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Research Article

Grassy Weed Management in Cotton under Humid Southern Plain Zone of Rajasthan

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Abstract

A field experiment was conducted during two consecutive years of *kharif* 2011 and 2012 at Agricultural Research Station, Banswara on "Grassy Weed Management in Cotton under Humid Southern Plain Zone of Rajasthan". The experiment was laid-out in Randomized Block Design with four replications having six treatments. Results revealed that, the application of post emergence herbicide pantera 4% EC @ 60g a.i. ha^{-1}gave significantly higher bolls $plant^{-1}$ (29.06),boll weight (3.93g), seed cotton yield (2065 kg ha^{-1}), but it was found at par with weed free check and Quizalofap-P-Ethyl @ 50g a.i. ha^{-1}. The maximum weed control efficiency (50.10 and 42.50 per cent) at 30 and 60 DAS, lowest weed population (16.50 and 19.98 m^{-2}), weed dry matter accumulation(16.54 & 20.51g m-2) at 30 and 60 DAS and weed index (2.44 per cent) were observed under application of post emergence herbicide pantera 4%EC @ 60g a.i. ha^{-1} over rest of herbicide treatments.

Keywords: Cotton, pantera herbicide, weed control efficiency and weed index

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Introduction

Cotton (*Gossypium spp* L.) is one of the predominant fibre crops and plays a pivotal role in agriculture, industrial development, employment generation and economic development of India. It is also called as "King of Fibres" and "White Gold" due to higher economical value among all cash crops in India. Cotton is gradually assuming the status of a preferred fibre even for fashion fabrics. Cotton cultivation needs to be sustainable, offering livelihood security to millions of people in the country. In India an estimated 4 million farmers and about 60 million people depend on cotton production and textile industry to make their livelihood. Cotton is the most important cash and commercial crop contributing nearly 75 per cent of total raw material needs of textile industry in India. Textile industry is the number one export enterprise in the country earning revenue of over $ 8.5 billion. Hence, it is also called as 'White Gold', and plays a vital role in the economic development of the country (Smita, 2013).

In India, cotton is an important commercial crop supporting the livelihood of about 7.7 million farmers. Cotton occupies an area of 12.25 million ha of which 11.6 million ha (94 per cent) is genetically modified cotton (*Bt* cotton) (Choudhary and Gaur, 2015). India is the second largest exporter of cotton (FICCI report, 2012). In the last seven decades that cotton has been grown, production and productivity have steadily increased. However, in the last few years it appears to have reached a plateau. Current production is about 39 million bales (Choudhary and Gaur, 2015).

Yield in cotton is dependent on the climatic conditions, rainfall pattern, weed competition and incidence of pests and diseases. Weeds are a potential problem in cotton cultivation and reduce yield by 50 to 85 per cent depending upon the nature and intensity (Jain *et al.*,1981).

Cotton is a long duration crop and typically takes about 140-160 days to complete its life cycle. Throughout the growth cycle it is exposed to weeds and the competition therein. Every crop has a critical period of weed control (CPWC) which refers to the minimum time period during which the crop must be weed free. In cotton, the CPWC is the first 15 to 60 days (Ayyadurai and Poonguzhalan 2011). Maximum yield can be derived when there is at least 95 per cent weed control (Sharma 2008).

Material and Methods

A field experiment was conducted during two consecutive years of *kharif* 2011 and 2012 at Agricultural Research Station, Banswara "Grassy Weed Management in Cotton under Humid Southern Plain Zone of Rajasthan". The

experimental field was well prepared by two ploughing followed by harrowing & cultivator and one planking for uniform leveling were performed for sowing of cotton. The experiment was laid-out in Randomized Block Design with four replications having six treatments *i.e.*T_1 : Weedy check (control), T_2: Weed free check, T_3 : Pantera 4% EC @ 30g a.i. ha^{-1}, T_4 : Pantera 4% EC @ 40g a.i. ha^{-1}, T_5: Pantera 4% EC @ 60g a.i. $ha^{-1}$and T_6: Quizalofap-P-Ethyl @50 g a.i. ha^{-1}.The soils of experimental field were (black cotton soil) clay loam texture and alkaline in reaction (pH 7.9 and 7.8). The soil was medium in available nitrogen (245 and 253 kg/ha) and phosphorus (48.40 and 50.50 kg/ha) and high in available potassium (320 and 326 kg/ha) during the year 2011 and 2012, respectively.

