

## Original Research Article

# Influence of Organics, Inorganics With and Without Plant Protections on Quality of Desi Cotton

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## ABSTRACT

A field experiment was conducted at Agronomy farm, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (M. S.) to study the effect of various sources of nutrients i.e. organics and inorganics along with different plant protection measures on monetary returns and quality of desi cotton. Experiment results revealed that the number of bolls, boll weight and seed cotton yield plant<sup>-1</sup> were significantly affected by the different combinations of organic and inorganic sources of nutrients. Treatment combinations of FYM @ 10 t ha<sup>-1</sup> + 50: 25: 25 kg NPK ha<sup>-1</sup> and Vermicompost @ 2 t ha<sup>-1</sup> + 50: 25: 25 kg NPK ha<sup>-1</sup> being par recorded significantly maximum seed cotton yield (14.44 & 16.27 and 14.15 & 15.87 q ha<sup>-1</sup>, respectively) during first season and second season. Plant protection measures viz., organics and inorganics were found to be equally comparable for increasing seed cotton yield ha<sup>-1</sup> in both the years. Earliness index was affected significantly and recorded inconsistent trend due to various treatments of organics, inorganics and plant protection measures during 2004-05 and 2005-06. Seed index affected significantly due to inorganics and treatment received application of 50: 25: 25 kg NPK ha<sup>-1</sup> recorded maximum seed index rest of the treatments during both the years of study. Mean halo length, ginning percentage and various fiber technological properties like 2.5% span length, micronaire value, bundle strength and uniformity ratio were not affected at level of significance in both the years due to use of different organics, inorganics and plant protection measures.

### Keywords

Desi cotton,  
Monetary  
returns,  
Quality

## Introduction

India is unique in that all four major cultivated species of cotton are grown commercially. Major area in India is occupied by *G. hirsutum* varieties (30%) and hybrids (40%) which are bushy and with spreading growth habit, susceptible to more pests and diseases thereby reducing yields and resulting in poor returns under rainfed conditions. Desi cotton (20 %) performs well under rainfed conditions with less incidence of pests and disease. Hence, it is necessary to promote desi cotton cultivation in marginal lands (as its cost of cultivation is

lower compared to hybrid cotton. Hence the maximum yield potential of desi cotton can be recovered by adopting optimum organic and inorganic nutrient sources with suitable plant protection measures.

## Materials and Methods

Field experiment was conducted for two consecutive crop seasons at Departmental farm of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (M. S.). The soil of the experimental field was

clayey in texture, low in organic carbon, available nitrogen and phosphorus with slightly alkaline in reaction. The experiment was laid out in split plot design with three replications. There were 36 treatment combinations. The combination of four organics viz., FYM @ 10t ha<sup>-1</sup> (O<sub>1</sub>), Vermicopost @ 2 t ha<sup>-1</sup> (O<sub>2</sub>), in-situ green manuring of *sannhemp* at 45 DAS between rows of cotton (O<sub>3</sub>) and seed inoculation with *Azotobacter* + PSB (O<sub>4</sub>) and three inorganics viz., No fertilizer (I<sub>0</sub>), 25: 12.5: 12.5 kg NPK ha<sup>-1</sup> (I<sub>1</sub>) and 50: 25: 25 kg NPK ha<sup>-1</sup> (I<sub>2</sub>) were taken in main plots and three plant protection measures viz., No plant protection measures (P<sub>0</sub>), plant protection with organic measures like Neemark, *HaNPV* (P<sub>1</sub>) and plant protection with inorganic measures like Methyl dematon, Endosulfan (P<sub>2</sub>) under sub plots.

Plant protection measures were applied on the basis of ET-Levels for sucking and bollworm complex. Earliness index was calculated by Bartlett's formula (1937), seed index, mean halo length and ginning percentage was worked out of seed cotton picked from first two pickings. For fiber technological properties, lint samples were analyzed at Ginning Training Center, CIRCOT, Nagpur. A total rainfall of 460.70 and 697.10 mm was received during 2004 and 2005, respectively.

