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Short Communication

Yield and Fiber Quality of Cotton as Influenced by Fertilizer Levels and Organic Manure

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Cotton (*Gossypium herbaecum*) is a widely grown major cash crop in Karnataka. It contributes about 85% of raw material to the textile industry. In Karnataka, cotton is cultivated over an area of 4.45 lakh ha with production of 9 lakh bales and productivity is 344 kg ha^{-1}, which is slightly more than national average. The targeted productivity with high yielding varieties and modern agriculture technologies, besides exploitation of limited natural resources, have added new dimensions to the problems for maintaining soil fertility and sustaining the productivity. The ever increasing and escalating price of inorganic fertilizers leads to the use of organic manure as supplement. Quality besides being genetic, is also determined largely by environmental factors and cultural practices such as use of organic manures known to influence the quality parameters of cotton (Venkanna *et al.,* 1998; Padole *et al.,* 1998). With this background, the present study was undertaken to find out the suitable organic manures or combination of them with or without inorganic fertilizers to improve the yield and quality of cotton.

A field experiment was carried out during 1998-1999 and 1999-2000 at Agricultural Research Station Annigeri, Karnataka, in deep black soils having 222, 24 and 425 kg ha^{-1} of available N, P_2O_5 and K_2O, respectively, to study the yield and quality of *Herbaceum* cotton as influenced by fertilizer levels and organic manures. The trial was conducted in split plot design with three replications. There were three main plot treatments viz., fertilizer levels (Control, 50% RDF and 100% RDF- 30:15:15 $N:P_2O_5:K_2O$ kg ha^{-1}) and six sub-plot treatments viz., organic manures (farm yard manure FYM) @ 5.0 t ha^{-1}, poultry manures PM @ 5.0 t ha^{-1}, cotton stalks CS @ 5.0 t ha^{-1}, FYM+CS each at @ 2.5 t ha^{-1}, PM+CS each at @ 2.5 t ha^{-1} and FYM+PM each at @ 2.5 t ha^{-1}). Fertilizers and organic manures were applied as per treatments. The crop was sown in last week of September during both the years. The total rainfall received during first and second year of experimentation was 656.9 and 451.0 mm, respectively as against the normal of 670.9 mm (average of 25 years). The net plot size was 4.8 x 4.8 m. Fiber quality parameters were analyzed as per the standard procedure out lined by Sundaram (1979) from the lint samples drawn from different treatments. Lint index and ginning out turn were computed as indicated by Chabra *et al.* (1996).

Table 1. Effect of integrated nutrient management practices on yield and yield components of cotton (mean of 1999 and 2000)

Treatments	No. of bolls at 180 DAS	Mean boll weight (g plant^{-1})	Seed cotton yield (g plant^{-1})	Seed cotton yield (kg ha^{-1})		
				1998-99	1999-2000	Pooled
Main plots						
No fertilizer	12.94	1.40	18.50	1037	742	890
50% RDF	15.21	1.59	20.72	1143	827	985
100% RDF	15.76	1.73	22.60	1244	859	1052
CD at 5%	0.58	0.07	1.33	102	70	62
Sub-plots						
FYM @ 5 t ha^{-1}	14.73	1.57	21.34	1172	824	998
PM @ 5 t ha^{-1}	15.13	1.62	20.48	1153	813	983
CS @ 5 t ha^{-1}	13.89	1.54	20.26	1056	763	910
FYM @ 2.5 t ha^{-1} + CS 2.5 t ha^{-1}	14.74	1.52	19.59	1133	818	976
PM @ 2.5 t ha^{-1} + CS 2.5 t ha^{-1}	14.36	1.58	20.72	1128	812	970
FYM @ 2.5 t ha^{-1} + PM 2.5 t ha^{-1}	14.97	1.61	21.23	1206	829	1017
CD at 5%	NS	NS	NS	95	NS	54

100% RDF = 30:15:15 N, P_2O_5 and K_2O kg ha^{-1}.

