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Influence of higher levels of NPK on seed cotton yield, seed yield and seed quality characters of cotton cv. MCU 5 and hybrid TCHB 213

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Abstract : The variety MCU 5 and hybrid TCHB 213 both responded well for heavy doses of fertilizer levels, eventhough the response to fertilizers was felt much in MCU 5 than TCHB 213. Comparatively more seed cotton yield and seed yield were obtained by a fertilizer dose of 200:150:100 NPK kg ha^{-1}. For this levels of NPK, MCU 5 and TCHB registered 2588 and 2750; 1719 and 1846 kg ha^{-1} seed cotton yield and seed yield respectively. It was 48 and 41 per cent and 51 and 47 per cent higher seed cotton and seed yield than recommended level in MCU 5 and TCHB 213 respectively. Under laboratory condition, the resultant seeds of variety and hybrid recorded significantly higher per cent germination, seedling growth measurements, drymatter production and vigour index with corresponding increase in fertilizer levels except in 200:0:200 NPK kg ha^{-1}. (***Key words :*** *MCU 5, TCHB 213, NPK fertilizers, Seed cotton yield, Seed yield and Seed quality.*)

Generally cotton crop is very sensitive to fertilizer, doses, particularly for N and P_2O_5 fertilizers. Moreover, in cotton fertilizer response depends upon the prevailing climatic factors such as temperature, sunlight, RH, rainfall. There was incidences that the same fertilizer doses did not respond similarly in consecutive years, due to changes in the climatic factors. The studies made by Singh *et al.* (1968) showed that dose of fertilizer and time of its application different from place to place depending upon soil type, climatic conditions and variety. Cotton response to higher doses of fertilizers particularly N will be greater but the response may not always be in the form of seed cotton or seed yield. However, the response may be in the production of vegetative parts such as plant height, number of leaves etc. Hence, an attempt was made to determine optimum dose of fertilizers to maximise the yield without affecting the seed quality.

Materials and Methods

A field trial was raised during winter 1996 in a variety MCU 5 and a hybrid TCHB 213 with different NPK fertilizer doses *viz.* 200:0:200 (F_1), 200:75:200 (F_2), 200:150:200 (F_3), 20:150:0 (F_4), 200:150:100 (F_5) along with general recommended dose of NPK to cotton crop 80:40:40 (F_0) kg ha^{-1}. 1/3rd of N and full dose of P_2O_5 and K_2O were applied basally. 1/3rd N as first top dressing on 40-45th day and 1/3rd N during second top dressing on 60-65th day. The crop was raised adopting the common recommended package of practices. At harvest the burst bolls were harvested in four different pickings at 10 days intervals in both MCU 5 and TCHB 213 which were represented as first picking (P_1), second picking (P_2), third picking (P_3) and forth picking (P_4). After harvest, seeds were subjected to laboratory evaluations like germination test, seedling growth measurements, drymatter production and vigour index to assess the quality of seed.

Results and Discussion

The seed cotton yield of both variety and hybrid were higher in applied fertilizer dose of 200:150:100 kg ha^{-1} recording 48 and 41 per cent higher seed cotton yield than the recommended level respectively, irrespective of pickings (Table 1). The higher doses of NPK increased 41, 64,55 and 35 per cent more

Table 1. Influence of fertilizer combinations on seed cotton yield and seed yield (kg ha^{-1})

Treat-ment	MCU5					TCHB 213				
	P_1	P_2	P_3	P_4	Total	P_1	P_2	P_3	P_4	Total
					Seed cotton yield					
F_1	895	458	391	332	2076	921	501	422	391	2535
F_2	917	510	421	340	2188	958	540	453	388	2339
F_3	960	547	480	369	2346	980	588	512	426	2506
F_4	895	458	428	317	2098	924	508	462	378	2272
F_5	971	702	517	399	2589	1012	742	543	452	2750
F_0	687	428	332	295	1742	709	512	388	341	1950
Mean	886	517	428	342	2173	917	565	463	396	2392
					Seed yield					
F_1	599	306	262	223	1390	621	326	288	247	1482
F_2	604	336	278	224	1442	632	352	291	251	1526
F_3	626	361	317	243	1547	661	383	343	278	1670
F_4	590	298	279	207	1374	612	318	309	236	1475
F_5	652	463	340	263	1719	698	487	371	289	1846
F_0	448	279	216	192	1136	489	302	237	228	1256
Mean	586	340	282	225	1433	618	362	306	255	2500

Seed Cotton yield	A	T	P	AxT	TxP	AxP	AxTxP
CD (P=0.05)	14.9**	26.6**	21.7**	37.2**	30.9**	53.2**	210.0**
Seed yield	A	T	P	AxT	TxP	AxP	AxTxP
CD (P=0.05)	906**	17.2**	14.0**	24.1**	20.0**	34.7**	136.9**

seed cotton yield in four pickings in variety and 42,45,40 and 32 per cent higher yield in hybrid respectively. In both variety and hybrid, fertilizer effect on seed cotton was more in second picking than other pickings. Tiwana *et al.* (1989) recorded increased seed cotton yield due to higher dose of N application. Bapna *et al.* (1975) reported that the highest dose of fertilizer level i.e., 240 N-120 P-120 K ha^{-1} in hybrid 4 cotton.

Among the fertilizer levels, 200:150:100 NPK kg ha^{-1} recorded 51 and 47 per cent higher seed yield than 80:40:40 NPK kg ha^{-1} respectively in both variety and hybrid (Table 1). Almost all fertilizer levels recorded significantly more yield than the recommended level indicating that seed yield was responding to the application of N in higher doses. Application of 240 kg N, 160 kg each of P_2O_5 and K_2O ha^{-1} recorded the maximum seed yield as compared to 168:80:80 and 80:40:40 NPK kg ha^{-1} in hybrid cotton (Vyakaannahal *et al.* 1987).

