

Potassium Fertility Management in Cotton Production Systems

Jac J. Varco
Plant and Soil Sciences Dept.
Mississippi State University

Objectives

1. Review what we think we know
2. Examine tillage and variety influences on cotton response to soil K and K fertilization
3. Explore reasoning for observed responses
4. Justify K management strategies

Potassium Effects on:

- Photosynthesis
- Sugar transport
- Water relations
- Dry matter partitioning
- Lint yield and quality



MSU Soil Test K Ratings

POTASSIUM(K) LEVELS (GROUP 3 CROPS)

<u>Level</u>	<u>CEC \leq 7</u>	<u>CEC 7-14</u>	<u>CEC 14-25</u>	<u>CEC 25+</u>
Very Low	0-70	0-90	0-120	0-150
Low	71-150	91-190	121-240	151-260
Medium	151-200	191-240	241-290	261-320
High	201-350	241-420	291-510	321-560
Very High	350+	420+	510+	560+

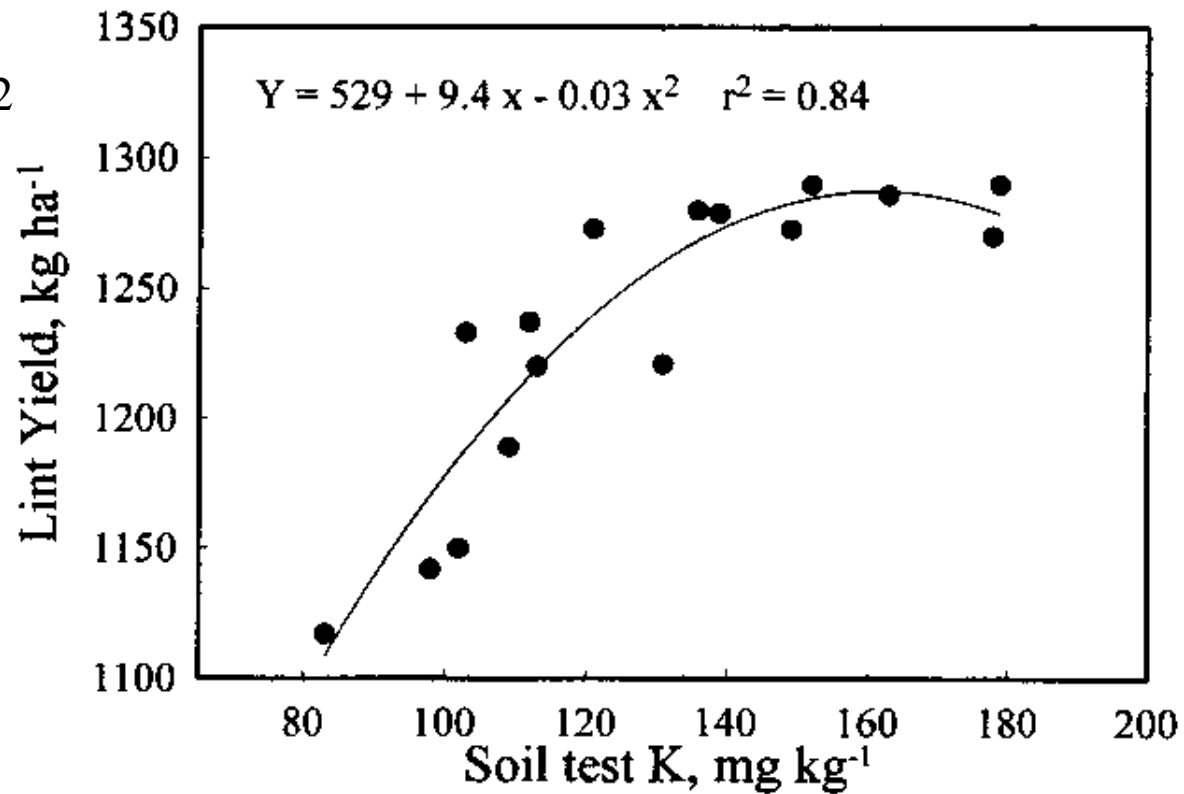
Leaf Tissue K Critical Concentrations

- Ark. Baker et al. (1991) 1.3 %
- Ark. Maples and Keogh (1974) 1.48 to 2.02%
- Miss. Hsu et al. (1978) 1.0%
- Miss. Nichols (1983) 1.28%
- Miss. Reddy et al. (2000) 2.1%, 95% of max. photosynthesis