## Results and Discussion

### Effect of Organics

Treatment FYM @ 10 t ha<sup>-1</sup> (12.10 and 14.41q ha<sup>-1</sup>) and Vermicompost @ 2t ha<sup>-1</sup> (11.79 and 14.12 q ha<sup>-1</sup>) being at par recorded significantly more seed cotton yield per ha during both the years of experimentation over other treatment of organics. However, in pooled data treatment FYM @ 10t ha<sup>-1</sup> showed its superiority in

respect of seed cotton yield (13.35 q ha<sup>-1</sup>) over rest of the treatments of organics (Table 2).

Earliness index was significantly greater with treatment O<sub>1</sub> (0.636) than rest of the treatments during first season while treatments O<sub>1</sub> (0.590) and O<sub>2</sub> (0.586) were at par during second season. Seed index, mean halo length and ginning percentage were not affected significantly due to different treatments of organics during both the years of investigation (Table 3). Fiber technological properties like 2.5% span length, micronaire value, bundle strength and uniformity ratio were not affected due to different treatments of organics during 2004-05 and 2005-06, respectively (Table 4).

### Effect of Inorganics

Increases in seed cotton yield per ha (Table 2) was significantly higher due to use of treatment I<sub>2</sub> during both the years (13.75 and 15.71 q ha<sup>-1</sup>) over rest of the treatments. Treatment I<sub>2</sub> recorded significantly maximum pooled seed cotton yield (14.73 q ha<sup>-1</sup>) over Treatment I<sub>1</sub> and I<sub>0</sub>.

Earliness index and seed index were profoundly increased with treatments of I<sub>2</sub> (50:25:25 kg NPK ha<sup>-1</sup>) and I<sub>1</sub> (25:12.5:12.5 kg NPK ha<sup>-1</sup>) during both the years. Mean halo length and ginning percentage (Table 3) and fiber technological properties viz., 2.5% span length, micronaire value, bundle strength and uniformity ratio (Table 4) were not affected at the level of significance due to use of different doses of inorganics during 2004-05 and 2005-06, respectively.

### Effect of Plant Protection Measures

Seed cotton yield per ha during first and second season and in pooled data were

significantly maximum due to treatments of plant protection measures (P<sub>2</sub> and P<sub>1</sub>) over no plant protection measures (Table 2).

Quality parameters like seed index, mean halo length and ginning percentage (Table 3) and fiber technological properties like 2.5% span length, micronaire value, bundle strength and uniformity ratio (Table 4) were not influenced significantly due to different treatments of plant protection measures in both the years.

The magnitudes of all these parameters were greater during second season as compared to the first season. However, inconsistent trend was recorded with earliness index.

### **Effect of organics**

Treatment FYM @ 10 t ha<sup>-1</sup> and Vermicompost @ 2 t ha<sup>-1</sup> recorded significantly more seed cotton yield. Use of bulky organic manure may be FYM or Vermicompost resulted in increased seed cotton yield per ha due to sufficient availability of nutrients (macro and micro) in the balanced form with good soil environment (Table 2).

The results confirmed the findings of Katkar *et al.*, (2002) and Hulihalli and Patil (2005).

Earliness index, seed index, mean halo length and ginning percentage (Table 3) 2.5% span length, micronaire value, bundle strength and uniformity ratio (Table 4) were not affected due to different treatments of organics during 2004-05 and 2005-06, respectively clearly indicated that genetical characters of variety could not altered by various organic manure management practices.

The results confirmed the findings of Katkar *et al.*, (2002) in cotton.

### **Effect of inorganics**

The increased pooled seed cotton yield in treatment I<sub>2</sub> i.e. application of 50: 25: 25 kg NPK ha<sup>-1</sup> to the tune of 42% and 24% over Treatment I<sub>1</sub> and I<sub>0</sub>, respectively due to balanced application of NPK. Kusbad *et al.*, (2004) and Katkar *et al.*, (2005) observed similar results (Table 2).

Earliness index and seed index were improved in these characters due to application of higher level of NPK over control were reported by Tomar *et al.*, (2000).

### **Effect of plant protection measures**

Seed cotton yield per ha in pooled data were significantly maximum due to treatments of plant protection measures (P<sub>2</sub> and P<sub>1</sub>) over no plant protection measures might be due to successful control of sucking and bollworm complex in treated plots. Similar result of enhanced yield parameters due to application of plant protection was reported by Thakre (2006).

