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Effect of Foliar Application of Nitrogen on Winter Cambodia Cotton (*Gossypium hirsutum*)

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ABSTRACT

Effect of graded doses of nitrogen applied partly through soil and partly as foliar on the yield and quality of MCU.5 cotton grown in the winter season was studied. The results revealed that 45 kg N / ha applied to soil plus 7.5 kg N / ha applied through foliage recorded maximum yield of kapas, number of bolls per plant and profit per / ha compared to the present recommended dose of 60 kg N / ha as soil application.

INTRODUCTION

Foliar feeding of nitrogen is credited with the advantages of quick and efficient utilization, elimination of losses through leaching and fixation and regulated uptake of nutrients by plants (Yawalkar and Agrawal, 1962). Therefore to study the effect of graded doses of nitrogen as applied through foliage in combination with soil application on MCU. 5 cotton variety raised as winter crop, an experiment was conducted for three seasons in the Cotton Breeding Station, Coimbatore. The results of the trial are presented herein.

MATERIALS AND METHODS

The experiment was conducted for three seasons from 1970-71 to 72-73 during winter season with MCU. 5 cotton variety. The soil type of the field selected for the experiment was of red loam with adequate drainage facilities. The eight treatments were tried in a randomised block design replicated four times (Table 1)

The application of entire dose through foliage was omitted to avoid possible nitrogen starvation of the crop until it puts forth adequate foliage to accommodate spraying. The crop was sown during the middle of August on ridges giving a spacing of 75×35 cm. Soil application of nitrogen was done in two split doses, half at sowing and the other half a month thereafter. Three per cent urea solution was used to supply 5 or 7.5 kg N/ha per spraying depending on the treatments. The first spraying was done on the 60th

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Table 1. Detailsof Treatments

Treatments	Nitrogen (kg/ha) Soil	Foliar	Total N/ha
Tr. 1	Control		
Tr. 2	60		60.0
Tr. 3	45	7.5	52.5
Tr. 4	45	5	50.0
Tr. 5	30	15	45.0
Tr. 6	30	10	40.0
Tr. 7	15	22.5	37.5
Tr. 8	15	15	30.0

day after sowing. Subsequent sprayings, wherever necessary, were done at an interval of ten days. Plant protection measure and irrigations were given as per the package of practices. Rainfall received during the crop growth period is furnished in Table 2.

RESULTS AND DISCUSSION

Significant differences between the treatments in two out of three years and also with pooled were observed means (Table 3).

The combined mean yields indicated that Tr. 3 (45 kg N soil + 7.5 kg N foliar) was superior not only to control, (no manure) but also to treatments Tr. 4, Tr. 6, and Tr 8 wherein the total quantities of nitrogen applied were low. The mean increases in yield of kapas in treatment (Tr. 3) over control (Tr. 1) and the departmental recommended dose of 60 kg N/ha (Tr. 2) were in the order of 385 and 120 kg/ha, which works out 38.9 per cent and 9.5 per cent respectively. Individual years yield also followed more or less similar trend, thus confirming the superiority of Tr. 3. The result is in line with the findings of Chockhey Singh *et al* (1970) and Rajamani *et al.* (1973) who found that the split application of nitrogen, part through soil and part as foliar was more efficient to increase the yield of seed cotton than the application of the entire quantity to the

TABLE 2. Rainfall in mm

Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1970	0.81	—	—	4.5	63.7	1.5	—	2.5	8.1	139.8	69.3	2.5
1971	10.9	—	20.9	69.7	30.4	35.5	14.0	26.6	140.2	234.7	58.6	79.0
1972	—	—	—	32.6	138.0	36.6	45.2	16.7	120.0	303.7	259.8	235.5

TABLE 3. Yield and economic characters (Mean for 3 years)

Character	Year	Tr. 1	Tr. 2	Tr. 3	Tr. 4	Tr. 5	Tr. 6	Tr. 7	Tr. 8	S.E.	C.D. (P = 0.05)
1*	1970–71	1235	1391	1352	1299	1372	1345	1345	1245	72	—
	1971–72	786	1052	1205	1079	1059	1032	1025	1052	89	185.1
	1972–73	946	1319	1565	1265	1312	1318	1459	1385	70.6	146.8
	Mean	989	1254	1374	1214	1248	1232	1277	1227	41.0	116.1
2		69 6	69.6	78.9	73.7	76.7	75 2	77.6	72.3		
3		7.2	8.7	9.2	7.5	8 6	7.5	8.5	7.5		
4		33.75	33.50	34.25	32.25	34.00	33.80	34.1	34.2		
5		29 7	30.2	30.3	29.9	30.2	29.9	30.0	29.0		
6		108.2	108.8	110.5	110.0	112.5	113.3	113.9	110.5		

*Character 1 Kapas yield [kg/ha] 2 Height [cm] 3. Bolls/plant 4. Ginning per cent

5 Mean halo length [mm] 6. Seed Index

soil. The higher seed cotton yield in treatment (Tr. 3) is mainly due to the higher number of bolls per plant (as seen in the table) as also observed by Chockhey Singh *et al.* (1970).

It is interesting to observe that the response to the foliar application of nitrogen is related to the distribution of rainfall during the crop period. In 1970-71 season when the total rainfall was comparatively low (Table 2) yield differences between the treatments were small and insignificant. In subsequent years when the amount of rainfall was higher, during the same growth period, treatments involving application of nitrogen part through foliage and part through soil showed better response. This is attributable to the leaching loss of nitrogen when applied entirely to soil.

The economic characters like ginning percentage and mean halo length were not influenced by different treatments. This agrees with the findings of Seetharaman and Abraham (1970) and Rajamani *et al.* (1973). Seed index however, tended to increase with the increased dose of foliar applied nitrogen. Avitarsingh and Dargan (1965)

TABLE 4. Economics of treatments

Treatment Soil	Foliar (kg N/ha)	Additional yield over control (kapas)	Increased yield/kg N (kapas)	Additional Income (at Rs. 4.5/kg of (kapas)	Additional Expenditure/ha Rs. Ps.	Additional profit/ha Rs. Ps.
Control						
60		265	4.4	1192.50	180.0	1012.50
45	7.5	385	6.9	1732.5	157.50	1475.50
45	5	225	4.5	1012.5	156.0	862.50
30	15	259	5.8	1161.0	135.0	1026.00
30	10	243	6.0	1093.5	120.0	973.50
15	22.5	281	7.7	1264.5	112.5	1152.50
15	15	2.38	7.9	1071.0	90.0	981.00

observed that higher doses of nitrogen application induced the formation of heavier and well developed cotton seeds. Evidently efficient utlization of foliar applied nitrogen caused the formation of heavier and well developed seeds in this experiment. which reflected in the increased seed index.

Economis of the different treatments (Table 4) brings out that the treatment-3 (45 kg N through soil and 7.5kg N through foliar) registered maximum profit Rs. 1475/ha besides reduced expenditure of Rs 22/- when compared to the presently recommended 60 kg N/ha through soil. It is pertinent to note that urea being compatible with pesticides, can be combined with plant protection operation warranting no additional expenditure for spraying. Thus for winter cambodia cotton where the leaching loss is inevitable maximum benefit of nitrogen is derived with the part of Nitrogen applied through foliage.

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