

AGRONOMY

COTTON YIELDS AND CHANGES IN SOIL TEST PHOSPHORUS FROM PHOSPHORUS FERTILIZERS WITH AND WITHOUT UPTAKE ENHANCERS ON RAIN-FED COTTON

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"FERTILIZER APPLICATIONS ABOVE RECOMMENDED LEVELS COST MONEY WHEN THERE IS NO RESPONSE TO ADDED FERTILIZER. THIS COTTON PROJECT CONTINUES TO LOOK AT YIELDS WITH VARYING PHOSPHORUS LEVELS AND THE CHANGES IN SOIL TEST PHOSPHORUS WITH TIME."

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Often producers are faced with decisions concerning fertilizer applications addressing both rates and sources of phosphorus (P) fertilizer. At the same time, products show up in the marketplace that tout "revolutionary fertilizer efficiency technology from the lab to the field" or other such claims. These products claim to enhance fertilizer uptake efficiency through various mechanisms leading to more

available P and better use of fertilizer investment. To address these claims and answer producer concerns with replicated field data, a multi-year field study was established at the Tribbett Satellite Farm. The study consisted of a 4x2 factorial arrangement of four P rates (0, 20, 40 and 60 pounds of P per acre) and two rates of AVAIL™ Phosphorus Uptake Enhancer (Specialty Fertilizer Products, later Verdesian Life

Evaluation of Phosphorus Rates and AVAIL® P Fertilizer Enhancer						
Main Effects – Lint Yield (lb/ac)						
(Averaged across AVAIL® Rates)						
YEAR	Phosphorus Rate (lb/ac)				LSD _{0.05}	
	0	20	40	60		
2010	1239	1311	1279	1274	65	NS*
2011	553	574	576	605	55	NS
2012	1404	1493	1460	1444	82	NS
2013	1506	1629	1578	1598	110	NS
2014	1535	1534	1530	1506	106	NS
2015	1049	1068	1035	1083	79	NS
2016	1551	1576	1551	1549	84	NS
AVERAGE	1261	1312	1287	1294	----	----

* Not significant

Science) (0 and 0.5 gallons per ton of 0-46-0). These eight treatments were arranged in a randomized complete block with six replications beginning in 2010. The area was continuously grown in rain-fed cotton and P additions were made in the fall after harvest in each of the first four years. No additional P has been added since 2013. Cotton yields have been measured from the harvest of two center rows of a 4-row plot. A grab-sample was collected at the time of harvest and ginned through a 10-saw micro-gin to determine lint percent and calculated lint yields.

Lint yields are summarized in Table 1 (2010 to 2016) with a slight response to P applications. The lowest average yields were measured in 2011 with the highest yields 2013, 2014, and 2016. The best way to evaluate the P additions is to examine the soil test P level. Soil

samples were taken following harvest in each year of the study. Through the first four years, one should expect buildup if application exceeds removal and a decrease if removal exceeds the application. A summary of the soil test P levels are shown in Table 2. There has been annual variation with a general trend toward buildup while P was being applied and a decline in soil test P during the last three years. Two of the last three years had greater than 1500 lb lint per acre. Table 2 shows a fairly large decline in available P in the three year following the last P application. Cotton removes about 12 pounds of P per 1000 pounds of lint with about three times that rate in potassium. Though the soil test values in 2016 saw a decline in P, it was decided to not recommend P additions. This study will continue to monitor the soil test P levels.

Soil Test Phosphorus – MSU-ES (Averaged Across AVAIL® Rates)							
Tribbett Satellite Farm – Rain-fed (Non-irrigated)							
PHOS	Extractable Soil Test Phosphorus (lb/ac)						
(lb P/A)	2010	2011	2012	2013	2014	2015	2016
0	111.5	103.2	122.3	134.0	108.1	96.3	63.4
20	131.8	110.7	126.2	138.5	120.6	94.6	78.0
40	146.7	130.3	128.0	152.7	133.8	104.2	78.5
60	129.8	136.1	134.1	166.7	148.1	114.1	85.1
LSD(0.05)	25.8ns	11.0	16.3ns	23.0	24.5	18.5ns	9.5
-----Annual P Applications-----				----- No P Applied -----			
(Averaged across 2 AVAIL Rates and 6 Replications: n = 12)							