Yield Response

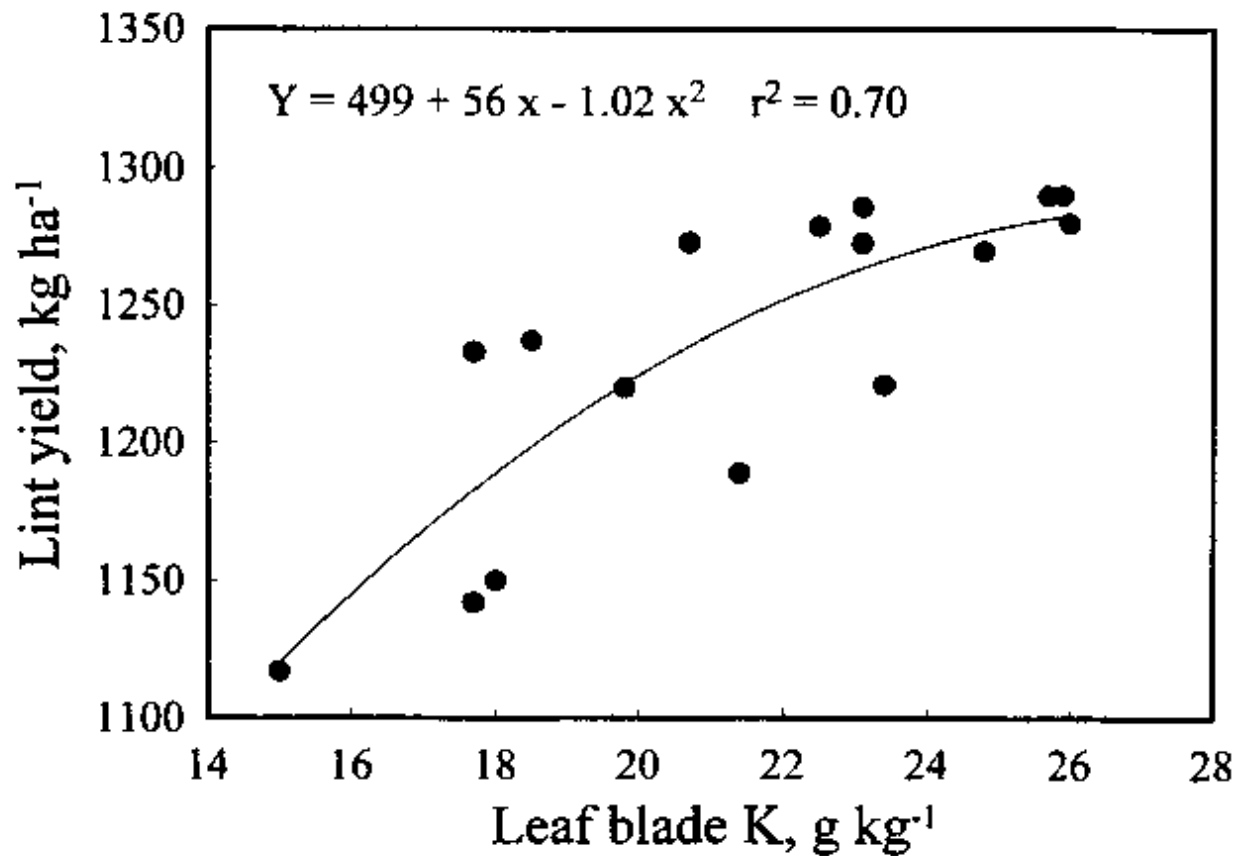
Yazoo City, MS Morganfield Silt Soil (CEC = 11)
Conventional Tillage Ave. 1990-92

ST 506 1990
DP 50 1991-92



(Adeli and Varco, 2002)

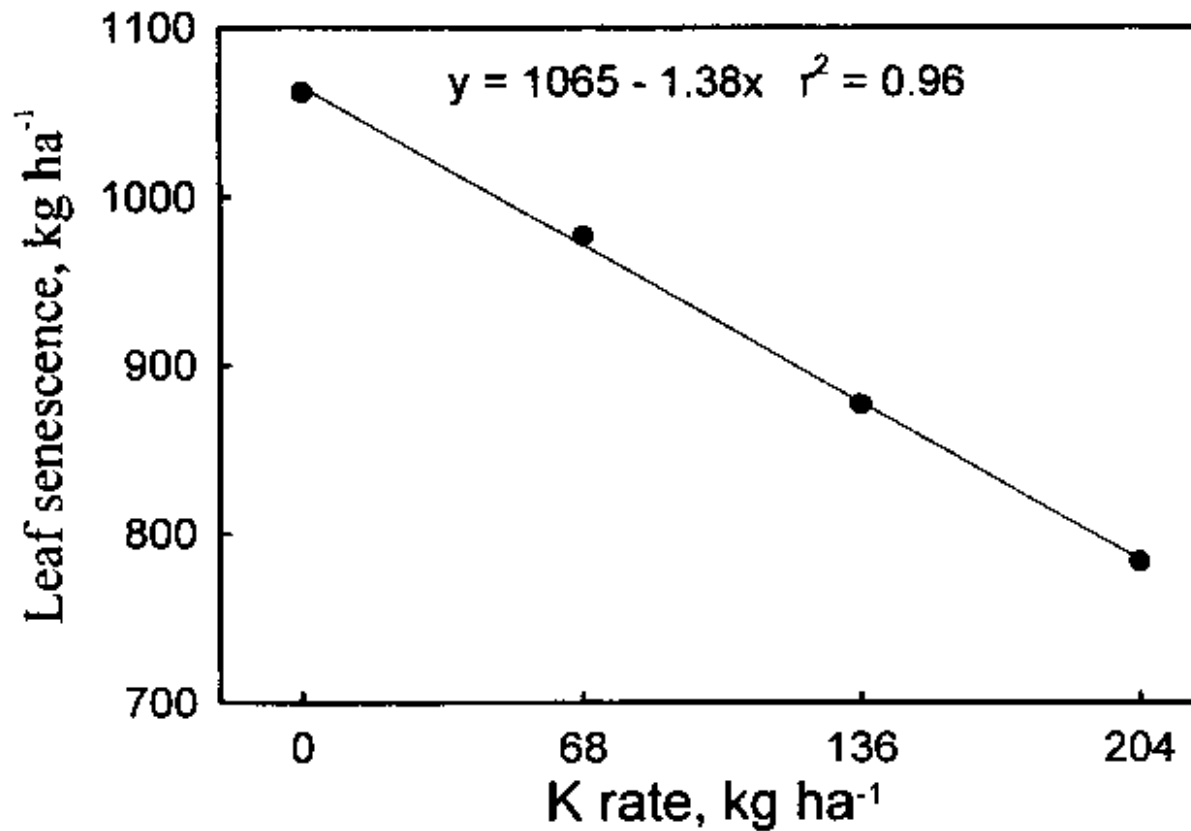
Nutritional
Response
Yazoo City, MS Morganfield Silt Soil (CEC = 11)
Conventional Tillage Ave. 1990-92



