EVALUATING FERTILIZER APPLICATION IN SOYBEANS

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SUMMARY:

Soil applied fertilizer knifed into land to be planted to soybeans at the rate of 8-23-23 per acre, did statistically increase soybean yields in a replicated demonstration but yields went up only 0.6 bu/a. At the rate of the fertilizer and application cost, the fertility demonstration did not prove economical.

OBJECTIVE:

To determine if the typical farmers' practice of not fertilizing soybeans is the most efficient use of resources. To determine if Texas University A&M Soil Testing Laboratory phosphorus recommendations on soybeans are profitable and if soil applied phosphorus can influence quality and yield of soybeans.

MATERIALS and METHODS:

Northrup King RA 452 soybeans were planted with a John Deere MaxEmerge Plus planter on 38 inch rows April 10, 2007 at the seeding rate of 165,000 seeds/acre. The seed was inoculated through Helena Chemical Company's Optimizer seed treatment program. No fertilizer (other than the test itself) was applied to this demonstration. Past history of this site is an eight year rotation of sorghum and soybeans with fertilizer only applied to the sorghum crop. Herbicide applied at planting included 14 oz/a of Boundary banded. Additionally, 3 oz/a of clethodim (generic Select herbicide) was applied at cultivation. Orthene was applied twice at 12 oz/a for stink bug control. Gramoxone desiccant was applied prior to harvest.

Soil tests were pulled from several sites within the demonstration area. Samples were collected at the following depths: 2 - 6 inches, 6 - 12 inches and 12 - 18 inches to determine nutrient levels and recommendations. Fertilizer applied to the test included 2l0 bs/a of 4-11-11 or an equivalence of 8-23-23 fertilizer was applied on December 5, 2006 placed 5 inches off the planting row and 2 inches below the depth of the furrow compared to an untreated check. This application rate was applied prior to the soil test results in an effort to guesstimate a phosphorus recommendation which would be a typical soybean fertilizer rate. See Table 1 for actual soil testing results and recommendations. The fertilizer applicator made a "dry run" knifing through the untreated check to alleviate any potential differences due to soil disturbance by fertilizing. The fertilizer was applied every other twelve rows replicating the treatment three times.

Harvest was on September 10, 2007 with 0.67 acre plots harvested per treatment. Treatments were replicated three times.

RESULTS and DISCUSSIONS:

The soil profile held adequate moisture throughout the growing season and received substantial rainfall in the summer months. The soybeans grew well with a matured height over 3 feet tall. There was no real difference noted in plant height between the treatments when visually appraised. Percent moisture and bushel weight showed no difference due to treatment.

Yields varied only slightly but were significantly different showing a positive response to the fertilizer added. At the rate of $171 per ton for the 4-11-11 fertilizer ($18.04/acre), plus an application of $6.00 per acre, there was a negative return of $19.65 per acre after factoring in the yield increase valued at $7.32/bushel.

ACKNOWLEDGMENTS:

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DISCLAIMER CLAUSE:

Trade names of commercial products used in this report are included only for better understanding and clarity. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas A&M University System is implied. Readers should realize that results from one experiment do not represent conclusive evidence that the same response would occur where conditions vary.

Table 1. Soil fertility levels and Texas A&M University Soils Laboratory recommendations for this phosphorus fertility demonstration. Duane Kainer, Cooperator, Victoria County, TX 2007.

Soil Depth Inches	Soil Fertility Levels; ppm [a/]						TAMU Soil Lab Recommendation; Lbs/A		
	Nitrogen		Phosphorus		Potassium		Nitrogen	Phosphorus [b/]	Potassium
2 - 6	13	M	36	M	122	M	0	20	35
6 - 12	10	L	16	L	127	M	0	50	30
12 -18	8	L	4	VL	133	M	0	70	30

[a/] Fertility levels: Ex - Excess; VH - Very High; H - High; M - Moderate; L - Low; VL - Very Low

[b/] This is the recommended broadcast rate. TAMU recommends half this rate if phosphorus is banded or knifed into the soil.

Table 2. Evaluation of various phosphorus soil application rates in soybeans and their effect on bean quality and yield. Duane Kainer, Cooperator, Victoria County, TX 2007.

TREATMENT	% MOISTURE	BUSHEL WEIGHT LBS/BU	YIELD BU/A [a/]
No Fertilizer	16.6 a	52.0 a	27.4 b
8-23-23	16.3 a	51.7 a	28.0 a
LSD (P=.05)		1.43	0.52
Standard Deviation		0.41	0.15
CV		0.79	0.53

[a/] Means within a data column followed by the same letter are not significantly different by ANOVA (P = 5 %; LSD). Yields were adjusted to 14 percent moisture.