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Fertilizer Requirements of Cotton in Parambikulam-Aliyar Project Areas

by

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Introduction : Fertilizers, in general, play a prominent role in stepping up crop yields. The benefits of irrigation, improved seed and improved management practices are fully realised only with the combination of application of optimum quantity of fertilizers that go to decide the availability of plant nutrients to the growing crop. In the *ayacut* areas wherever there are facilities for well irrigation, American cotton is being grown and acre yields upto 500 kg of *kapas* are obtained. The contemplated Parambikulam-Aliyar Project (PAP) when completed is likely to irrigate a total area of 2.4 lakhs acres lying in Pollachi, Palladam, Dharapuram and Udamalpet taluks of Coimbatore district. The availability of canal water in the newly developing project will give an impetus to include one of the commercially important crops like cotton in the crop rotation. Information

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as to the requirement of fertilizers for increased production of cotton under the soil and climatic conditions existing in the PAP areas is presented in this article.

Materials and Methods: With a view to determine the optimum dose of fertilizers for the irrigated Cambodia cotton grown in the winter season (September to February), an experiment was laid out at the Agricultural Research Station, Aliyarnagar during 1964–'65 and 1965–'66. The manurial treatments consisted of all the combinations of three levels of N *viz.*, 40, 60 and 80 lb. per acre, two levels of P_2O_5 *viz.*, 25 and 50 lb. per acre, two levels of K_2O *viz.*, 25 and 50 lb. per acre and a no fertilizer plot. The thirteen treatments were replicated four times in simple random blocks. The cotton strain grown was MCU. 1. A basal dose of five tons of compost per acre was applied to all the treatments. Phosphate and potash were supplied in the form of super phosphate and muriate of potash respectively as basal dressing by placement method along the sides of the ridges and covered by soil. Respective doses of N in the form of urea were applied as top dressing in three split doses on 20th, 40th and 60th day of sowing. The crop was raised by dibbling (two seeds per hill) on ridges formed two feet apart with a spacing of nine inches in the row, in September. Plant protection operations were adoted mainly as a prophylactic measure against pests and diseases. Observations on germination, general vigour, plant height, earliness in flowering and shedding of buds and bolls were recorded on five randomly selected plant from the non-experimental rows in each treatment and they were labelled and numbered. Flood irrigation of the canal water was provided for the crop once in seven days. Eight pickings were taken from the crop grown over a period of six months. The yield data on seed cotton gathered during 1964–'65 and 1965–66 were statistically analysed independently and also on the pooled data basis.

Results: The results of various characters studied in the experimentation are summarised below:

(a) *Germination and general vigour:* The differences in germination percentages were not appreciable. The germination percentages varied from 80 to 85 which indicated that the differences in the levels of P_2O_5 and K_2O had no effect on seed germination. The general vigour of the crop on visual observations showed spectacular differences in plots which received higher doses of N especially after the application of the third dose.

(b) *Plant height:* Plant height recorded on the ninetieth day was the lowest in the no manure (control) plot while in the other treatments, there was gradual increase with the increase in N level. The phenomenal increase in the height of plants at 80 lb. N revealed that there was effective

response of nitrogen at the heighest level. The first flowering was observed in the 80. lb N level and it was nearly a week earlier than 60 lb. N and 40 lb. N levels.

(c) *Shedding of buds and bolls :* The effect of different levels of N, P and K on shedding of buds and bolls was studied and there was not much difference in shedding of buds and bolls among the various manuring treatments.

(d) *Yield of seed cotton :* The yield of seed cotton in both the years (1964–65 and 1965–66) showed significant differences between control *Vs* rest and among the levels of N only (*vide* Table 1). On the other hand in the combined analysis significant differences were observed in respect of years X treatments, control *Vs* rest, levels of N and levels of K. Under the existing soil conditions of the research station at Aliyarnagar, the response of cotton for nitrogen was consistent at higher levels of N and 80 lb. N registered the maximum yield of *kapas*. It was seen that there was marked increase in the yield of *kapas* with every successive increase in nitrogen and potash. The response of the crop for phosphate was not evident. There were indications to show that the soil could be built in its fertility status in course of time with irrigation and cropping.

