Plant Archives Vol. 15 No. 2, 2015 pp. 1075-1077 *ISSN 0972-5210*

HIGH DENSITY PLANTING OF COTTON VARIETY AKH – 081 UNDER RAINFED CONDITION OF VIDHARBHA

A. N. Paslawar*, A. S. Deotalu and P. W. Nemade

Cotton Research Unit, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola - 444 104, (Maharashtra), India.

Abstract

The variety AKH– 081 was evaluated to see performance at higher planting densities in field trial under rainfed condition at Cotton Research Unit, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (Maharashtra), India; during 2012-13 and 2013-14 under vertisols. High density planting in cotton with early, dwarf and compact variety is the one of option under rainfed condition of Vidarbha region of Maharashtra with proper care of boll worm complex. Four plant geometry were tested *i.e.* 45 × 10 cm (2.22 lakh ha^{-1}), 45 × 15 cm (1.48 lakh ha^{-1}), 45 × 20 cm and 60 × 15 cm (1.11 lakh ha^{-1}). The taller plant height and maximum leaf area index was found with higher plant densities. Whereas more sympodia, boll weight, number of bolls were increased with decreased plant densities. The highest seed cotton yield (3108 kg ha^{-1}) was recorded with high density (2.22 lakh ha^{-1}), during both seasons. Similar trend was obtained with net monetary returns and B : C ratio. Rainfall use efficiency was highest with higher plant density (2.22 lakh ha^{-1}).

Key words : Biological yield, HDPS, LAI, RUE, SCY.

Introduction

India has the largest area in the world under cotton at 11.700 mha and is the second largest producer in the world at 29.000 m Bales. However, India's average cotton productivity is 540 kg lint yield per hectare combining both irrigated and rainfed fields and this is low compared to other countries like China 1380, Brazil 1465 kg lint yield per hectare, US as well as the world average yield of 926 kg lint yield per hectare (AICCIP Annual Report, 2013-14).

The majority (90%) of cotton in Maharashtra is rainfed system of high density (HDP) leading to more rapid canopy closer and decreased soil water evaporation is becoming popular to address. In many countries narrow row planting have been adopted after showing improvement in cotton productivity (Ali *et al.*, 2010). The adoption of HDP along with better genotype with boll worm control is one of option under rainfed situation of Vidharbha and control sucking pests in initial stage is needed (Kalyan *et al*., 2009).

Materials and Methods

A demonstration of 80 × 50 m was taken and it was divided into five plots. Randomised one square metre plot from each plot for SCY. This experiment was laid out in RBD with five replication on medium depth black cotton soils at Cotton Research Unit, Dr. P.D.K.V., Akola during 2012-2013 and 2013-2014 with spacing of 45 × 10 cm (2.22 lakh ha^{-1}), 45 × 15cm (1.48 lakh ha^{-1}), 45 × 20 cm (1.11 lakh ha^{-1}) and 60 × 15 cm (1.11 lakh ha^{-1}). Planting at 60 × 15 cm is already recommended for early and dwarf stature variety AKH-081 and which is better for intercultural operations and moisture conservation practices. Seed rate was used for 45 × 10 cm (24 kg per ha), 45 × 15 cm (16 kg per ha), 45 × 20 cm and 60 × 15 cm (12 kg per ha). Two hoeing and two weeding was undertaken for narrow spacing and three hoeing and two weeding for wider spacing plots. The 5 tonne FYM ha^{-1} and fertilizer @ 50:25:25 NPK kgha^{-1} was applied to 1.11 lakh population and 75:37.5:37.5 NPK kg ha^{-1} (150% NPK) was applied to higher density. 2% urea at flowering and 2% DAP at boll development stage was sprayed to all plots. One spraying of Acetamprid for sucking pest and two sprays of Quinolphos and Spinosad were undertaken for American and pink bollworm management. Rainfall of the seasons were 451 mm and 704 mm respectively (2012-2013 and 2013-2014). Seasonal rainfall was considered for Rainfall use efficiency. Economics were worked out as per MSP of cotton and prevailing market prices of inputs. The data

Author for correspondence : E-mail : adinathpaslawar@gmail.com

Table1: Growth parameters as influenced by high density planting in cotton variety AKH 081

Treatment	Final plant stand (lakh ha^{-1})	Plant height (cm)		Boll numbers		LAI		Dry matter/plant (g)		Sympodia/plant		Boll weight (g)	
		2012-13	2013-14	2012-13	2013-14	2012-13	2013-14	2012-13	2013-14	2012-13	2013-14	2012-13	2013-14
45 × 10	2.10	71.30	70.90	6.24	4.96	4.15	3.01	35.80	30.00	8.2	7.8	2.95	2.28
45 × 15	1.55	63.96	68.70	7.24	5.56	2.92	2.81	42.90	32.28	8.5	8.6	3.11	2.40
45 × 20	1.08	62.50	66.90	8.08	6.16	2.30	2.32	53.70	42.20	9.3	11.8	3.21	2.50
60 × 15	1.07	61.00	62.88	10.04	7.66	2.45	2.20	68.20	48.10	11.2	12.1	3.26	2.60
SE ±	-	0.91	1.05	0.29	0.14	0.05	0.03	0.86	0.96	0.50	0.61	0.03	0.05
CD at 5%	-	2.80	3.23	0.89	0.45	0.17	0.10	2.66	2.96	1.53	1.88	0.09	0.16

