

Uptake Pattern and Response of CBS.156 Hybrid Cotton Under Different Levels of Nitrogen Fertilization*

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Field experiments were conducted to study the uptake pattern and response of CBS.156 hybrid cotton under different levels of nitrogen. This study revealed that the uptake of N in the first crop and N, K uptake in the second crop was maximum under 80 and 120 Kg N/ha.

The uptake pattern and response to N may vary in CBS. 156 hybrid cotton from the ruling variety MCU. 5. The hybrids like H4 and Varalaxmi responded upto 135 and 120 Kg N/ha respectively. (Gururaj and Katarki, 1974; Nigam and Kotwani, 1971). Hence an investigation was undertaken to study the pattern of response to graded doses of nitrogen in CBS. 156 hybrid cotton.

The experiment was conducted at the Tamil Nadu Agricultural University Farm, Coimbatore for two consecutive years (1974-75 and 1975-76 winter seasons) with the object of finding out an optimum nitrogen dose, spacing requirement and method of planting for CBS. 156 hybrid cotton. The trial was laid out in factorial randomised block design with 4 x 4 combination of treatments as detailed below :

N levels	Spacing and planting methods
N ₀ : 0 kg N/ha	S ₁ : 75 x 60 cm - Single row planting

N ₁ : 40 kg N/ha	S ₂ : 75 x 60 cm - Paired row planting
N ₂ : 80 kg N/ha	S ₃ : 90 x 60 cm - Single row planting
N ₃ : 120 kg N/ha	S ₄ : 90 x 60 cm - Paired row planting

60 kg P₂O₅/ha in the form of super phosphate and 60 kg K₂O/ha in the form of muriate of potash were applied basally at sowing. Half the dose of nitrogen in the form of urea was applied basally and the rest applied 40 days after sowing. The uptake of nitrogen and potassium in the second crop at different stages were studied.

RESULTS AND DISCUSSION

The spacing and planting methods did not register any significant difference. The interaction was also not significant.

i) Uptake of nitrogen, K by crop at 40 days: The data on nitrogen

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* Forms part of M.Sc.(Ag) dissertation of the first author.

and potash uptake are presented in Table I. In the first year, the uptake of nitrogen was maximum (77.1 kg/ha) under N_2 , while the minimum uptake (35.6 kg/ha) was under N_0 . Applied nitrogen significantly increased its uptake by the crop. The increased uptake due to nitrogen fertilization resulted in significant increase in the dry matter production of the crop. The increase in dry matter ranged from 50 to 70 per cent in the nitrogen treated plots as compared to control. In the second year, the uptake of nitrogen and potash was generally more at higher levels of N (N_2 and N_3) as compared to N_1 and N_0 . Similar to this study, Bassett *et al.*, (1970) also found that nitrogen uptake was slow for the first 40-80 days following seeding. Thereafter, the uptake showed an upward trend at a rapid rate.

ii) Uptake of nitrogen and potassium by crop at 80 days: The uptake of Nitrogen was maximum under N_2 (92.3 kg/ha) but it was on par with that at N_3 (87.8 kg/ha) and N_1 (74.1 kg/ha). The dry matter production of the crop generally reflected the Nitrogen uptake pattern of the plant. In the second year, the uptake of Nitrogen, K was significantly higher under N_1 , N_2 and N_3 as compared to that at N_0 treatment. Here again, the growth rate of crop as evidenced from the dry matter production at 30 days followed the uptake pattern. The maximum dry matter production was under higher levels of Nitrogen and the minimum under untreated control.

iii) Uptake of nitrogen and potassium by crop at 120 days: In the first crop, as in the earlier stages applied nitrogen continued to exert a significant increase in the uptake of nitrogen by the crop. The maximum uptake of nitrogen (128.1 kg/ha) was recorded under N_3 , while the minimum uptake (49.9 kg/ha) was under N_0 . However, no significant variation in the uptake pattern among the levels of nitrogen applied was observed. On close examination of growth and yield attributes of the crop furnished in Table II, it may be seen that nitrogen application, significantly increased dry matter production, LAI, no. of sympodia, no. of bolls per plant and the seed cotton yield. In the second year, the uptake of nitrogen and potassium was significantly higher under N_1 , N_2 and N_3 as compared to N_0 treatment. Increased uptake of nitrogen and potassium at higher levels of nitrogen had generally contributed for a substantial increase in growth and yield attributes (Table II). As observed in this study, Basinski *et al.*, (1975) also found that increased amounts of fertilizer resulted in greater uptake of these nutrients.