(Adeli and Varco, 2002)

Photosynthetic Capacity

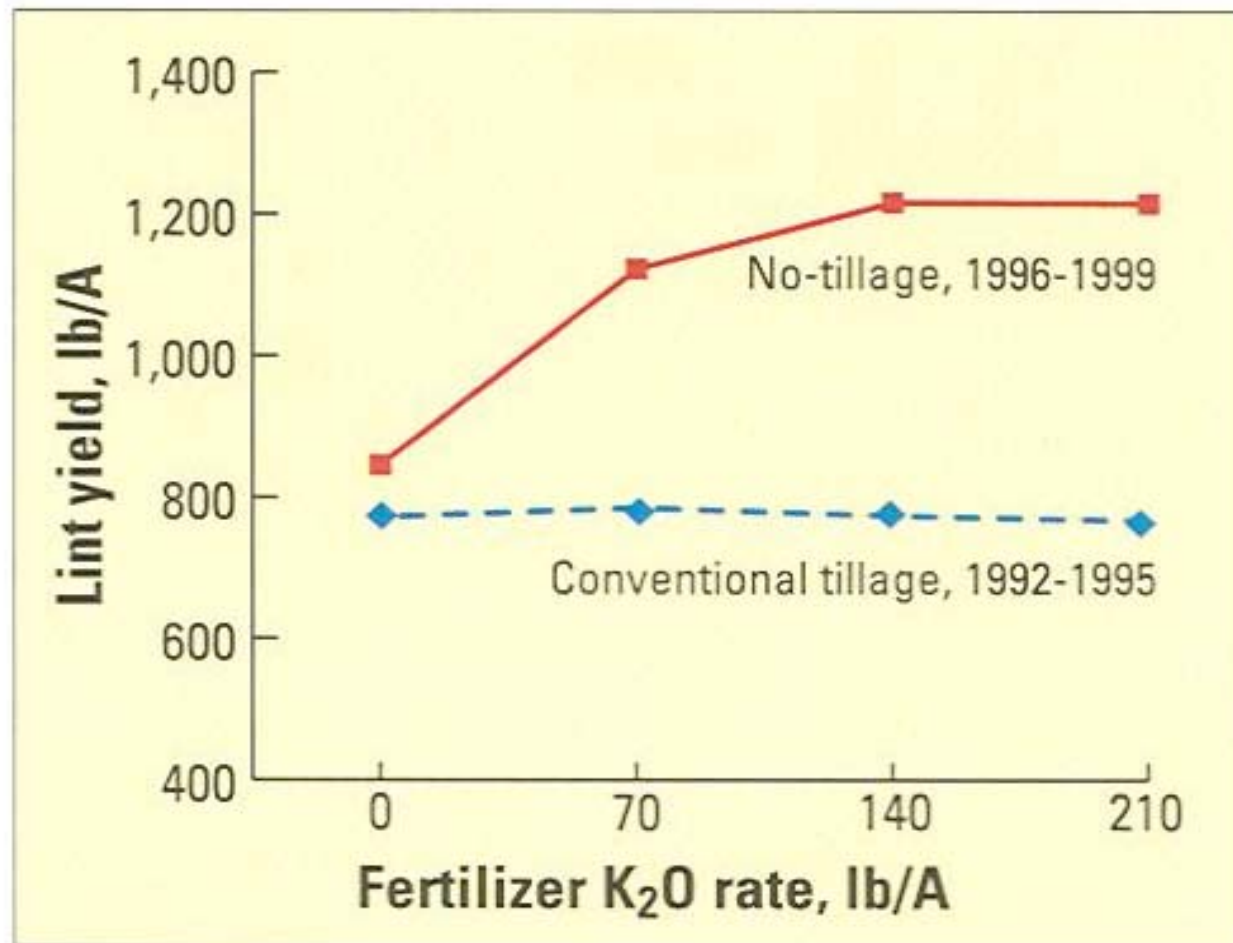
Yazoo City, MS Morganfield Silt Soil (CEC = 11)
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(Adeli and Varco, 2002)

