TITLE:

Long-term P, K, and Micronutrient Fertility for West Texas Peanut Cropping System

AUTHORS:

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OBJECTIVE:

Response to P and K fertilizer in peanut is 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 is needed whereby peanut, as well as its rotational crop (cotton), is fertilized at a range of nutrient levels, each of which are 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. In addition iron (Fe) and zinc (Zn) will be included for study in high pH soils of West Texas.

The objective of this proposal was to establish two sites (AGCARES, Lamesa, TX; Western Peanut Growers facility, Gaines Co., 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

The following trial was conducted at the Western Peanut Growers Assn. research farm in north central Gaines Co., Texas.

	Gaines County
Soil Type:	Brownfield loamy sand
Peanut variety:	Flavor Runner 458
Planting:	May 16, 2001, on 36” rows
Previous Crop:	Cotton
Seeding Rate:	~4.5 seeds per row foot
Plot Set-up:	RCBD, four reps for each of 6 treatments
Harvest Area:	4 rows X 50’
Inoculant:	Urbana FrozenPrep
N Fertilizer:	40 lbs. N/A applied with pivot
Herbicide:	Sonolan
Insecticide:	None
Rainfall:	~3” during the growing season
Irrigation level:	~21”
Date Dug:	October 26, 2001
Date Harvested:	November 6, 2001

Cotton

	Gaines County
Soil Type:	Brownfield loamy sand
Cotton variety:	Paymaster 2326 RR
Planting:	May 16, 2001, on 36" rows
Previous Crop:	Set 1, cotton; set 2, peanuts
Seeding Rate:	~16 lbs./A
Plot Set-up:	RCBD, four reps for each of 6 treatments
Harvest Area:	2 rows X 52.5' (stripper)
N Fertilizer:	60 lbs. N/A
Herbicide:	Prowl, 1.5 pt./A
Rainfall:	~3" during the growing season
Irrigation level:	~17"
Date Harvested:	October 22, 2001

Each individual plot was marked and the position recorded with a GPS unit so we can come back on the same location in 2002, especially since fields were deep broke after the 2001 cropping season. Soil samples were collected from 0-8" depth.

Texas A&M soil tests on the peanut ground indicated WPG indicated average 26 ppm P (moderate) and potassium, 228 ppm K (high).

Fertilizer application for P at WPG used 11-52-0 with incorporation into the root zone. 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. In subsequent years now that the sites are established, we will use liquid P with a fertilizer rig, and continue to broadcast K before listing.

RESULTS AND DISCUSSION:

Peanut

There was no significant peanut yield response to P or K at in this first year of fertilizer application. Yields at WPG were fairly good considering the late planting date. As noted earlier, it is difficult to show statistical significance on fertility research results for peanut for some nutrients, P and K among them. We believe that as this study continues for up to six years that crop response may begin to respond to residual fertility. This information should be valuable in helping West Texas peanut and cotton farmers gauge the value of their particular approach to fertilizer use.

In the fall of 2001, the peanut ground was deep broke thus we will soil sample in Spring 2002 to 12-14" deep so as not to lose account of P and K turned below the 0-8" sampling depth used in 2001.

Table 1: Peanut yield response to P and K at Western Peanut Growers, 2001 (first year of long-term same site study).

Treatment	P2O5 (lbs./A)	K2O (lbs./A)	Peanut Yield (lbs./A)^	Grade (%SMK+SS)
1	0	0	4200 a	74.8
2	30	0	3824 a	73.9
3	60	0	4067 a	74.2
4	0	80	4160 a	75.1
5	30	80	4021 a	73.9
6	60	80	4268 a	74.4
Trial average			4090	74.4
P-Value:	0.737	0.927		
P-Value interaction (P2O5 X K2O): 0.196 Least significant difference (LDS), 0.05			N/A	Non-replicated
Trial coefficient of variation (CV), 9.2%				

^Means in the same column followed by the same letter are not significantly different at the 0.05 significance level.

Cotton

In similar fashion to the peanuts at both WPG and AGCARES no significant measured yield response to either P or K was observed. This again points out the near futility that may be expected trying to gauge response to nutrients in the same year they are applied. Again, the potential benefit is that we have the opportunity to observe peanut and cotton growth response to long-term fertility applications year after year vs. where no fertilizer is applied.

Table 2: Cotton yield response to P and K at Western Peanut Growers, 2001 (cotton after peanut, first year of long-term same site study).

Treatment	P2O5 (lbs./A)	K2O (lbs./A)	Lint Yield (lbs./A)^
1	0	0	1212 a
2	30	0	1260 a
3	60	0	1178 a
4	0	80	1158 a
5	30	80	1224 a
6	60	80	1228 a
Trial average			1210
P-Value:	0.356	0.820	
P-Value interaction (P2O5 X K2O): 0.846 Least significant difference (LDS), 0.05			N/A
Trial coefficient of variation (CV), 10.1			

^Means in the same column followed by the same letter are not significantly different at the 0.05 significance level.

Table 3: Cotton yield response to P and K at Western Peanut Growers, 2001 (cotton after cotton, first year of long-term same site study).

Treatment	P2O5 (lbs./A)	K2O (lbs./A)	Lint Yield (lbs./A)^
1	0	0	1247 a
2	30	0	1135 a
3	60	0	1138 a
4	0	80	1194 a
5	30	80	1149 a
6	60	80	1197 a
Trial average			1177
P-Value:	0.943	0.969	
P-Value interaction (P2O5 X K2O): 0.486 Least significant difference (LDS), 0.05			N/A
Trial coefficient of variation (CV), 11.1			

^Means in the same column followed by the same letter are not significantly different at the 0.05 significance level.

An identical trial was also conducted at AGCARES in Dawson County.

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