The pooled data of two years (Table 1) indicate that application of 100% RDF recorded significantly higher seed cotton yield (1052 kg ha^{-1}) than control (890 kg ha^{-1}) and 50% RDF (985 kg ha^{-1}). The variation in seed cotton yield between fertilizer levels was mainly attributed to number of bolls per plant at 180 DAS, mean boll weight and seed cotton yield per plant. The native available soil nitrogen was low (222 kg ha^{-1}) and hence the application of higher fertilizer nitrogen resulted in higher nutrient availability. This might have favored better yield components in turn seed cotton yield. Number of bolls per plant at 180 DAS was significantly higher (15.8) with 100% RDF as compared to control (12.9) and 50% RDF (15.2). Similarly seed cotton yield per plant (22.6 g) and mean boll weight (1.7 g) were also significantly higher with 100% RDF than control (18.5 g and 1.4 g, respectively) and 50% RDF (20.7 g and 1.6 g, respectively). Similar observations were reported by Koraddi *et al.* (1992). Similar trend was observed during first year of experimentation. Whereas, during second year of experimentation 50 and 100% RDF recorded at par seed cotton yield and both were superior to control. This might be due to low moisture availability (the rainfall received during the year was nearly 30% less than the normal), which resulted in poor growth of plant and did not utilize the higher applied fertilizer. Within the organic manures FYM+PM each at @ 2.5 t ha^{-1} recorded significantly higher seed cotton yield (1017 kg ha^{-1}) as compared to cotton stalks incorporation @ 5.0 t ha^{-1} (910 kg ha^{-1}) the other organic manurial treatments were at par with earlier treatment (Table 1). The low seed cotton yield with cotton stalks was mainly due to temporary immobilization

Table 2. Effect of fertilizer levels and organic manures on fiber and other qualities of cotton (G. herbaceum) (mean of 1999 and 2000)

Treatments	Mean fiber length (mm)	Fiber strength (g/tex)	Micro-naire value	Maturity coefficient	Lint index (g)	Oil (%)	Ginning (%)
Main plots							
No fertilizer	18.50	19.12	3.99	0.743	2.55	14.95	30.45
50% RDF	18.35	19.01	4.02	0.743	2.63	15.18	30.32
100% RDF	17.99	18.94	4.04	0.743	2.68	15.15	30.52
CD at 5%	0.23	0.07	NS	NS	0.11	NS	NS
Sub-plots							
FYM @ 5 t ha^{-1}	18.15	18.98	4.01	0.744	2.71	15.11	30.52
PM @ 5 t ha^{-1}	18.30	19.06	4.01	0.744	2.57	15.13	30.27
CS @ 5 t ha^{-1}	18.35	19.05	4.01	0.742	2.59	15.08	30.33
FYM @ 2.5 t ha^{-1} + CS 2.5 t ha^{-1}	18.34	19.02	4.02	0.744	2.55	15.42	30.41
PM @ 2.5 t ha^{-1} + CS 2.5 t ha^{-1}	18.22	19.03	4.02	0.744	2.62	15.04	30.38
FYM @ 2.5 t ha^{-1} + PM 2.5 t ha^{-1}	18.31	19.03	4.03	0.742	2.69	14.77	30.68
CD at 5%	NS	0.08	NS	NS	0.13	NS	NS

100% RDF = 30:15:15 N, P_2O_5 and K_2O kg ha^{-1}.

of nutrients by the microorganisms during initial years of cotton crop residue application (Babalad, 1999). This might have resulted in poor yield components in turn seed cotton yield. Similar results were observed during individual years of experimentation.

Among the interaction effects, application of 100% RDF with FYM+PM each at @ 2.5 t ha^{-1} resulted in higher seed cotton yield as compared to interaction effects of no fertilizer with different organic manures. The results are in conformity with findings of Malewar *et al.* (1999).

Analysis of fiber quality parameters (Table 2) revealed that 100% RDF recorded significantly higher lint index as compared to control, but ginning out turn was not influenced by fertilizer levels. Fiber length was significantly influenced by various fertilizer levels. It was significantly higher with control (18.5 mm) and 50% RDF (18.4 mm) as compared to 100% RDF (17.9 mm). This might be attributed to lint contribution from under developed bolls (with short and immature fibers) at later stages of the crop. Similarly at Dharwad, lower fertilizer level recorded higher fiber length than higher fertilizer level (Abraham *et al.*, 1991). Stronger fibers were produced with the treatment of control as compared to 50 and 100% RDF. Micronaire value, maturity coefficient and oil content were not influenced by fertilizer levels. These results confirm the findings of Venkanna *et al.* (1998).

All the quality parameters except lint index and fiber strength were not influenced by organic manurial treatments. Significantly higher lint index was recorded with FYM @ 5.0 t ha^{-1} as compared to PM, CS and FYM+CS. Application of PM @ 5.0 t ha^{-1} recorded significantly higher

fiber strength as compared to FYM @ 5.0 t ha^{-1}.

The interaction effect showed that higher fertilizer levels with organic manures recorded higher lint index, ginning out turn and micronaire value. Whereas, fiber strength and length were higher with lower fertilizer levels with organic manures.

It is concluded that application of 100% RDF with FYM+PM each at @ 2.5 t ha^{-1} in deep black soils of semi-arid tropics of Karnataka under rainfed conditions found beneficial for getting higher seed cotton yield. However, except fiber strength and lint index none of the quality parameters were influenced due to either fertilizer levels or organic manures.

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