### **Effect of interactions**

The values of seed cotton yield per ha was significantly higher with combinations of O<sub>1</sub>I<sub>2</sub> and O<sub>2</sub>I<sub>2</sub> in both the years of experimentation (Table 1) due to better combination of organic and inorganic sources of nutrient supply to the crop throughout its growth period and thereby more yield per ha. Similar result of enhanced seed cotton yield by More and Hangarge (2003).

From this study it can be concluded that the use of FYM @ 10 t ha<sup>-1</sup> or Vermicompost @ 2 t ha<sup>-1</sup> with 50: 25: 25 kg NPK ha<sup>-1</sup> found to be useful for getting higher productivity per hectare in desi cotton.

**Table.1** Seed cotton yield ( $q\ ha^{-1}$ ) as influenced by interactions of O x I during 2004-05 and 2005-06

Organics	Inorganics					
	I			II		
	I <sub>0</sub>	I <sub>1</sub>	I <sub>2</sub>	I <sub>0</sub>	I <sub>1</sub>	I <sub>2</sub>
O <sub>1</sub>	9.75	12.11	14.44	12.00	14.95	16.27
O <sub>2</sub>	9.37	11.85	14.15	11.86	14.64	15.87
O <sub>3</sub>	9.00	11.76	13.78	11.52	14.00	15.58
O <sub>4</sub>	9.15	10.99	12.64	10.07	12.47	15.12
SE (m) ±		0.20			0.22	
CD at 5 %		0.57			0.64	

**Table.2** Seed cotton yield as influenced by different treatments

Treatment	Seed cotton yield ( $q\ ha^{-1}$ )		
	I	II	Pooled
<b>A. Organics (O)</b>			
O <sub>1</sub> : FYM (10 t ha <sup>-1</sup> )	12.10	14.41	13.25
O <sub>2</sub> : Vermicompost (2 t ha <sup>-1</sup> )	11.79	14.12	12.95
O <sub>3</sub> : <i>In situ</i> Sannhemp green manuring	11.52	13.70	12.61
O <sub>4</sub> : Seed inoculation with <i>Azotobacter</i> + PSB	10.93	12.55	11.74
SE (m) ±	0.11	0.13	0.08
CD at 5 %	0.33	0.37	0.24
<b>B. Inorganics (I)</b>			
I <sub>0</sub> : No fertilizer	9.32	11.36	10.34
I <sub>1</sub> : Application of 25 : 12.5 : 12.5 kg NPK ha <sup>-1</sup>	11.68	14.01	12.85
I <sub>2</sub> : Application of 50 : 25 : 25 kg NPK ha <sup>-1</sup>	13.75	15.71	14.73
SE (m) ±	0.10	0.11	0.07
CD at 5 %	0.29	0.32	0.21
<b>C. Plant protection measures (P)</b>			
P <sub>0</sub> : No plant protection	11.23	13.27	12.25
P <sub>1</sub> : Organic plant protection	11.62	13.81	12.72
P <sub>2</sub> : Inorganic plant protection	11.91	14.00	12.95
SE (m) ±	0.13	0.08	0.08
CD at 5 %	0.37	0.23	0.23
<b>D. Interactions</b>			
Int. (O x I)			
SE (m) ±	0.20	0.22	0.14
CD at 5 %	0.57	0.64	NS

Interaction effects were found to be non-significant in respect of (O x P), (I x P) and (O x I x P), respectively.

**Table.3** Earliness index, seed index (g), mean halo length (mm) and ginning percentage of cotton as influenced by various treatments

