P: ISSN NO.: 2321-290X RNI : UPBIL/2013/55327 **SHRINKHALA :** VOL-II * ISSUE-IV*December-2014
E: ISSN NO.: 2349-980X

Quality Indices of Rainfed Cotton as Influenced by Intercropping, Weed Control and Fertility Management Practices

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Abstract

A field experiment was carried out at the Agronomy Research Farm, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (MS) during *kharif* 2007-08 and 2008-09 with an object to study the effect of intercropping, weed control and fertility management practices on quality aspects of cotton. Results indicated that the treatment of cotton + pigeonpea and cotton + blackgram being par exibited significantly greater ginning percentage. Treatment of cotton + blackgram, cotton + soybean, cotton + pigeonpea, cotton + clusterbean and cotton + marigold being par recorded significantly higher seed index over cotton + cowpea. Earliness index was found maximum under cotton + pigeonpea during both the years of experimentation. The treatments of cotton + blackgram, cotton + soybean, cotton + pigeonpea and cotton + clusterbean being par registered significantly higher values for fiber length. Normal weeding gave more earliness index while, fertility management at higher levels increased ginning percentage, seed index, lint index, earliness index and fiber length.

Keywords: Fiber Length, Ginning Percentage, Earliness Index, Lint Index, Seed Index, Quality Indices etc.

Introduction

Cotton (Gossypium spp.) the white gold is a premier commercial cash and fiber crop of India. It plays a vital role in economic, political and social affairs of the world. Beside this, cotton seed contains 15-16 percent oil and is used as vegetable oil after removing gossypol and in soap industries. Cotton cake is very proteinous and used as cattle feed. It can also be used as manure as it contains 6.4, 2.9 and 2.2 % NPK respectively. Among the major cotton growing states, Maharashtra ranks first with an area of 40.00 lakh hectares, production of 77.31 lakh bales and productivity of 329 kg lint ha^{-1}. Whereas, Vidarbha is famous for cotton crop occupies 15.4 lakh hectare area with production of 32.00 lakh bales and productivity of 352 kg lint ha^{-1} (Anonymous, 2011, d). Though the area under cotton is more, the productivity is very low as compared to the other states of India and countries of cotton world. There are many reasons for low productivity of cotton, the major reason is aberrant weather and rainfed condition.Intercropping with weed control and fertilizer management is a way to improve yield and tackle the situation of monsoon rain for long duration crop of cotton. The information is very meager on quality aspects like, ginning percentage, fiber length, seed index, lint index and earliness index of cotton etc. Hence, this experiment was conducted to study the impact of intercropping, weed control and fertility management practices on quality aspects of rainfed cotton.

Materials and Methods

Two years field experiment was carried out at the Agronomy Research Farm, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (MS) during *kharif* 2007-08 and 2008-09. The experimental site was fairely leveled and uniform in topography. The soil was medium black cotton belonging to *vertisols*. It was clayey in texture and moderately alkaline in nature (p^H 8.3).As regard to nutrient status, it is medium in organic carbon (0.51%) and available potassium (239.41 kg ha^{-1}), low in available nitrogen (169.76 kg ha^{-1}) and phosphorous (28.68 kg ha^{-1}) and slightly calcarious. AKH-8828 an American *hirsutum* variety was used for experiment. The intercrops and their varieties popular among the farmers of this area were used in replacement series of experiment

with spacing of 45 × 10 cm for drilling and 45 × 30 cm for dibbling by reducing the recommended spacing of 60 × 30 cm and plant population of cotton (Anonymous, 2007). Treatment combinations were 36 with 12 Main plots (A) Intercropping (6) viz., I_1- Cotton + blackgram (1:1), I_2- Cotton + soybean (1:1), I_3- Cotton + pigeonpea (6: 2), I_4- Cotton + clusterbean (1:1),I_5-Cotton + cowpea (1:1), I_6- Cotton + marigold (1:1) and (B) Weed management (2) W_1- No weeding and W_2- Normal weeding at 25 and 50 days after sowing and three Sub plots (C) Fertilizer management (3) F_1- 75 % Recommended dose of fertilizer (37.5, 18.75, 18.75 kg NPK ha^{-1}) to base crop of cotton, F_2- 100 % Recommended dose of fertilizer (50, 25 , 25 kg NPK ha^{-1}) to base crop of cotton and F_3-125 % Recommended dose of fertilizer (62.5, 31.25, 31.25 kg NPK ha^{-1}) to base crop of cotton. The experiment was laid out in split plot design with three replications. The gross plot size was 6.30 m × 3.60 m, net plot size 5.40 m × 3.00 m and recommended dose of fertilizers of cotton was 50, 25, 25 kg NPK ha^{-1} with no fertilizers to the intercrops.

Results and Discussion

Quality Studies

Data (Table 1) on quality studies viz., ginning percentage during 2007-08 (39.90 %) was higher than 2008-09 (36.92 %) while, seed index (100 seed weight in gram) lint index, earliness index and fiber length were greater during 2008-09(7.98g,5.31,--and 3.08) as compared to 2007-08 (7.79 g, 4.79 and 2.13). The mean fiber length (26.74 cm) was equal during both the years of experimentation.

