P: ISSN NO.: 2321-290X RNI : UPBIL/2013/55327 Shrinkhla Ek Shodhparak Vaicharik Patrika
E: ISSN NO.: 2349-980X Vol-II * Issue-XI*July-2015

Response of Intercropping, Weed Control and Fertility Management Practices to Total Dry Matter Production of Cotton

B. V. Saoji
Professor,
Deptt. of Agronomy & Director,
Central Research Station,
Dr. Punjab Rao Deshmukh Krishi Vidyapeeth,
Akola (MS)

Abstract

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 with an object to study the effect of intercropping, weed control and fertility management practices on total dry matter production in cotton. Results indicated that the treatments of cotton + blackgram and cotton + soybean being par recorded greater total dry matter accumulation plant^{-1} at 150 DAS in first year while, treatment of cotton + clusterbean recorded significantly higher total dry matter accumulation plant^{-1} at harvest in second year. Normal weeding at 25 and 50 DAS and increased fertility levels recorded significantly maximum total dry matter accumulation plant^{-1} in cotton.

Keywords: Seed Cotton Yield, Intercrops Yield, Intercropping, Weed Control and Fertility Management Practices.

Introduction

In Vidarbha, cotton is grown predominantly as a rainfed crop. Major causes of low productivity are erratic behavior of rainfall, growing of cotton on marginal and sub-marginal land and less adoption of improved technologies. October heat is well known in this area in which cotton gets flowering and fruiting that adversely sheds the reproductive parts of plant due to heat resulted in less crop yield. Cotton being a long duration crop, wider spaced, grow slow initially offers scope for intercrops of short duration, fast growing, non competitive with dissimilar growth habit, productive, utilize resources efficiently and effectively. Intercropping is a risk covering factor, stabilize the yield of component crops with more returns per unit area even under adverse climatic condition and therefore intercropping is more prevalent practice in rainfed farming. Assumption from the study was that the growing of various intercrops having different diversification of short duration, non competitive growth habit, less use of inputs, able to suppress weeds, fulfill the nutritional requirement of base crop to some extent, gives the additional yields with more returns per unit area. Recent need is to search out the most profitable and resource efficient system that sustains in changing climatic situation. In addition, fertilizer application and weed control are also required for obtaining higher returns. Therefore this experiment was conducted with an object to identify the most remunerative intercrop in cotton based system and to assess the optimum fertilizer requirement and weed control in cotton.

Material 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 fairly levelled and uniform in topography. The soil was medium black cotton belongs to *vertisols*. It was clayey in texture and moderately alkaline in nature (p^H 8.3), 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. The total rainfall received during 2007-2008 in 23rd - 52 nd MW at Akola centre was771.0 mm in 43 rainy days, it was said to be normal year. Whereas, during 2008-2009 the total rainfall recorded was 528.2 mm in 42 rainy days and it was stated to be abnormal year. It was deficit by 30.70 % as against normal rainfall of 762.8 mm. Soon after sowing to flowering and boll development stage weather had adversely affected the cotton yields. An American *hirsutum* variety AKH-8828 and Popular intercrops varieties

were used in replacement series of experiment (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 and crop was sown at the spacing of 45 × 30 cm distance. The gross plot size was 6.30 m × 3.60 m, net 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

Total Dry Matter Accumulation Plant^{-1}

Total dry matter accumulation plant^{-1} increased progressively and reached to its maximum of 52.82 g plant^{-1} at 120 DAS during 2007-08 and 45.60 g plant^{-1}at 150 DAS during 2008-09 (Table 1).

Effect of Intercropping

During 2007-08 at 90 DAS, treatments of cotton + blackgram, cotton + soybean and cotton + cowpea being par produced significantly higher total dry matter accumulation plant^{-1} over the treatments of cotton + pigeonpea, cotton + clusterbean and cotton + marigold but, these treatments were found at par. At 120 DAS, cotton + blackgram and cotton + clusterbean being par showed maximum total dry matter accumulation plant^{-1} over other. At 150 DAS, treatments of cotton + blackgram and cotton + soybean being par recorded greater total dry matter accumulation plant^{-1} over the treatments of cotton + pigeonpea, cotton + clusterbean, cotton + cowpea and cotton + marigold but, these treatments were found at par. Intercrops like blackgram produced complementary effect and favoured to increase the overall dry weight of cotton. Similar line of work was reported by Turkhede (2010). During 2008-09 at 90 DAS, treatments of cotton + soybean and cotton + clusterbean being par showed higher total dry matter accumulation plant^{-1} over other treatments. Treatments of cotton + blackgram, cotton + pigeonpea and cotton + cowpea being par recorded significantly maximum production of total dry matter accumulation plant^{-1} than the treatment of cotton + marigold. At 120 DAS, treatments of cotton + blackgram, cotton + soybean, cotton + clusterbean cotton + cowpea and cotton + marigold being par recorded significantly higher total dry matter accumulation plant^{-1} than treatment of cotton + pigeonpea. At 150 DAS, similar trend of the results were noticed. At harvest, treatment of cotton + clusterbean recorded significantly higher total dry matter accumulation plant^{-1} over other treatments of cotton intercropping. While, rest of the treatments were at par among themself. Other treatments viz., cotton + soybean, cotton + pigeonpea, cotton + cowpea and cotton + marigold were found equally effective in production of total dry matter accumulation plant^{-1}. Higher dry matter accumulation could be attributed to significant increase in growth components like plant height, number of leaves, leaf area etc. These results were in confirmity with Hanumanthappa *et al.* (2008).