Results

Yield and yield attributes

It is evident from pooled data (**Table 1**) that the application of post emergence herbicide pantera 4% EC @ 60g a.i. ha^{-1}, Quizalofap -P-Ethyl @ 50 g a.i. ha^{-1} and weed free check were found at par with each other in respect of bolls $plant^{-1}$ (29.06, 27.0 and 31.05),boll weight (3.93,3.78 and 4.01 g), respectively over rest of the treatments. Application of post emergence herbicides pantera 4% EC @ 60g a.i. ha^{-1},Quizalofap-P-Ethyl @ 50 g a.i. ha^{-1} and weed free check were noted at par in respect of seed cotton yield (2065,1973 and 2125 kg ha^{-1}), respectively but these treatments were recorded significantly higher seed cotton yield over rest of the treatments in pooled analysis. These results are in close proximity with those of Jain *et al.*, 1981, Sharma 2008 and Ayyadurai and Poonguzhalan 2011, Rajeswari, and Charyulu, 1996 and Choudhary and Gaur 2015.

Table 1 Effect of post emergence herbicides application on yield attributes and seed cotton yield

Treatment	Bolls $plant^{-1}$			Boll weight (g)			Seed cotton yield (kg ha^{-1})		
	2011	2012	Pooled	2011	2012	Pooled	2011	2012	Pooled
Weedycheck (control)	20.67	22.00	21.33	3.40	3.45	3.43	1451	1570	1510
Weed free check	30.08	32.01	31.05	4.00	4.03	4.01	2051	2200	2125
Pantera 4% EC @ 30g a.i. ha^{-1}	24.00	25.13	24.57	3.45	3.48	3.47	1813	1878	1846
Pantera 4% EC @ 40g a.i. ha^{-1}	25.03	26.09	25.56	3.40	3.62	3.51	1840	1856	1848
Pantera 4% EC @ 60g a.i. ha^{-1}	28.03	30.09	29.06	3.95	3.91	3.93	1980	2150	2065
Quizalofap-P-Ethyl @50 g a.i. ha^{-1}	26.00	28.00	27.00	3.75	3.82	3.78	1865	2080	1973
SEm±	0.674	0.947	1.091	0.115	0.098	0.090	86	54	73
CD (P = 0.05)	2.12	2.69	3.21	0.36	0.33	0.28	270	154	215

Weed population

An examination of data (**Table 2**) shows that untreated check (control) was recorded significantly higher grassy weeds (32.17 and 34.67 m^{-2}) at 30 and 60 DAS over weed free check.Under the application of post emergence herbicides pantera 4% EC 60 g a.i. ha^{-1} was observed lowest grassy weeds (16.50 and 19.98 m^{-2}) at 30 and 60 DAS as compared to application of post emergence herbicides pantera 4% EC 40, pantera 4% EC 30 g a.i. ha^{-1} and Quizalofap-P-Ethyl 50 g a.i. ha^{-1} in the pooled analysis.These results are in close proximity with those of Jain *et al*,1981, Sharma (2008) and Ayyadurai and Poonguzhalan (2011).

Table 2 Effect of post emergence herbicide application on weed population (m^{-2}) of grassy weeds

Treatment	30 DAS			60 DAS		
	2011	2012	Pooled	2011	2012	Pooled
Weedy check (control)	32.00(5.69)*	32.33(5.72)*	32.17(5.71)*	35.00(5.94)*	34.33(5.88)*	34.67(5.91)*
Weed free check	14.00(3.79)*	15.00(3.94)*	14.50(3.86)*	18.10(4.30)*	16.00(4.06)*	17.05(4.18)*
Pantera 4% EC @ 30g a.i. ha^{-1}	24.00(4.95)*	22.90(4.83)*	23.45(4.89)*	26.08(5.14)*	25.09(5.05)*	25.59(5.10)*
Pantera 4% EC @ 40g a.i. ha^{-1}	21.93(4.73)*	20.00(4.51)*	20.97(4.62)*	24.00(4.94)*	22.00(4.74)*	23.00(4.84)*
Pantera 4% EC @ 60g a.i. ha^{-1}	16.00(4.05)*	17.00(4.16)*	16.50(4.10)*	19.97(4.52)*	20.00(4.52)*	19.98(4.52)*
Quizalofap-P-Ethyl @50 g a.i. ha^{-1}	23.00(4.84)*	22.00(4.74)*	22.50(4.79)*	26.00(5.15)*	23.00(4.85)*	24.50(5.00)*
SEm +	0.204	0.105	0.154	0.227	0.091	0.151
CD (P = 0.05)	0.642	0.298	0.453	0.716	0.259	0.446

Dry matter accumulation

The pooled data shows that (**Table 3**) untreated check (control) was recorded significantly higher weed dry matter accumulation (33.08 and 35.67 g m^{-2}) at 30 and 60 DAS over weed free check.Under the application of post emergence herbicides pantera 4% EC 60 g a.i. ha^{-1} was observed lowest weed dry matter accumulation (16.54 and 20.51 m^{-2}) at 30 and 60 DAS as compared to application of post emergence herbicides pantera 4% EC 40, pantera 4% EC 30 g a.i. ha^{-1} and Quizalofap-P-Ethyl 50 g a.i. ha^{-1} in the pooled analysis.These results are in close proximity with those of, Jain *et al*,1981,Sharma, 2008, Gnanavel, and Babu, (2008) and Choudhary and Gaur(2015).