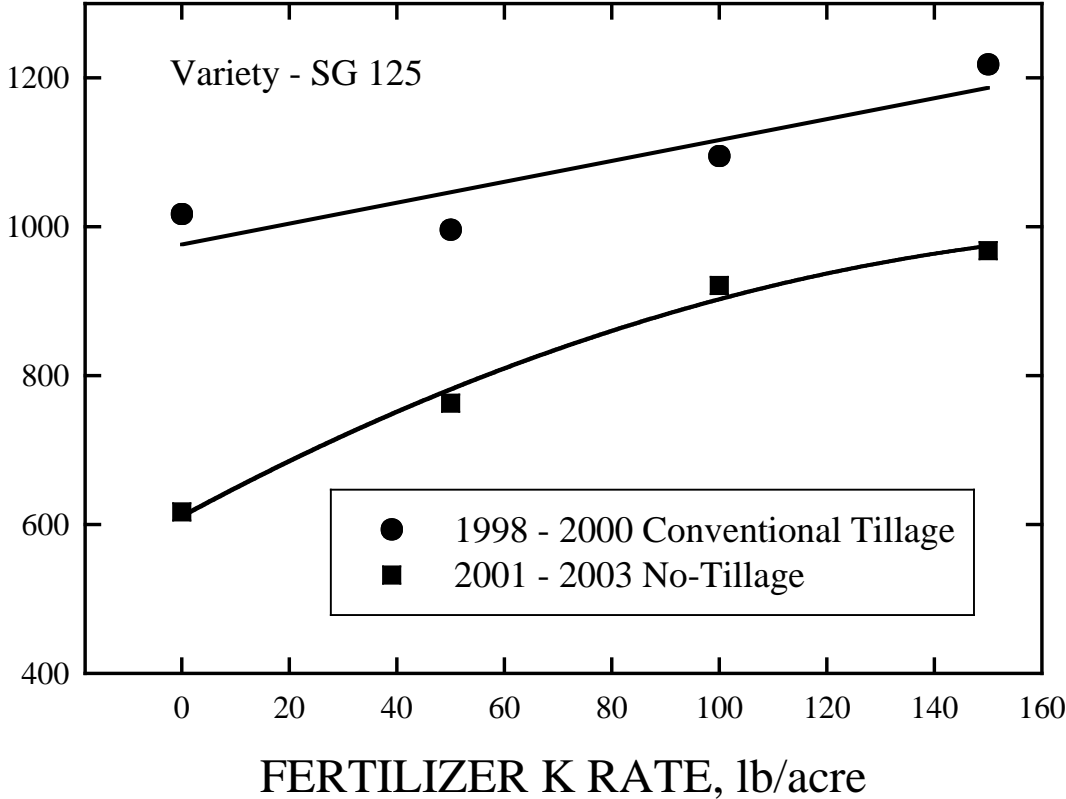
Tillage Effects

Mississippi State, Leeper Silty Clay Loam

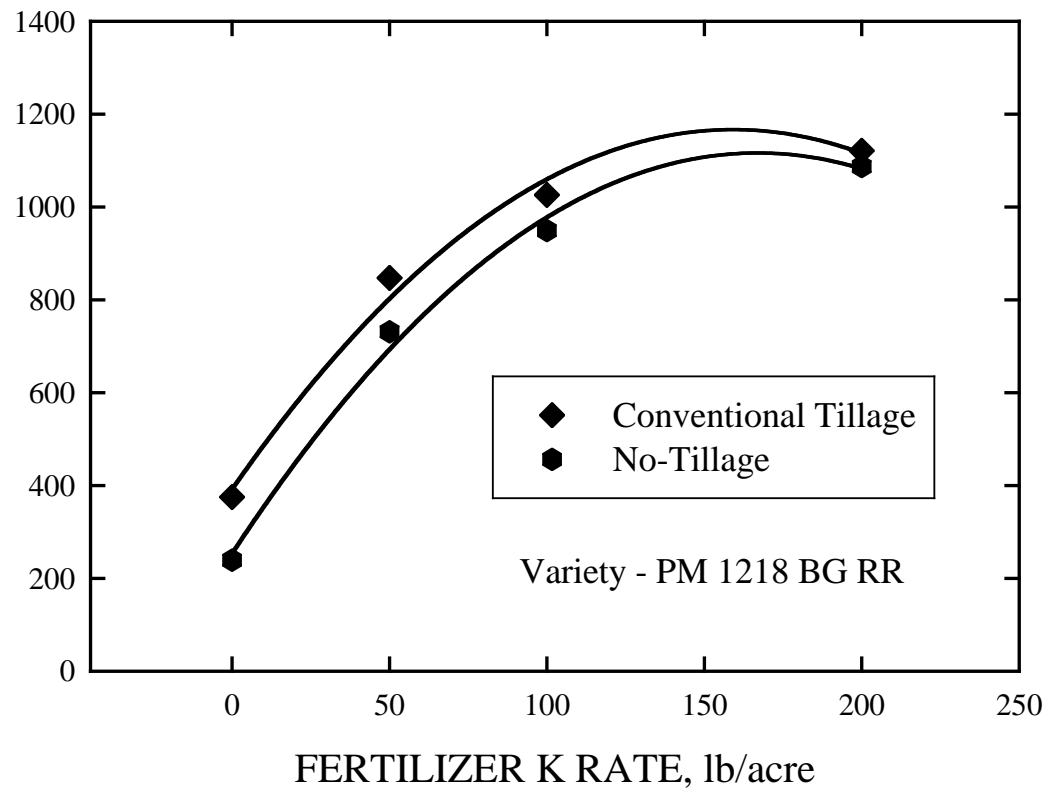


(Varco, 2000)