Effect of Weed Management

Normal weeding treatment was found significantly superior in recording maximum total dry matter accumulation plant^{-1} than no weeding at 60, 90,120, 150 DAS and at harvest during 2007-08 and at 60 DAS and at harvest during 2008-09 only. Irrespective of crops, weeding reduced weed competition at an early growth stage and help the crop to grow fast and smother the weeds effectively. Similar observations were quoted by Hosmani *et al.* (1991).

Effect of Fertility Management

Increased fertilizer levels increased total dry matter production in cotton. It might be due to adequate supply of nutrients for development of good canopy in the initial stages supported by reproductive parts in latter stages of crop growth. Similar type of work reported by Anonymous (2005), Srinivasan (2006), Moola and Giri (2006) and Tengade (2008).

Effect of Interaction

Interaction effects of intercropping × weed management × fertility management (I×W×F) were found significant on total dry matter accumulation plant^{-1} at 90 DAS during 2007-08. Treatment combination of cotton + soybean with normal weeding under 125 % RDF to base crop of cotton ($I_2W_2F_3$) being par with treatment combination of cotton + blackgram with normal weeding under 125 % RDF to base crop of cotton ($I_1W_2F_3$) recorded significantly higher total dry matter accumulation plant^{-1}over other treatment combinations (Table 2).

References

1. Anonymous, (2007). *Krishisamvadini.* Published by Director of Extension Education, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (MS). Pp. 46-271.
2. Anonymous, (2005). Area, production and productivity in Maharashtra. *Epitome of Agriculture*.
3. Hanumanthappa, M. and Basavraj L.Dalavai (2008). Growth and yield of seasamum (Seasamum indiacum L) as influenced by intercropping and fertilizer levels. *Mysore J. Agric. Sci*. 42 (3): 440-443.
4. Hosmani, M.H., M.M. Hosmani, V.V. Angadi, B.M. Chittapur and S.M. Hiremath (1991). Comparative weed smothering ability of some legumes under rainfed condition. *Karnataka J. of Agric. Sci*. 4 (1&2): 52-54.
5. Moola, Ram and A.N. Giri (2006). Response of newly released cotton (G.hirsutum) varieties to plant densities and fertilizers levels. *J. Cotton Res. & Dev.* 20 (1) : 85-86.
6. Srinivasan, G. (2006). Agronomic evaluation of Bt. cotton hybrids in summer irrigated tract of southern Tamil Nadu. *J. Cot. Res.and Dev*. 20 (2): 224-225.
7. Tengade, R.J. (2008). Effect of nutrient management on cotton based intercropping system under rainfed condition. M.Sc. (Agri) thesis submitted to Dr.PDKV, Akola (MS).
8. Turkhede, A.B. (2010). Influence of intercrop and nutrient management on productivity and economics of deshi and American cotton Ph.D. Thesis submitted to Dr.PDKV, Akola (MS).

Table 1 Total Dry Matter Accumulation Plant -1 of Cotton as Influenced by Different Treatments During 2007-08 and 2008-09