Table 2: Seed cotton yield, economics and rainwater use efficiency as influenced by high density planting in cotton variety AKH 081

Treatment	Plant density (lakh ha^{-1})	SCY (Kg ha^{-1})		Mean SCY (Kg ha^{-1})	Mean Biological Yield (Kg ha^{-1})	Mean Harvest Index	RUE (Kg ha^{-1} mm)		GMR (RS/ha)	COC (RS/ha)	NMR (RS/ha)	B:C Ratio
		2012-13	2013-14		2012-13	2012-13	2012-13	2013-14	2012-13	2012-13	2012-13	
45 × 10	2.22	3208	3008	3108	6509	49.2	7.09	4.25	124320	39244	85076	3.17
45 × 15	1.48	3012	2794	2903	6327	47.4	6.65	3.95	116120	38004	78116	3.06
45 × 20	1.11	2410	2180	2295	5479	43.9	5.32	3.08	91800	33350	58450	2.75
60 × 15	1.11	2896	2128	2512	6422	45.4	6.43	3.00	100480	36480	64000	2.75
SE ±	-	59	116	76	-	-	-	-	3045	-	-	-
CD at 5%	-	183	356	236	-	-	-	-	9449	-	-	-

obtained was subjected to statistical analysis after suitable transformation as per statistical guidelines given by Gomez and Gomez (1984).

Results and Discussion

The plant height was significantly highest (71.30 cm and 70.90cm) in both the year 2012-13 and 2013-14 with narrow planting and minimum under 60 × 15cm spacing (61.00 cm and 62.88 cm). Similar results were observed by Ram and Giri (2006). Less number of sympodia, bolls and Boll weight was observed in dense planting, where as more number of sympodia , bolls and boll weight were found in wider spacing (60 × 15 cm). Leaf Area Index (LAI) was highest with dense plant population 2.22 lakh per ha. These results were similar to earlier finding of Rao *et al.* (2000).Rainfall use efficiency was maximum (7.09 and 4.25 $hamm^{-1}$) in both the years, respectively with 2.22 lakh per ha (table 1).

The seed cotton yield was significantly highest with 45 × 10 cm (3218 and 3008 $kgha^{-1}$) and which is at par with 60 × 15 cm (2916 and 2128 $kgha^{-1}$) in both the years 2012-13 and 2013-14. Similar results were noticed with biological yield. Due to higher plant density utilised all natural resources like solar radiation, moisture, nutrients and space. Maximum LAI increased photosynthesis and utilized for boll development, which ultimately improved the SCY. The harvest index was highest with HDP (2.22 Lakh/ha). Such a beneficial results also reported by Mohapatra (2011).

Average SCY was (3108 kg/ha).The gross monetary returns (Rs. 124320/ha) and net monetary returns (Rs. 85076/ha) were significantly highest with 2.22 lakh plant population per hectare (table 2). The B:C ratio was maximum with HDP (3.17) followed by plant density of 1.11 lakh/ha (2.75) where seed rate, fertilizer dose is less and weeding cost is less. This result agreement with Reddy and Gopinath (2008).

Conclusion

A variety AKH 081 which short duration and short stature is found suitable for high plant density system with timely plant protection measures undervertisols of Vidarbha region of Maharashtra.

Acknowledgment

The authors duly acknowledge the Director, CICR, Nagpur and Director of Research, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola for providing necessary grants and facilities during research investigation.

References

AICCIP (All India Coordinate Cotton Improvement Project) – *Annual Report* 2013-14.

Giri, A. N. and S. B. Gore (2006). Effect of plant densities and NPK levels on yield of newly released deshi varieties of cotton (*Gosspium arboreum* L.). *J. Cotton Res. Dev.*, **20(1)** : 77-79.

Gomez, K. A. and A. A. Gomez (1984). *Statistical procedures for agricultural Research* (2nd edn.). A John Wiley and Sons Intersciences Publications Book of An International Res. Institute, Philippines, pp. 680.

Kalyan, R. K., D. P. Saini, P. P. Jambhulkar and A. Pareek (2012). Comparative bioefficacy of some new molecules against leaf hoppers and whitefly in cotton. *The Bioscan*., **7(4)** : 641-643.

Mohapatra, S. C. and S. S. Nanda (2011). Response of various levels of nutrient and spacing in non-Bt. Hybrid cotton (*Gossypium hirsutum*) under rainfed situation. *Res. J. Agric. Sci*., **2(1)** : 162-163.

Rao, Satyanarayana and R. A. Shetty (2000). Response of compact and early cotton genotypes under different spacing. *J. Cotton Res. Dev*., **14(2)** : 238-239.

Reddy, P., Raghu Rami and M. Gopinath (2008). Influence of fertilizers and plant geometry on performance of Bt cotton hybrid. *J. Cotton Res. Dev*., **22(1)** : 78-80.