 5.5 to 59.2 ppm from B1P and M3P, respectively.

Table 3. Mean and range of potassium and organic matter per region.

Region	No. of fields	K mean (ppm)	K range (ppm)	OM mean (ppm)	OM range (ppm)
NW	76	199.28	192.2	1.40	0.5 - 2.2
SW	9	310.22	244.6	1.73	0.7 - 3.3
NE	73	113.77	107.5	2.54	1.2 - 3.5
KS	20	173.76	152.4	-	-

- Critical values for potassium sufficiency is 130 and 125 ppm for Oklahoma and Kansas, respectively. Majority of the soils in Kansas and Oklahoma are high in potassium (66%). Mean potassium concentration ranged from 27.8 to 544.9 ppm.
- Base on data and history, organic matter content in northeast OK is higher than the southwest and northwest region of the state. Native vegetation in the northeast region plays a direct role in the organic matter present within a specific soil system. Mean percent OM ranged from 0.5 to 3.5%.

Conclusion

Data help support the concept that we should find ways to increase the resolution, or decrease the number of acres represented by a single soil sample.