Treatments		Total dry matter accumulation plant $^{-1}$ (g)											
		2007-08						2008-09					
I) Main plot						DAS	At					DAS	At
A) Intercropping (6)		**30**	**60**	**90**	**120**	**150**	**harvest**	**30**	**60**	**90**	**120**	**150**	**harvest**
I_1	Cotton + blackgram (1:1)	1.31	12.47	34.64	71.61	57.50	53.56	2.08	5.89	17.89	35.61	59.50	22.61
I_2	Cotton + soybean (1:1)	1.40	12.50	28.67	49.56	52.22	40.50	2.03	5.36	24.50	31.83	44.39	17.00
I_3	Cotton + pigeonpea (6:2)	1.28	12.36	19.44	48.33	44.22	40.28	1.86	5.64	18.22	20.92	39.83	24.00
I_4	Cotton + clusterbean (1:1)	0.98	13.94	19.17	57.67	39.89	41.94	2.11	5.14	30.17	30.89	50.61	34.72
I_5	Cotton + cowpea (1:1)	1.26	14.08	29.89	50.50	37.89	46.78	2.14	4.94	22.17	30.81	45.89	24.50
I_6	Cotton + marigold (1:1)	1.36	12.61	21.11	39.28	41.89	41.28	2.19	6.00	13.22	31.53	35.72	20.72
S. E. (m) ±		0.13	1.12	2.50	5.46	3.60	5.05	0.15	0.54	2.07	2.74	3.67	3.34
C. D. at 5%		-	-	7.34	16.01	10.56	-	-	-	6.06	8.05	10.76	9.80
B) Weed management (2)													
W_1	No weeding	1.25	11.04	19.22	51.52	36.70	37.04	1.94	4.95	20.41	26.76	45.09	17.94
W_2	Normal weeding (2 hoeings + 2 weedings at 25 and 50 DAS)	1.28	14.95	32.07	54.13	54.50	51.07	2.19	6.04	21.65	33.44	46.89	29.91
S. E. (m) ±		0.08	0.65	1.58	3.15	2.08	2.34	0.09	0.31	1.19	1.45	2.12	1.93
C. D. at 5%		-	1.90	4.65	-	6.10	6.85	-	0.92	-	4.24	-	5.66
II) Sub plot													
C) Fertility management (3)													
F_1	75 % RDF of base crop of cotton	1.24	12.92	24.11	49.17	43.72	43.61	2.01	5.33	20.86	29.03	44.53	21.94
F_2	100 % RDF of base crop of cotton	1.24	12.99	25.97	52.69	45.47	44.03	2.15	5.42	20.97	29.22	46.61	23.33
F_3	125 % RDF of base crop of cotton	1.31	13.08	26.86	56.61	47.61	44.53	2.31	5.74	21.25	32.06	46.83	26.50
S. E. (m) ±		0.08	0.90	1.11	4.14	1.78	3.02	0.09	0.36	1.08	1.72	2.19	1.51
C. D. at 5%		-	-	-	-	-	-	-	-	-	-	-	-
D) Interaction effects													
Intercropping x weed management (I x W)													
S. E. (m) ±		0.18	1.58	3.54	7.72	5.09	5.72	0.21	0.77	2.92	3.88	5.19	4.72
C. D. at 5%		-	-	-	-	-	16.78	-	-	-	-	15.22	-
Intercropping x fertility management (I x F)													
S. E. (m) ±		0.20	2.21	2.71	10.13	4.20	7.39	0.22	0.89	2.65	4.36	5.36	3.70
C. D. at 5%		-	-	7.71	-	11.96	-	-	-	7.54	-	-	10.52
Weed management x fertility management (W x F)													
S. E. (m) ±		0.11	1.28	1.57	5.85	2.43	4.27	0.13	0.51	1.53	2.52	3.09	2.14
C. D. at 5%		-	-	-	-	-	-	-	-	-	-	-	-
Intercropping x Weed management x fertility management (I x W x F)													
S. E. (m) ±		0.28	3.12	3.84	14.32	5.95	10.46	0.32	1.26	3.75	6.16	7.57	5.23
C. D. at 5%		-	-	10.91	-	-	-	-	-	-	-	-	-
GM		**1.27**	**13.00**	**25.65**	**52.82**	**45.60**	**44.06**	**2.07**	**5.50**	**21.03**	**30.10**	**45.99**	**23.93**

Table 2 Total Dry Matter Accumulation Plant^{-1} (G) of Cotton as Influenced by Intercropping × Weed Management × Fertility Management Interactions at 90 DAS during 2007-08

Treatments	2007-08		
	90 DAS		
IxWxF	**F_1**	**F_2**	**F_3**
I_1W_1	21.67	23.33	29.33
I_1W_2	42.00	42.33	55.00
I_2W_1	14.67	18.00	24.67
I_2W_2	15.67	43.00	56.00
I_3W_1	13.67	17.00	21.67
I_3W_2	14.00	17.33	33.00
I_4W_1	8.33	13.00	16.00
I_4W_2	24.67	25.67	27.33
I_5W_1	19.33	30.67	24.67
I_5W_2	33.00	37.67	34.00
I_6W_1	12.67	17.33	19.00
I_6W_2	19.00	22.67	36.00
S. E. (m) ±	3.84		
C. D. at 5%	10.91		