TABLE 1. *NPK – trial on MCU. 1 cotton – Mean yield of Kapas per plot.*

Particulars	1964—'65	1965—'66	Pooled data
Control	0·155	0·475	0·315
Rest	0·713	1·078	0·896
S. E.	0·042	0·089	0·050
C. D. (P = 0·05)	0·085	1·181 ?	0·099
Levels of N 40 N_1	0·528	0·754	0·638*
60 N_2	0·690	1·015	0·851
80 N_3	1·921	1·469	1·195
S. E.	0·020	0·042	0·024
C. D. (P = 0·05)	0·057	0·122	0·068
Levels of K. 25 K_1	...	...	0·863
50 K_2	...	...	0·927
S. E.	...	...	0·020
C. D. (P = 0·05)	...	...	0·056
Conclusion : (i) Rest, Control (ii) N_3, N_2, N_1	(i) Rest, Control (ii) N_3, N_2, N_1,	(i) Rest, Control (ii) N_3, N_2, N_1 (iii) K_2, K_1	

* The linear trend was tested for N application and found to be not significant. The equation is given as

$Y = 0{\cdot}000165\ x^3 + 0{\cdot}00735\ x + 0{\cdot}557.$

Discussion: The application of N at higher levels *viz.*, 80 lb. and 60 lb. N brought about a distinctly marked effect on the height and vigour of cotton plants. This observation was in conformity with the view expressed by Christids and Harrison (1955) and Qureshi (1965). Bederkar and Shaligram (1958) who recorded similar findings, stated that nitrogen manuring had a direct bearing on the height of cotton plant.

Earliness in flowering which was noticed in the higher dose of N indicated that nitrogen stimulated the cotton crop to early flowering and early maturity and increased amount of seed cotton was recovered during the first round of picking. This finding concurred with that of Hinkle and Jacks (1960). Narayanayya (1947) also observed that application of higher levels of N markedly increased the proportion of *kapas* picked at the time of first harvest. Observations recorded in respect of shedding of buds and bolls showed that there was no appreciable difference among the various manuring treatments. This was in conformity with the finding of Eaton and Ergle (1953) who reported that the percentage of boll shed was not influenced by nitrogen supply.

The yield of seed cotton gathered in the experiment clearly revealed the increased yields of all the manurial treatments as against the control (no manure). Among the three levels of N *viz.*, 40 lb, 60 lb and 80 lb. N, there was distinct increase in yield of *kapas* with increase in the dose of N. In the pooled analysis, response of cotton crop for potash was also revealed. There was marked increase in the yield of *kapas* with every successive increase of nitrogen and potash. The crop response for the application of phosphate was not perceptible. In the study of nitrogen requirements of cotton P. 216F in rice fallows undertaken at Aduthurai (Tanjore district) and Coimbatore, Kanniyan and Krishnamurthi (1964) reported significant yield response upto 90 lb. N per acre and recommended higher doses of N in such soils. The encouraging yields obtained at Aliyarnagar farm in sandy loam soil with low nitrogen status, clearly indicate that there are good prospects of extending the area under cotton during winter-cropping season with facilities for canal irrigation. Effective response for nitrogen at higher levels is a good augury for the spread of cotton in the newly developing *ayacut* area. In the monograph on cotton, potash was reported to have no effect on cotton crop. But response of cambodia cotton for the application of potash was recorded for the first time under the soil conditions existing at Aliyarnagar. This has necessitated a detailed agronomic trial to determine the optimum level of potash for cotton crop grown in the project areas commanded by canal irrigation.

Summary: In order to determine suitable manuring schedule for canal irrigated cambodia cotton in the Parambikulam-Aliyar Project areas, an experiment was laid out at the Agricultural Research Station, Aliyarnagar during the winter seasons of 1964–65 and 1965–66. There were thirteen manuring treatments representing combinations of three levels of N (40, 60 and 80 lb. per acre), two levels of P_2O_5 (25 and 50 lb. per acre), two levels of K_2O (25 and 50 lb. per acre) and the control (no manure). Phosphate and potash were applied as basal dressing while nitrogen was top dressed. Observations on germination, general vigour, plant height, earliness in flowering and shedding of buds and bolls were recorded and interpreted. From the yield data of seed cotton, it was inferred that there was marked increase in yield of *kapas* with every successive increase of nitrogen and potash.

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