Mississippi State, Marietta Loam

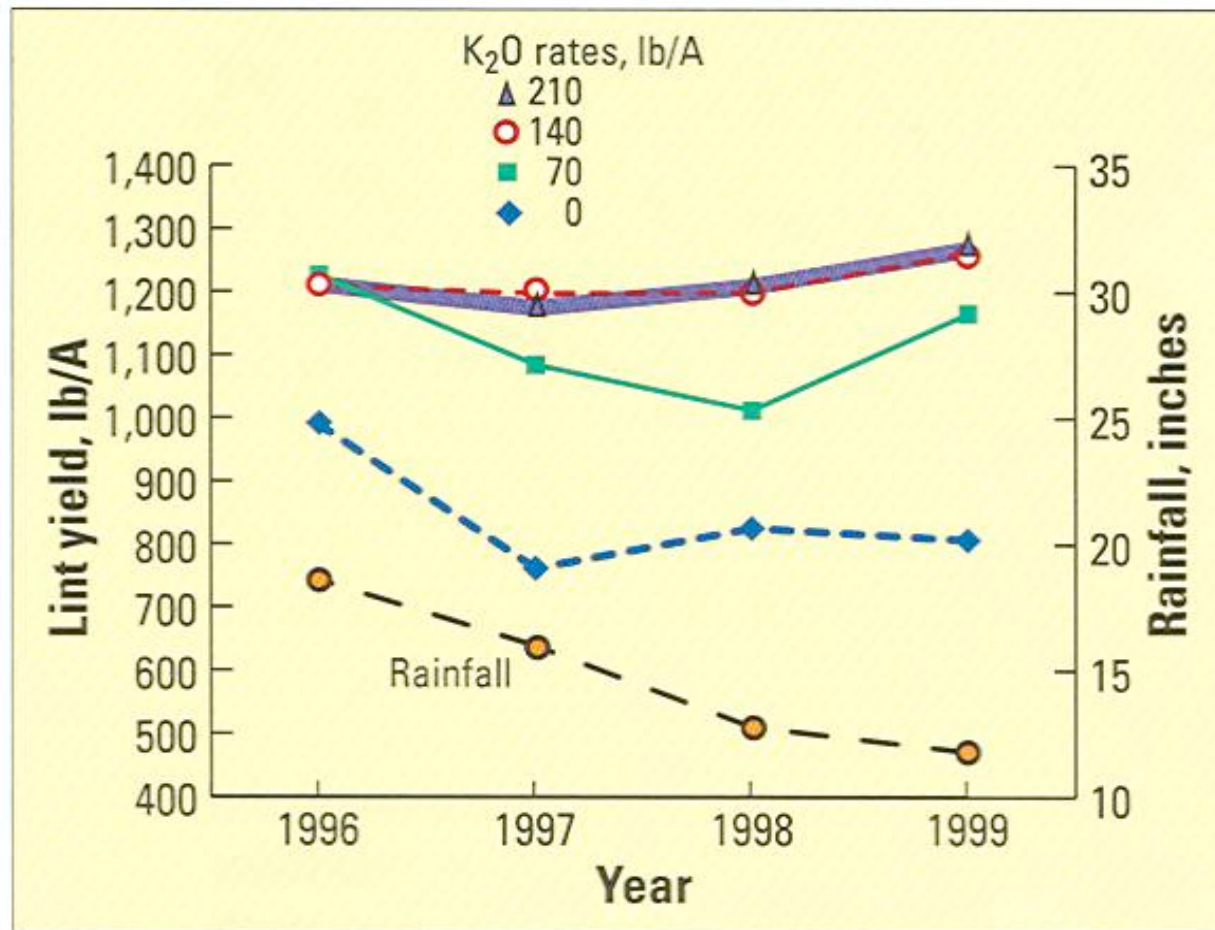


Jackson, TN
2000 - 2002



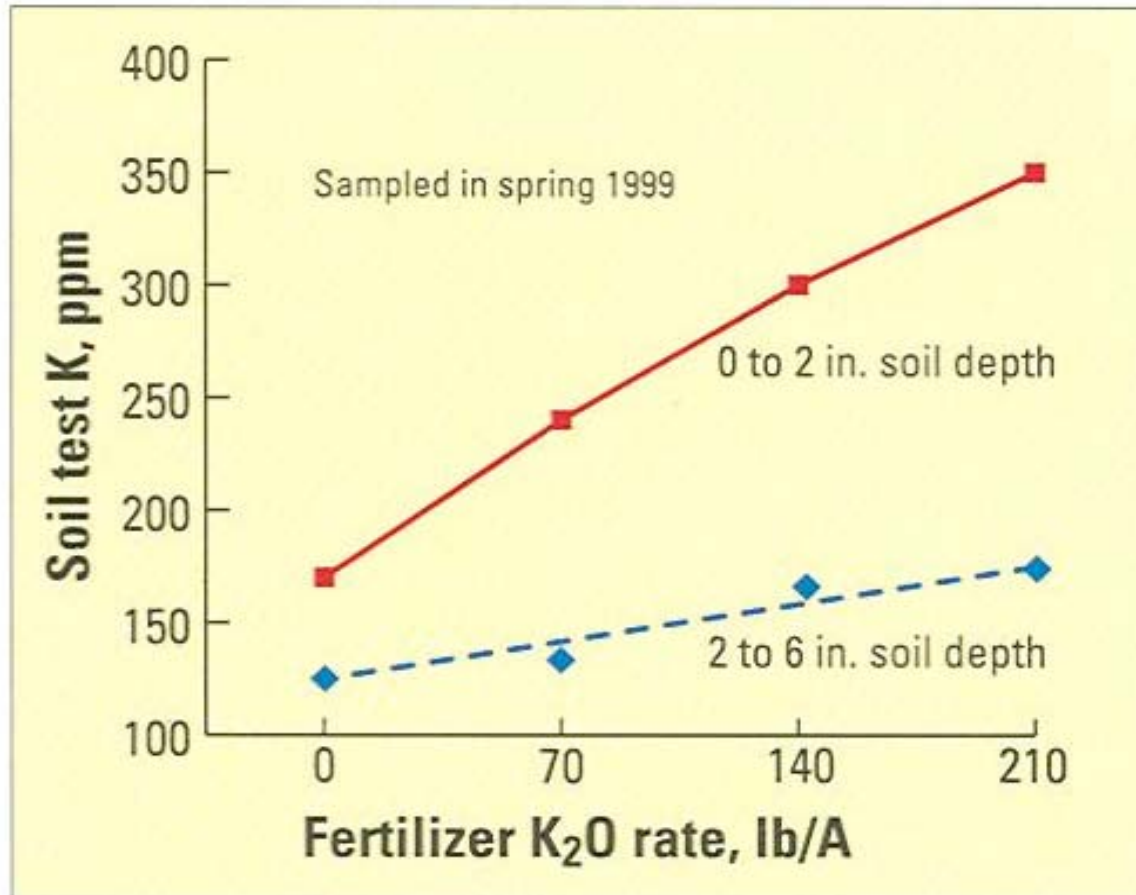
Source: Howard and Gwathmey

K Effects on Drought Resistance, Mississippi State, Leeper Silty Clay Loam



(Varco, 2000)