Effect of Intercropping

During 2008-09, treatments of cotton + pigeonpea and cotton + blackgram being par recorded significantly higher percentage of ginning over other treatments. Ginning percentage improved by blackgram due to its complementary effect and supply of nutrients (Harisudan et al., 2009). Treatments of cotton + blackgram, cotton + soybean, cotton + pigeonpea, cotton + clusterbean and cotton + marigold being par recorded significantly higher seed index over the treatment of cotton + cowpea. Lint index and fiber length of cotton were not influenced by any treatment of intercropping. During 2007-08, treatment of cotton + pigeonpea recorded significantly higher values of earliness index over rest of the treatments. It might be due to more number of plants of cotton and yield per plot. The second best position was placed by cotton + blackgram followed by cotton + cowpea. Intercropping of cotton + soybean and cotton + clusterbean being par recorded significantly greater values of earliness index than cotton + marigold. Treatment of intercropping of cotton + blackgram, cotton + soybean, cotton + pigeonpea and cotton + clusterbean being par exhibited more fiber length over cotton + cowpea and cotton + marigold. However, cotton + marigold were not significant.

Effect of Weed Management

Significantly greater values of ginning percentage recorded by no weeding and earliness index by normal weeding. Whereas, Seed index, Lint index and fiber length were not affected by any treatment of weed management during both the years of study.

Effect of Fertility Management

Treatment of 100% RDF and 125% RDF being par resulted in higher percentage of ginning during 2008-09 only. Treatments of 100% RDF and 125% RDF to base crop of cotton being par recorded greater values of seed index. Treatment of 100% RDF to cotton resulted in recording higher values of fiber length over 75% RDF and 125% RDF. Application of fertilizers influenced the ginning% , seed index, lint index , fiber length and other quality aspects of cotton indicated that the increased efficiency of uptake of applied fertilizers. Similar results were reported by Khawale and Prasad (2001) and Turkhede (2010).

Effect of Interaction

Interaction effects were absent.

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Table 1.
Ginning Percentage, Seed Index, Lint Index, Earliness Index and Fiber Length of Cotton As Influenced by Different Treatments During 2007-08 and 2008-09.

Treatments		**2007-08**					**2008-09**				
I) Main plot **A) Intercropping (6)**		**Ginning percentage**	**Seed index (g)**	**Lint index**	**Earliness index**	**Fiber Length (cm)**	**Ginning percentage**	**Seed index**	**Lint index**	**Earliness index**	**Fiber Length (cm)**
I_1	Cotton + blackgram (1:1)	39.74	7.78	4.88	2.41	27.57	37.81	8.16	5.37	3.22	26.94
I_2	Cotton + soybean (1:1)	39.24	7.94	4.72	1.99	26.87	36.17	8.29	5.39	2.73	27.14
I_3	Cotton + pigeonpea (6:2)	40.13	7.67	4.86	2.68	26.80	38.10	7.99	5.37	3.58	27.58
I_4	Cotton + clusterbean (1:1)	40.09	7.75	4.72	1.96	26.24	36.60	7.91	5.29	3.09	26.91
I_5	Cotton + cowpea (1:1)	40.18	7.72	4.75	2.15	26.70	36.28	7.55	5.09	3.35	25.77
I_6	Cotton + marigold (1:1)	40.01	7.86	4.80	1.57	26.26	36.60	7.96	5.34	2.49	26.08
S. E. (m) ±		0.43	0.31	0.16	0.06	0.43	0.44	0.14	0.13	0.08	0.31
C. D. at 5%		NS	NS	NS	0.19	NS	1.29	0.41	NS	0.22	0.90
B) Weed management (2)											
W_1	No weeding	39.84	7.78	4.85	1.86	26.90	37.36	8.06	5.37	2.91	26.91
W_2	Normal weeding at 25 and 50 DAS	39.95	7.80	4.73	2.39	26.57	36.49	7.89	5.25	3.24	26.56
S. E. (m) ±		0.25	0.18	0.09	0.04	0.25	0.25	0.08	0.08	0.04	0.18
C. D. at 5%		NS	NS	NS	0.11	NS	0.74	NS	NS	0.13	NS
II) Sub plot											
C) Fertility management (3)											
F_1	75 % RDF of base crop of cotton	39.64	7.90	4.68	1.86	26.80	37.10	7.49	4.92	2.79	26.11
F_2	100 % RDF of base crop of cotton	39.58	7.76	4.94	2.16	26.40	36.09	8.20	5.40	3.15	26.58
F_3	125 % RDF of base crop of cotton	40.47	7.69	4.75	2.36	27.02	37.58	8.24	5.61	3.29	27.52
S. E. (m) ±		0.32	0.14	0.08	0.05	0.30	0.38	0.11	0.13	0.06	0.26
C. D. at 5%		NS	NS	NS	0.13	NS	1.07	0.33	0.36	0.18	0.73
D) Interaction effects											
Intercropping x weed management (I x W)											
S. E. (m) ±		0.60	0.44	0.23	0.09	0.61	0.62	0.20	0.19	0.11	0.43
C. D. at 5%		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Intercropping x fertility management (I x F)											
S. E. (m) ±		0.78	0.33	0.21	0.11	0.74	0.92	0.28	0.31	0.16	0.63
C. D. at 5%		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Weed management x fertility management (W x F)											
S. E. (m) ±		0.45	0.19	0.12	0.06	0.43	0.53	0.16	0.18	0.09	0.37
C. D. at 5%		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Intercropping x Weed management x fertility management (I x W x F)											
S. E. (m) ±		1.11	0.47	0.29	0.16	1.04	1.30	0.40	0.44	0.22	0.89
C. D. at 5%		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
GM		**39.90**	**7.79**	**4.79**	**2.13**	**26.74**	**36.92**	**7.98**	**5.31**	**3.08**	**26.74**