The yield differences were observed among the fertility levels due to significant increase in number of bolls harvested in high fertility (Singh and Bharadwaj, 1983) and also due to increase in monopodial and sympodial branches (Malik *et al.* 1998). In Egyptian cotton, Sawan *et al.* (1989) stated that the increased seed yield for N fertilization may be attributed to increase flower bud production, reflecting enhanced meristematic activity which resulted in more mature bolls plant^{-1}. Nuriddinova and Karimov (1985) obtained greatest boll retention from high application rate of N (upto 240 kg ha^{-1}) which created more favourable for physiological processes.

Under laboratory condition, resultant seeds of variety recorded more initial germinaiton than hybrid. In both variety and hybrid ther was an indication from the results that the per cent germination and vigour index decreasing with corresponding increase in the fertilizer levels except in 200:0:200 NPK Kg ha^{-1} received seeds, where it was significantly higher than recommended level of fertilizer in both variety and hybrid (Table 2).

The reason probably might be due to the fact

Table 2. Influence of fertilizer combinations on germination (%) and vigour index

Treat-ment	MCU5					TCHB 213				
	P_1	P_2	P_3	P_4	Total	P_1	P_2	P_3	P_4	Total
					Germination (%)					
F_1	82	78	75	72	77	74	71	69	66	70
	(64.9)	(62.0)	(60.0)	(58.0)	(61.3)	(59.3)	(57.4)	(56.1)	(54.3)	(56.7)
F_2	72	70	68	65	69	67	65	64	63	64
	(58.0)	(56.7)	(55.5)	(53.7)	(56.1)	(54.9)	(53.7)	(53.1)	(52.4)	(53.1)
F_3	69	66	64	61	65	65	64	63	62	63
	(56.1)	(54.3)	(53.1)	(51.3)	(53.4)	(53.7)	(53.1)	(52.4)	(51.9)	(52.4)
F_4	76	73	70	68	72	69	67	66	64	66
	(60.6)	(58.6)	(56.7)	(55.5)	(58.0)	(56.1)	(54.9)	(54.3)	(53.1)	(54.3)
F_5	73	71	68	64	69	67	65	63	62	64
	(58.6)	(57.4)	(55.5)	(53.1)	(56.1)	(54.9)	(53.7)	(52.4)	(51.9)	(53.1)
$F_0$7	5	73	70	67	71	68	66	64	63	65
	(60.0)	(58.6)	(56.7)	(54.9)	(57.4)	(55.5)	(54.3)	(53.1)	(52.4)	(53.7)
Mean	74	72	69	66	70	68	66	65	63	66
	(59.3)	(58.0)	(56.1)	(54.3)	(56.7)	(55.5)	(54.3)	(53.7)	(52.4)	(54.3)
					Vigour Index					
F_1	2517	2313	2129	1916	2218	2249	2097	1932	1790	2017
F_2	1962	1820	1686	1506	1743	1849	1688	1593	1491	1655
F_3	1839	1676	1559	1392	1617	1776	1638	1545	1447	1601
F_4	2138	1934	1755	1597	1856	1947	1780	1676	1548	1737
F_5	2016	1992	1679	1484	1792	1864	1697	1569	1475	1648
F_0	2071	1927	1783	1619	1860	1887	1771	1633	1550	1710
Mean	2090	1943	1765	1586	1846	1927	1778	1658	1550	1728

Germination	V	F	P	VxF	VxP	FxP	VxFxP
CD (P=0.05)	0.5*	*1.0**	0.83**	2.05**	1.43**	2.05**	8.1**
Vigour index							
CD (P=0.05)	15.2**	27.2**	22.2**	31.6**	38.1**	54.5**	214.9**

in 200:0:200 NPK Kg ha^{-1} treatment P was zero. Under no phsphate fertilizer the 200 kg applied N would not have been absorbed by the plants corresponding to the higher doses. Since, N and P were parallely absorbed by the plants and where absorption of P was higher than absorption of N.

According to Uppar and Kulkarni (1989) increased dose of N increased the seed quality characters like germination per cent and vigour index in sunflower. Kumar and Basavaraju (1984) also observed the same results. But in the present study, controversial results were recorded. This might be due to higher doses of all the three fertilizers.

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Residual effect of tillage systems coupled with organics on soil physical properties after groundnut (var Co 2) in a sandy clay loam having sub soil hard pan

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Abstract : A field experiment was conducted to study the residual effect of tillage practices and organics on physical properties in a Typic Haplustalf having hard pan at shallow depth on groundnut crop after sorghum as the main crop. The results revealed that the bulk density was increased to 1.84 Mg m^{-3} at harvest from the initial value of 1.67 Mg m^{-3} after the harvest of main crop of sorghum. Neither the different tillage treatments nor the organics influenced the hydraulic conductivity of soil. The depth alone influenced the parameter and the surface layer registered significantly higher value than the sub surface layers. Different tillage and organic treatments did not influence the total porosity. However, an increase in porosity was evident registering the highest value of 50.23 per cent in the surface layer (0-15 cm) which was significantly superior over other depths. *(Key words: Tillage practices, Organic manures, Bulk density, Hydraulic conductivity, Pore size distribution)*

Soil physical constraints affecting the retention and movement of soil moisture, soil aeration, soil nutrient movement, soil temperature, seed germinaiton, seedling establishment, root penetration and proliferation have been well documented (Ghildyal and Gupta, 1991). Even judicious application of all the required plant nutrients at times fails to yield good results due to the poor soil physical