K Stratification on High CEC (> 25) Soil

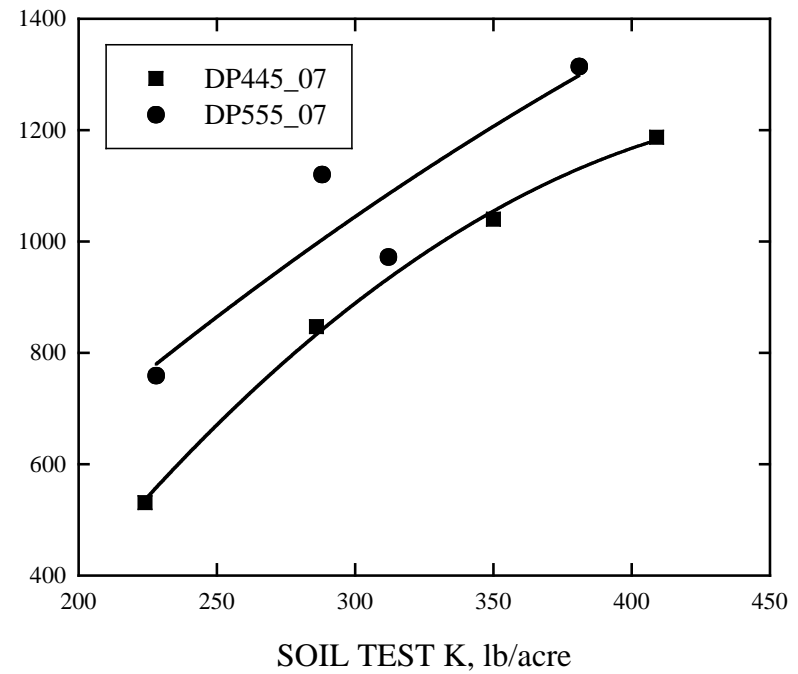
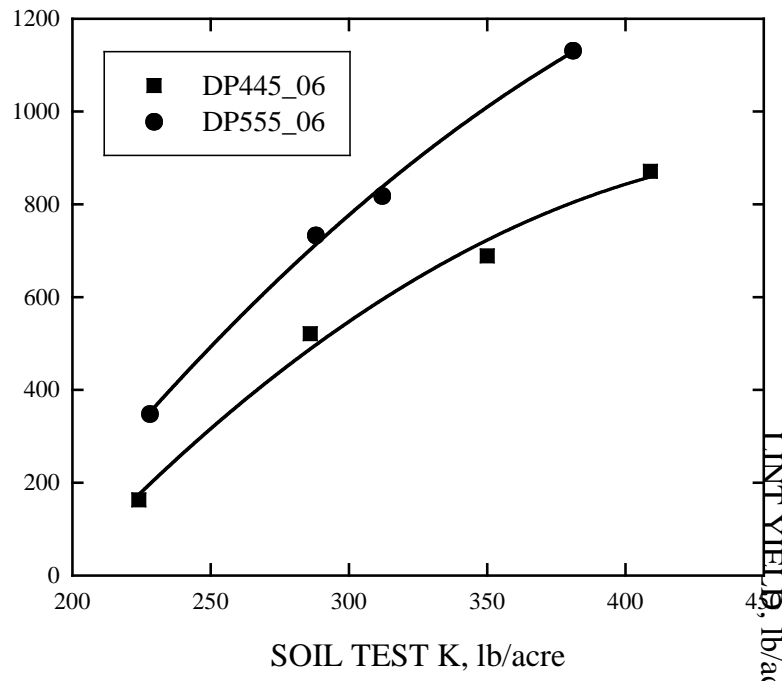


(Varco, 2000)