General view and monitoring of experiment plot

Table 3 Effect of post emergence herbicide application on dry matter accumulation (g m^{-2}) of grassy weeds

Treatment	DMA at 30 DAS			DMA at 60 DAS		
	2011	2012	Pooled	2011	2012	Pooled
Weedycheck (control)	32.07	34.10	33.08	35.00	36.33	35.67
Weed free check	13.00	14.95	13.98	15.00	16.00	15.50
Pantera 4% EC @ 30g a.i. ha^{-1}	25.06	27.10	26.08	30.00	31.00	30.50
Pantera 4% EC @ 40g a.i. ha^{-1}	22.17	24.15	23.16	26.06	27.50	26.78
Pantera 4% EC @ 60g a.i. ha^{-1}	15.00	18.07	16.54	20.00	21.02	20.51
Quizalofap-P-Ethyl @50 g a.i. ha^{-1}	24.10	26.08	25.09	27.03	28.11	27.57
SEm +	0.944	0.356	0.612	1.304	0.404	0.788
CD (P = 0.05)	2.973	1.012	1.806	4.108	1.150	2.325

Weed control efficiency

An examination of data (**Table 4**) shows that weed free check was recorded significantly higher weed control efficiency (57.82 and 56.56 per cent) at 30 and 60 DAS over weedy check.The application of post emergence herbicides pantera 4% EC 60 g a.i. ha^{-1} was observed highest weed control efficiency (50.10 and 42.50 per cent) at 30 and 60 DAS as compared to application of post emergence herbicides pantera 4% EC 40, pantera 4% EC 30 g a.i. ha^{-1} and Quizalofap-P-Ethyl 50 g a.i. ha^{-1} in the pooled analysis. These results are in close proximity with those of Jain *et al*, 1981, Sharma 2008, Chauhan, and Yadav, 2013, and Ayyadurai and Poonguzhalan (2011).

Weed index

Among the weed free check treatment was recorded lowest weed index as compared to control, pantera 4% EC 30 g a.i. ha^{-1}, pantera 4% EC 40 g a.i. ha^{-1},Quizalofap-P-Ethyl 50 g a.i. $ha^{-1}$and pantera 4% EC 60 g a.i. ha^{-1}during both the years as well as in the pooled analysis.These results are in close proximity with those of Sharma (2008), Verma *et al*., 2013 and Ayyadurai and Poonguzhalan (2011).

Table 4 Effect of post emergence herbicide application on weed control efficiency (%) and weed index (%) of grassy weeds

Treatment	WCE at 30 DAS			WCE at 60 DAS			Weed Index		
	2011	2012	Pooled	2011	2012	Pooled	2011	2012	Pooled
Weedycheck (control)	0.00	0.00	0.00	0.00	0.00	0.00	29.25	28.60	28.93
Weed free check	59.46	56.17	57.82	57.14	55.98	56.56	0.00	0.00	0.00
Pantera 4% EC @ 30g a.i. ha^{-1}	21.84	20.43	21.13	14.32	14.66	14.49	11.34	13.85	12.59
Pantera 4% EC @ 40g a.i. ha^{-1}	30.87	29.17	30.02	25.59	24.29	24.94	9.24	11.00	10.12
Pantera 4% EC @ 60g a.i. ha^{-1}	53.22	46.99	50.10	42.85	42.15	42.50	3.15	1.72	2.44
Quizalofap-P-Ethyl @50 g a.i. ha^{-1}	24.84	23.56	24.20	22.60	22.62	22.61	8.47	5.44	6.96
SEm +	2.95	1.05	1.87	3.69	1.13	2.22	2.84	2.55	2.48
CD (P = 0.05)	9.29	3.00	5.53	11.63	3.21	6.56	8.61	7.27	7.23

Conclusion

It could be concluded that, the application of post emergence herbicide pantera 4% EC 60g a.i. ha^{-1} gave significantly higher bolls $plant^{-1}$ (29.06), boll weight (3.93g), seed cotton yield (2065 kg ha^{-1}) and weed control efficiency (50.10 and 42.50 per cent) at 30 and 60 DAS over rest of the treatments, but it was found at par with weed free check and Quizalofap -P-Ethyl 50 g a.i.ha^{-1}.

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