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Long-term P & K Fertility for West Texas Peanut-Cotton Cropping System
Gaines and Dawson County, Texas
Year 6—2006 & Six-Year Summary

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OBJECTIVE:

This report continues the project initiated in 2001. Response to P and K fertilizer in peanut is often difficult to measure. Soil tests in West Texas report high K, and P is often high as well. One- and two-year fertility projects addressing P and K in peanuts will not provide adequate results. A long-term fertility project was needed whereby peanut, as well as its rotational crop (cotton), is fertilized at a range of nutrient levels, each of which is retained on the same land area over time. Results will assist producers in examining the economic value of P and K for peanut and cotton in a three-year rotation.

The objective of this proposal is to complete the long-term P&K fertility site at AGCARES, Lamesa, TX, to gauge long-term impact and optimum levels of different P and K fertilizer regimes in a three-year peanut-cotton rotation.

METHODS AND PROCEDURES:

Peanuts

	Dawson County
Soil Type:	Amarillo fine sandy loam
Peanut variety:	Flavor Runner 458
Planting:	May 2, 2006 on 40" rows
Previous Crop:	Cotton (2 years)
Seeding Rate:	~5.7 seeds per row foot
Plot Set-up:	Same
Harvest Area:	4 rows X 32'
Inoculant:	Nitragin Soil Implant granular, 1X
N Fertilizer:	~50 lbs. N/A
Herbicide:	Prowl
Insecticide:	None
Rainfall:	8" during growing season
Irrigation level:	13"
Date Dug:	October 27, 2006
Date Harvested:	November 3, 2006

Cotton

	Dawson County
Soil Type:	Amarillo fine sandy loam
Cotton variety:	FiberMax 989RR
Planting:	May 5, 2006 on 40" rows
Previous Crop:	Set 1 (UNR), cotton; set 2, peanuts
Seeding Rate:	15 lbs./A
Harvest Area:	2 rows X 30' (stripper)
N Fertilizer:	~60 lbs. N/A
Herbicide:	Treflan, 1.5 pt/A
Rainfall:	10" during growing season
Irrigation level:	10"
Date Harvested:	November 10, 2006

Each individual plot was marked and the position recorded with a GPS unit so we can come back on the same location in 2006. Soil samples were collected from 0-12" depth.

Texas A&M soil tests on the peanut ground indicated 22 ppm P (moderate), and potassium, 290 K (high). Slight trends were observed reflecting application (or lack thereof) of P and K in early 2006.

Fertilizer application for P used 10-34-0 applied with rolling coulters leading a knife rig, banded 4" deep. Equivalent amounts of N were applied to each plot to ensure that all plots received the same amount of N. Potash application for K used 0-0-60, which also was incorporated into the surface.

RESULTS AND DISCUSSION:

Peanut

There was no significant yield response to K or P in this fifth year of fertilizer application. Yields were ~5,200 lbs./A at AGCARES. Although we believed that as this study continued for six years that crop response would begin to respond to residual fertility, we have not seen consistent evidence of it yet. It is possible that with soil K levels already high that addition of more K could interfere with calcium uptake. This information should be valuable in helping West Texas peanut and cotton farmers gauge the value of their particular approach to fertilizer use.

Table 1: Peanut yield response to P and K at AGCARES, 2006 (sixth year of long-term same site study).

Treatment	P2O5 (lbs./A)	K2O (lbs./A)	Peanut Yield (lbs./A)^
1	0	0	4858
2	30	0	5520
3	60	0	5201
4	0	80	5067
5	30	80	5154
6	60	80	5328
Trial average			5187
P-Value:	0.2181	0.9512	
P-Value interaction (P2O5 X K2O): 0.3854 Least significant difference (LSD), 0.10			**NS**
Trial coefficient of variation (CV)			8.5%

Cotton

We observed significant yield response to P in 2005 for the first time, and this same significant result occurred in 2006 as well. A slight response to K in cotton after peanut had been observed at WPG in 2003. With high soil test levels of residual fertility for K this any response is not expected. Potassium response is often seen not in the crop the year it was applied but in the subsequent crop, but we have not observed this in this trial.

Table 2: Cotton yield response to P and K at AGCARES, 2006 (north pie, cotton after cotton after peanut), sixth year of long-term same site study).

Treatment	P2O5 (lbs./A)	K2O (lbs./A)	Lint Yield (lbs./A)^
1	0	0	795
2	30	0	998
3	60	0	1046
4	0	80	712
5	30	80	1073
6	60	80	1093
Trial average			959
P-Value:	<0.0001	0.5505	
P-Value interaction (P2O5 X K2O): 0.5169 Least significant difference (LSD), 0.10			**92 (P)**
Trial coefficient of variation (CV)			17.4

Table 3: Cotton yield response to P and K at AGCARES, 2006 (northwest pie, cotton after cotton after peanut), sixth year of long-term same site study).

Treatment	P2O5 (lbs./A)	K2O (lbs./A)	Lint Yield (lbs./A)^
1	0	0	572
2	30	0	612
3	60	0	674
4	0	80	624
5	30	80	615
6	60	80	751
Trial average			641
P-Value:	0.0484	0.2593	
P-Value interaction (P2O5 X K2O): 0.7284 Least significant difference (LSD), 0.10			**81**
Trial coefficient of variation (CV)			15.8%

A six-year summary is included for field yield trial results for peanut and cotton treated with long-term P & K fertilizer (Table 4). After six years no consistent effect has been observed in peanut for either nutrient. Year 5 & 6 yielded significant responses to P in cotton production, but not for K, in Dawson Co.

Table 4. Summary of long-term P and K applications to peanut and cotton in a three-year rotation (Gaines and Dawson Counties, Texas, 2001-2006).

Nutrient	Location	2001	2002	2003	2004	2005	2006
Phos-phorus	WPG--Peanut	NS	NS (T)	**	NS		
	AGCARES--Peanut	NS	NS	NS	NS	NS	NS
	WPG--Cotton after peanut after cotton	NS	**	NS	NS (T)		
	WPG--Cotton after cotton after peanut	NS	**	NS	NS		
	AGCARES--Cotton after peanut after cotton	NS	NS (T)	NS	NS	**	**
	AGCARES--Cotton after cotton after peanut	NS	NS	NS	NS	**	**
Potas-sium	WPG-Peanut	NS	NS	NS	NS		
	AGCARES-Peanut	NS	NS	NS	NS	NS	NS
	WPG--Cotton after peanut after cotton	NS	NS	*	NS		
	WPG--Cotton after cotton after peanut	NS	NS	NS	NS		
	AGCARES--Cotton after peanut after cotton	NS	NS	NS	NS	*	NS
	AGCARES--Cotton after cotton after peanut	NS	NS	NS	NS	NS	NS

NS, not significant at α = 0.10
NS (T), not significant at α 0.10, though upward trend noted in crop response to nutrient
*, significant at α = 0.10
**, significant at α = 0.05