iv) Correlation studies: The uptake of nitrogen at all stages of growth had significant positive correlation with seed cotton yield. Likewise the dry matter of crop at all stages showed significant correlation with seed cotton yield. The respective predication equations are also furnished (Table II).

v) Response study: In both the years, the yield response to added

TABLE I. Nutrient uptake and dry matter production at different stages of growth in CBS.156 hybrid cotton

Treatment	Nutrient uptake (Kg/ha)						* Dry matter production (Kg/ha)								
	At 40 days		80 days		120 days		40 days		80 days		120 days				
	1974-75	1975-76	1974-75	1975-76	1974-75	1975-76	1974-75	1975-76	1974-75	1975-76	1974-75	1975-76			
N ₀	35.6	42.5	25.3	44.2	48.6	31.8	46.9	63.8	34.2	1007	1369	1492	1826	2367	3043
N ₁	55.0	58.2	37.2	74.1	73.8	44.2	111.1	115.9	54.5	1518	1994	2265	2658	3572	4431
N ₂	77.1	71.6	38.2	92.3	90.0	50.6	126.3	125.9	58.6	1723	2158	2564	2988	4403	4980
N ₃	69.6	66.6	37.4	87.8	82.0	50.9	128.1	124.4	60.8	1686	2077	2603	2837	4080	4617
S.E.	5.3	5.7	2.9	6.8	7.2	4.1	8.1	8.8	4.1	112	151	165	186	231	474
C.D.(P=0.05)	16.1	16.5	8.3	20.3	20.7	11.8	24.4	25.4	11.8	337	435	496	534	697	1363

* Above ground parts alone.

TABLE II. Correlation and regression coefficients and prediction equation fitted

Correlation between Y	X	1974-75 'r'	1975-76 'r'	1974-75 'b'	1975-76 'b'	Prediction equation	Prediction equation
Seed Cotton Yield	No. of bolls per plant	0.35 ^{ns}	0.56 ^{ns}	0.3284	0.3392	$Y = 10.00 + 0.3284X$	$Y = 13.19 + 0.3392X$
-do-	No. of fruiting points per plant	0.16NS	0.62 ^{**}	—	0.1023	—	$Y = 11.98 + 0.1023X$
-do-	No. of sympodia per plant	0.10NS	0.10NS	—	—	—	—
-do-	Dry matter of crop at 40 days	0.86 ^{**}	0.37 [*]	0.0088	0.0021	$Y = 4.76 + 0.0088X$	$Y = 15.52 + 0.0021X$
-do-	Dry matter of crop at 80 days	0.85 ^{**}	0.36 [*]	0.0059	0.0015	$Y = 4.65 + 0.0059X$	$Y = 15.64 + 0.0015X$
-do-	Dry matter of crop at 120 days	0.91 ^{**}	0.03NS	0.0041	—	$Y = 3.04 + 0.0041X$	—
-do-	Uptake of N at 40 days	0.44 ^{**}	0.29 [*]	0.1032	0.0463	$Y = 11.70 + 0.1032X$	$Y = 16.74 + 0.0463X$
-do-	Uptake of N at 80 days	0.56 ^{**}	0.32 ^{ns}	0.1014	0.0386	$Y = 10.26 + 0.1014X$	$Y = 16.67 + 0.0386X$
-do-	Uptake of N at 120 days	0.54 ^{**}	0.43 [*]	0.0712	0.0388	$Y = 10.48 + 0.0712X$	$Y = 15.34 + 0.0388X$

Correlation between

N uptake of crop at 40 days
Vs dry matter of crop
0.74^{**}
0.83^{**}

N uptake of crop at 120 days
Vs dry matter of crop
0.70^{**}
0.83^{**}

N uptake of crop at 80 days
Vs No. of bolls per plant
0.44^{**}
0.42^{**}

1974-75
1975-76

nitrogen was of quadratic nature. The optimum dose for maximum yield was found to be 84 kg N/ha and the economic optimum for maximum return was found to be 83 kg N/ha at the prevailing price levels of Rs. 4.50 per kg of nitrogen and Rs. 5.00 per Kg of seed cotton.

Thanks are due to the Tamil Nadu Agricultural University for the kind permission to publish part of the M. Sc. (Ag.) dissertation of the first author.

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