**Potassium Dynamics in Coastal Plain Soils**

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**ABSTRACT**

Potassium deficiency of crops on southern U.S. Coastal Plain soils has been known since the 1980s, long-term soil fertility studies have been conducted with K since 1911 on several Coastal Plain and related Hapludults, Paleudults, and Kandudults in Alabama. Data from these long-term experiments allow us to answer questions such as: (1) How much K can accumulate in Coastal Plain soils under cropping and fertilization? (2) Is subsoil testing necessary to obtain an accurate soil test calibration for K? (3) How much K does a crop remove from the subsoil? (4) How long does it take for crops to deplete soil test K? (5) Does soil test K vary during the year?

**OBJECTIVES**

- Review soil test and yield data from some of Alabama's long-term soil fertility experiments in order to answer the following questions:
  1. How much K can accumulate in Coastal Plain soils under cropping and fertilization?
  2. Is subsoil testing necessary to obtain an accurate soil test calibration for K?
  3. How much K does a crop remove from the subsoil?
  4. How long does it take to deplete soil test K?
  5. Does soil test K vary during the year?

**How much K can accumulate in Coastal Plain soils under cropping and fertilization?**

Potassium rates were suspended from 1982 through 1988, e.g. crops were grown using residual K only. Soil samples were collected after harvest from the 0–15 cm depth every other year. Mehlich-3 extractable K suggests that once soil test K is above the critical value (horizontal line on figures), more than 15 years of cropping is necessary before additional K fertilization will be needed on the finer textured soils (Slocomb and Desoto). As expected, K is depleted faster on the low CEC soils (Dothan and Berribee). Normally, routine soil tests are taken every other year from all plots in the long-term fertility experiments. In 1987, samples were taken monthly beginning at grain sorghum harvested in the fall and continuing until planting the following year (6 months). In most cases there was a gradual increase in Mehlich-3 extractable K as K was mineralized from crop residues. This may explain, in part, some of the variability we see in biennial soil samples that may or may not be taken immediately after harvest as in the previous long-term figures.

**Does soil test K vary during the year?**

Note that in soils where "no K" or "Low K" has historically been applied, total K uptake was low due to K deficiencies but also a higher percentage of the K came from the subsoil. In the "High K" soil where topsoil K was adequate, more total K was taken up and almost all of it came from the topsoil. These data suggest that where crops are adequately supplied with K, very little will come from subsoil supplies.

**ACKNOWLEDGEMENTS**

These experiments have been maintained by the Alabama Agricultural Experiment Station and the AU department of Agronomy & Soils since their inception. Without this foresight, this type of information would be difficult to obtain. Superintendents and staff of the following outlying units are greatly appreciated, Ten. Valley Research & Extension Center, Sand Mountain Research and Extension Center, Wiregrass Research and Extension Center, Prattville Research Unit and Bremen Research Unit.

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