Treatment	Earliness index		Seed index (g)		Mean halo length (mm)		Ginning percentage	
	I	II	I	II	I	II	I	II
<b>A. Organics (O)</b>								
O <sub>1</sub> : FYM (10 t ha <sup>-1</sup> )	0.636	0.590	5.355	5.401	24.693	24.714	38.733	38.926
O <sub>2</sub> : Vermicompost (2 t ha <sup>-1</sup> )	0.610	0.586	5.420	5.490	24.341	24.629	38.341	38.653
O <sub>3</sub> : <i>In situ</i> Sannhemp green manuring	0.582	0.565	5.395	5.399	24.496	24.540	39.143	39.554
O <sub>4</sub> : Seed inoculation with <i>Azotobacter</i> + PSB	0.611	0.575	5.380	5.409	24.711	24.596	38.273	38.340
SE (m) ±	0.002	0.001	0.054	0.078	0.270	0.247	0.240	0.335
CD at 5 %	0.005	0.004	NS	NS	NS	NS	NS	NS
<b>B. Inorganics (I)</b>								
I <sub>0</sub> : No fertilizer	0.613	0.574	5.251	5.210	24.428	24.407	38.537	38.405
I <sub>1</sub> : Application of 25 : 12.5 : 12.5 kg NPK ha <sup>-1</sup>	0.615	0.575	5.391	5.446	24.278	24.632	38.679	39.118
I <sub>2</sub> : Application of 50 : 25 : 25 kg NPK ha <sup>-1</sup>	0.602	0.588	5.520	5.619	24.975	24.821	38.712	39.082
SE (m) ±	0.002	0.001	0.047	0.067	0.233	0.214	0.207	0.291
CD at 5 %	0.005	0.004	0.138	0.197	NS	NS	NS	NS
<b>C. Plant protection measures (P)</b>								
P <sub>0</sub> : No plant protection	0.621	0.576	5.348	5.387	24.647	24.804	38.434	38.917
P <sub>1</sub> : Organic plant protection	0.614	0.580	5.374	5.466	24.619	24.329	38.648	38.432
P <sub>2</sub> : Inorganic plant protection	0.595	0.581	5.440	5.421	24.414	24.726	38.785	39.256
SE (m) ±	0.002	0.001	0.079	0.072	0.259	0.232	0.341	0.256
CD at 5 %	0.005	0.003	NS	NS	NS	NS	NS	NS

Interaction effects were found to be non-significant in respect of (O x I), (O x P), (I x P) and (O x I x P), respectively.

**Table.4** 2.5 % span length (mm), micronaire value, bundle strength ( $\text{g tex}^{-1}$ ) and uniformity ratio (%) of cotton as influenced by various treatments

Treatment	2.5 % span length (mm)		Micronaire value		Bundle strength ( $\text{g tex}^{-1}$ )		Uniformity ratio (%)	
	I	II	I	II	I	II	I	II
<b>A. Organics (O)</b>								
O <sub>1</sub> : FYM (10 t ha <sup>-1</sup> )	24.46	24.68	5.63	5.68	19.60	19.70	51.25	51.19
O <sub>2</sub> : Vermicompost (2 t ha <sup>-1</sup> )	24.51	24.64	5.66	5.64	19.65	19.63	51.16	51.26
O <sub>3</sub> : <i>In situ</i> Sannhemp green manuring	24.42	24.70	5.62	5.71	19.60	19.72	51.12	51.15
O <sub>4</sub> : Seed inoculation with <i>Azotobacter</i> + PSB	24.45	24.60	5.66	5.60	19.62	19.64	50.89	51.04
SE (m) ±	0.07	0.17	0.04	0.03	0.12	0.10	0.15	0.17
CD at 5 %	NS	NS	NS	NS	NS	NS	NS	NS
<b>B. Inorganics (I)</b>								
I <sub>0</sub> : No fertilizer	24.52	24.64	5.59	5.65	19.52	19.56	51.26	51.11
I <sub>1</sub> : Application of 25 : 12.5 : 12.5 kg NPK ha <sup>-1</sup>	24.44	24.59	5.62	5.63	19.60	19.69	50.93	51.31
I <sub>2</sub> : Application of 50 : 25 : 25 kg NPK ha <sup>-1</sup>	24.42	24.73	5.71	5.69	19.72	19.77	51.12	51.06
SE (m) ±	0.06	0.15	0.04	0.03	0.11	0.08	0.13	0.15
CD at 5 %	NS	NS	NS	NS	NS	NS	NS	NS
<b>C. Plant protection measures (P)</b>								
P <sub>0</sub> : No plant protection	24.43	24.55	5.66	5.69	19.53	19.65	51.15	51.03
P <sub>1</sub> : Organic plant protection	24.52	24.66	5.64	5.61	19.65	19.67	51.29	51.17
P <sub>2</sub> : Inorganic plant protection	24.43	24.76	5.62	5.67	19.67	19.71	50.87	51.28
SE (m) ±	0.07	0.08	0.03	0.04	0.09	0.07	0.14	0.15
CD at 5 %	NS	NS	NS		NS		NS	NS

Interaction effects were found to be non-significant in respect of (O x I), (O x P), (I x P) and (O x I x P), respectively.

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