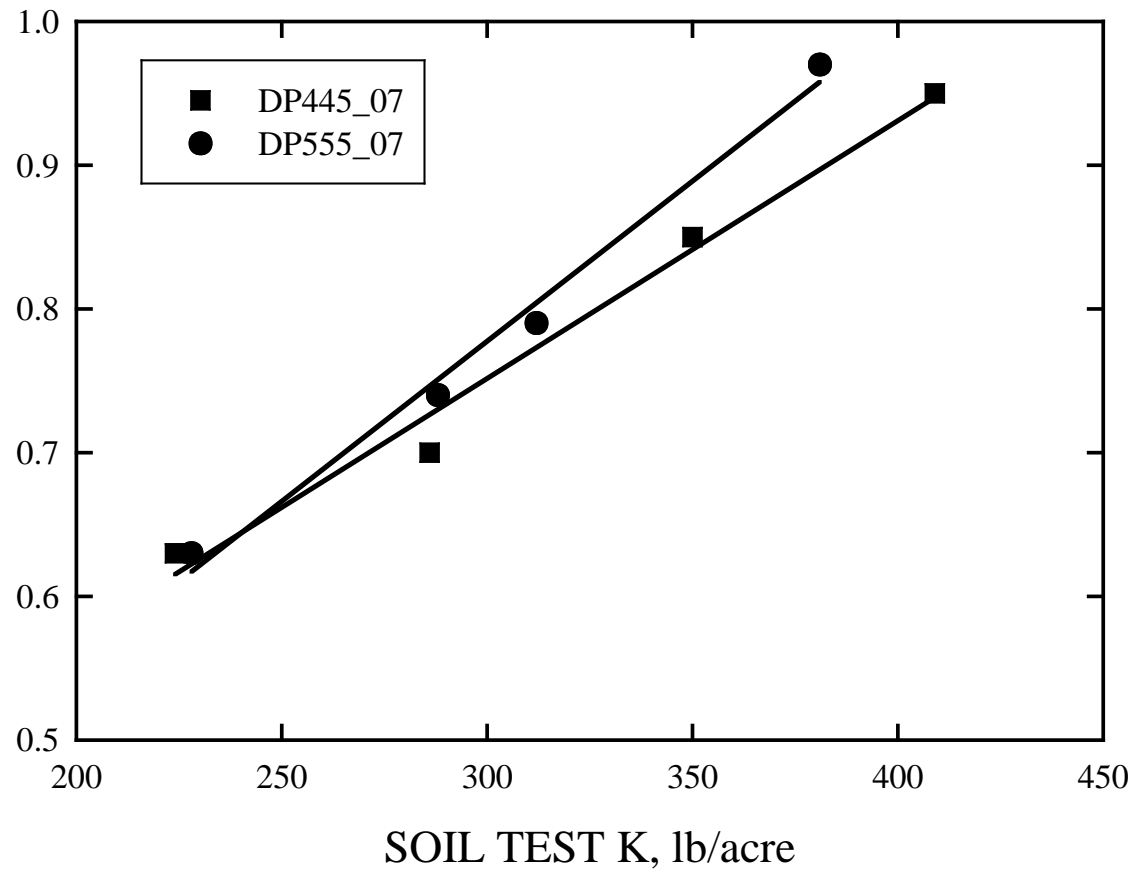
Variety Effects

DP 445 (Early-Mid) vs. DP555 (Mid-Full)

Mississippi State, Marietta Loam



Mississippi State, Marietta Loam

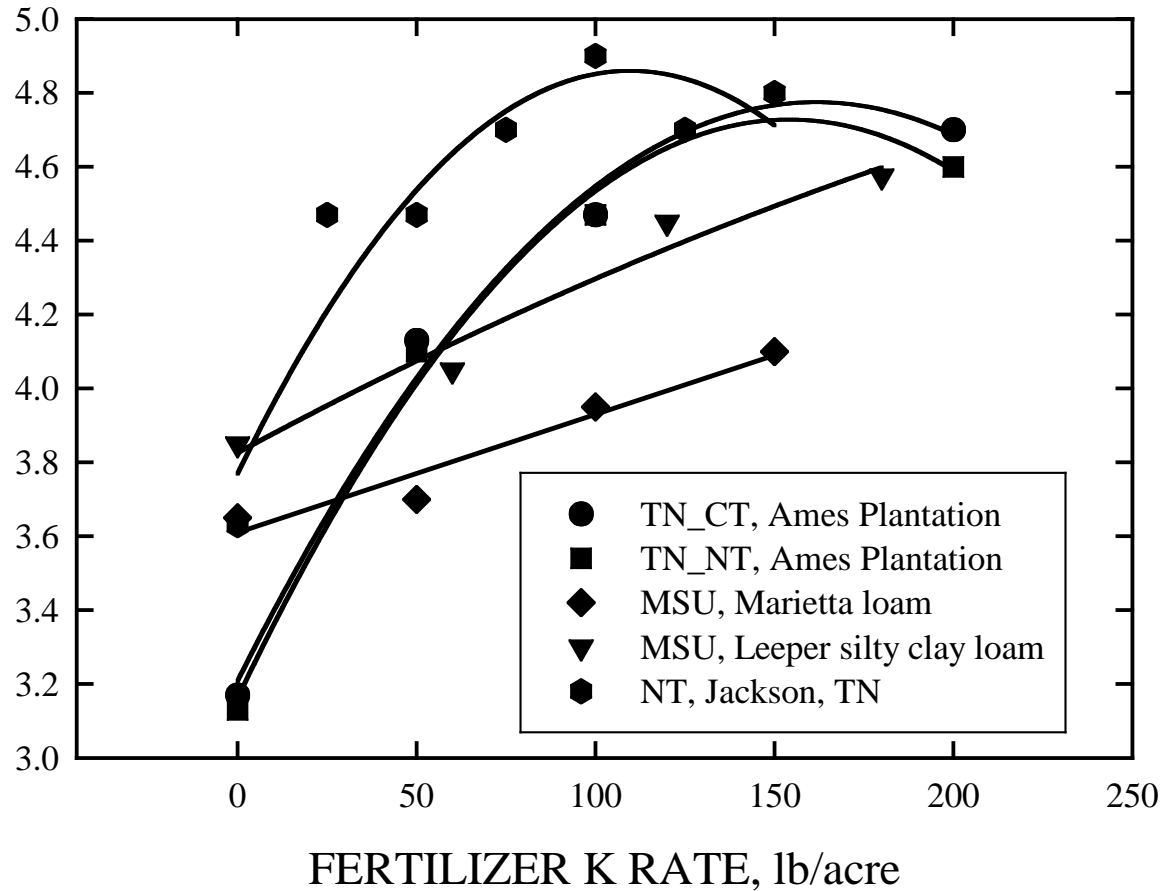


Jackson, TN, Loring Silt Loam, No-Till,
(Clement-Bailey and Gwathmey, 2007)

Variety	K Rate, lb/acre	% 1 st Harvest	Total Lint Yield, lb/acre
PM 1218 BG/RR	50	89.9	1676
PM 1218 BG/RR	100	87.5	1846
DP 555 BG/RR	50	78.8	1869
DP 555 BG/RR	100	72.4	1877

Lint Quality Response

Fertilizer K Effects on Micronaire



Summary

To avoid mid- to late season K deficiency:

- Consider fertilizer K adjustment for no-till
- Utilize up-to-date soil and plant tissue information for K management
- Address spatial issues
- Know variety characteristics



Questions/Comments?

