Cotton Fertilizers

kind and amount needed for best production studied in field tests

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Four-row experimental treatments compare cotton fertilized with 100N—*left;* 50N—*center;* 100N—*right;* and 150N—*upper extreme right.*

Nitrogen fertilization increased cotton yield in a series of experiments designed to determine the kind of fertilizer and—specifically—the amount of nitrogen necessary for maximum production on soils of the San Joaquin Valley.

The actual increase from nitrogen varied from 8.6% to 111.5% over unfertilized plots and varied with rates of nitrogen application, soil type, past fertilizer and cropping history.

Yield increases from the use of phosphate fertilizers were smaller than from nitrogen and its need is not general. Specific areas of phosphate requirement must be determined.

Adequate available potash occurs naturally in most California soils used for cotton production. Where supplies are already adequate, potash fertilization may cause yield depression.

During the past 10 years California cotton rose from 12th place in national production to its present second rank. Continuous cotton cropping on the land has allowed this expansion. Commercial fertilizers have been used to maintain the soil fertility once partially supplied by suitable crop rotations. At present more than 90% of the continuous cotton production receives commercial fertilizer to maintain high yields and economic production.

Experimental sites, located on soil types typical of large blocks of land used for continuous cotton cropping, were used in these tests. These soils necessarily differ in chemical and physical properties and can be expected to respond to fertilization in a varied manner. Tests were under ordinary farm conditions.

All fertilizer treatments were applied to established Acala cotton in the seedleaf stage, in bands about 6″ each side of the plants and 3″–5″ below the seed. All fertilizers were applied well in advance of the first irrigation.

Ammonium sulfate was used as the nitrogen source to supply 50, 100, and 150 pounds actual nitrogen an acre. Ammonium phosphate-sulfate was used as the nitrogen-phosphate carrier, to supply 100 pounds actual nitrogen and 120 pounds phosphoric acid an acre. A mixed fertilizer, 10–12–10, with ammoniacal nitrogen, phosphate and sulfate of potash was used as the complete fertilizer material. This material supplied 100 pounds actual nitrogen, 120 pounds phosphoric acid and 100 pounds of potash an acre.

The tests were arranged in a randomized block design and all 4-row treatments were replicated five times. Seed cotton was harvested from all treatments in two pickings made by a mechanical harvester.

A large number of soil series exists, but it is possible to group certain ones which have similar major characteristics and common soil forming materials. These similar soils, called series groups, are used here to characterize effects of fertilization on cotton production.

The Cajon series group, including Cajon and Hesperia soil series, are light brownish in color, have a calcareous reaction and are of recent alluvial origin. Found in Kings, Kern, Fresno and Tulare counties, these soils respond to nitrogen fertilization and in these tests gave maximum yields when supplied with 50 to 100 pounds actual nitrogen an acre. The average increase in yield from nitrogen fertilization varied between 20.7% and 29.3%. There was no beneficial effect of phosphate or potash fertilization at these test locations.

The Foster series group, including Chino and Foster soil series, are dark brownish-gray in color, have a calcareous reaction, have slightly developed profiles and are sometimes imperfectly drained. Found in Kings, Madera and Tulare counties, these soils produced maximum seed cotton yields with about 50 pounds actual nitrogen an acre. On the Chino series, the fertilized plots were not statistically different, but are a little better than the unfertilized. The actual average yield increase with nitrogen was about 8.6%. Phosphate and potash did not benefit cotton production at this location.

The Panoche series group, including Panoche and Panhill soil series, are of light grayish-brown color, calcareous in reaction and of recent alluvial origin. Found rather extensively in western Fresno, Kings, Kern and Madera counties, they are rather important cotton producing soils. Maximum yields were obtained on these test soils with 150 pounds actual nitrogen an acre with the greatest increase averaging 111.5% above unfertilized cotton. Each rate of nitrogen significantly increased yields up to the 150-pound rate. Observational plots receiving 200 pounds actual nitrogen were not materially different than the 150-pound rate. Phosphate with nitrogen produced significantly higher yields than where nitrogen was used alone. This increase improved yields by 12.6% over similar nitrogen rates. Potash combinations in a complete fertilizer significantly reduced seed cotton yields as compared with the same rates without potash.

Specific soil series groups varied in their requirement for fertilizer. Nitrogen fertilization generally improved yields on all test locations and affected largest crop improvement. Phosphates have not generally improved yields and the increase has been smaller than with nitrogen. Potash has not been found lacking in areas where tests were conducted.

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Effect of Nitrogen, Phosphate and Potash Fertilization on Seed Cotton

Fertilizer treatment (pounds/ acre)	Average seed Cotton Yields (pounds/acre)					
	Panoche 1	Panoche 1	Chino fsl.	Cajon fsl.	Hesperia sl.	Hesperia sl.
None	2012	2394	1642	2519	2693	2356
50N	3063	2975	1784	2887	3013	2700
100N	3687	3308	1749	3040	3483	2721
150N	4255	3572	1781	3009	3441	2893
100N 120P_2O_5	3944	3450	1806	3060	3376	2738
100N 120P_2O_5 100K_2O	3687	3345	1735	3019	3419	2746
L. S. D. (.05)	233	175	N.S.D.	204	415	234
Location	Fresno Co.	Kings Co.	Madera Co.	Tulare Co.	Shafter	Kern Co.

L. S. D. = Least significant difference. N. S. D. = Not significantly different.