



## **Demonstration and evaluation of the effect of the yield response of seed cotton yield to various planting methods in ecological zone of Rahim Yar Khan**

**Muhammad Aslam<sup>1</sup>, Tanweer Ahmed<sup>2</sup>, Ashiq Hussin Sanghi<sup>3</sup> and Laila Khalid<sup>4</sup>**

<sup>1</sup>Senior Subject Matter Specialist (Agronomy) Department of Adaptive Research Farm, Rahim Yar Khan

<sup>2</sup>Director (Farms and Trainings) Adaptive Research Rahim Yar Khan

<sup>3</sup>Senior Subject Matter Specialist (Plant Protection) Department of Adaptive Research Farm, Rahim Yar Khan

<sup>4</sup> Assistant Research Officer Adaptive Research Rahim Yar Khan

### **Abstract**

Adequate supply of essential nutrients, promising cultivars and improved planting methods are prime important to realize the maximum potential of any crop. A field experiment was conducted to study the effect of yield response of seed cotton yield to various planting methods in ecological zone of Rahim Yar Khan. The experiment was conducted at Adaptive Research Farm during the year 2016 and 2017 of Rahim Yar Khan District. The experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. The various planting methods i.e (Flat sowing, ridge sowing and bed sowing) significantly affected the plant population/m<sup>2</sup>, plant height (cm), number of mature bolls/plant, seed cotton boll weight (g), and seed cotton yield kg/ha. The various planting methods was significantly affected almost all the characters related to growth and yield of B.T cotton variety IUB-2013. The average of two years result revealed that significant maximum plant population/m<sup>2</sup> i.e 6.8, plant height (cm) i.e 147.9, number of bolls/plant i.e 43.9, boll weight (g) i.e 3.1 and maximum seed cotton yield i.e 2168.6 kg/ha was obtained when cotton sown on ridges s compared with flat and bed sowing.

**Keywords:** cotton, planting methods, growth and yield.

### **Introduction**

Cotton is the most important crop of Pakistan, cultivated on 2.879 million hectares and is the source of large amount of foreign exchange, contributing about 7.0% of value added in agriculture and about 1.5 percent of GDP and contributes about 66.50% share in national oil production (Anonymous, 2013). Cotton is the major cash crop and the white gold of Pakistan. It is the most important and economy dependent crop of Pakistan (Hakim et al. 2011). In textile manufacturing, it produces seeds with a potential multi product base such as hulls, oil and lint (Ozyigit et al. 2007). Adequate and balanced supply of nutrients,

promising cultivars and improved planting methods are prime important to realize the maximum potential of different maize hybrids (Alias et al. 2003). Improved sowing methods not only help to maintain optimum plant population due to better germination but also enable the plants to utilize land, light and other input resources uniformly and efficiently. So it is imperative to develop such a planting pattern which may help in avoiding excessive crowding and thereby enabling the plants to utilize the resources more effectively and efficiently (Quanqi et al. 2008). Ridges provide loose fertile layer of soil that results well

developed root system. Phosphorus uptake is closely related to root growth and morphology (Bucher, 2007; Ao et al. 2010). Planting method is one of a crucial factor for improving crop yield. Different planting methods are practiced in the World at the time of sowing maize crop. Inappropriate planting method results in barren plants. Ear and its size remains smaller, crop become susceptible to lodging, diseases and pests resulting in lower yield per unit area. Ridge tillage can be considered as an alternative to no-tillage in climates and environments which are not very favorable for the latter (Liu & Yong, 2008). Maximum number of plants ha<sup>-1</sup> at harvest was obtained from ridge planting, while minimum in broadcast. It might be due to high survival rate in ridge planting as compared with broadcast method. These results are in line with the findings of Siddique & Bakht (2005) who concluded that ridge sowing improved seedling emergence. Planting method has a significant effect on water, nitrogen and phosphorus economy, energy savings and soil compaction (Trodson et al. 1989). Influence crop growth and development. Mishra and Tiwari (1999) have reported lower root weight in broadcast method as compared to non-conventional planting methods. Application of chemical fertilizers has played a vital role in increasing crop production all over the world. Bed planting enhances the seedling emergence and eliminates the formation of crust on the soil surface (Ahmad et al., 2009). Iftikhar et al. (2010) reported that cultivation of cotton on beds gave better yield than flat sowing method. The alkaline and calcareous soils of Pakistan are low both in nitrogen (N) and in phosphorus (P) requiring the addition of nutrients in appropriate amounts for improving crop yields. The use of N and P fertilizers increased many fold since their introduction in the late fifties (Ahmad, 2000). The scarcity of any nutrient in the soil can be a barrier for the growth of crops even when all other nutrients are in excess in the soil (Soleymani and Shahrajabian 2012). Optimum levels of micro and macro inorganic nutrients are required for normal growth and supplements give improvements. Low yield of cotton in Pakistan is due to many crop husbandry problems such as low or more plant population, water shortage, low seed rate, improper fertilizer management, weed infestation, insect pest and disease problems (Ahmed et al. 2009). Wang et al. (2004) and Ortega et al. (2008) reported that raised bed planting is the most efficient method of planting for wheat, maize and other crops. Ridge sowing of cotton has been found to improve the soil physical properties such as increased soil moisture content and decreased root penetration resistance and also

enhances the emergence and seed cotton yield (Gursoy et al. 2011).

Keeping in view the significant of cotton in Pakistan this study was conducted to see cotton response to various planting methods.

## Materials and Methods

The experiment was conducted at Adaptive Research Farm Rahim Yar Khan during 2016 and 2017 to determine the effect of various planting methods on the growth and yield of seed cotton. The experiment was laidout in Randomized Complete Block Design (RCBD) with three treatments and repeated thrice. Seed bed was prepared by cultivating the field for two times with tractor mounted cultivated each followed by planking. The cotton B.T variety IUB-13 was sown on sandy loam soil. Sowing was done on well prepared soil through all three methods i.e (T<sub>1</sub> Flat, T<sub>2</sub> ridges and on T<sub>3</sub> beds) on 1st week of May in two years. 12 inch plant to plant distance was maintained by thinning at 6 inch height of the cotton plant. Required irrigations were applied and weeds were controlled through weedicides. Insecticides were applied to control the sucking insects (Whitefly, Thrips, Jassid, & Mites) and boll worms (Pink boll worm). All other agronomic practices were kept normal and uniform for all the treatments. Plant population/m<sup>2</sup> was counted after three weeks of sowing. Plant height (cm) of randomly selected plots from each plot was measured at the time of last picking and average height was calculated. The total number of bolls on the randomly selected plants picked at the time of each picking was counted. Thus total number of bolls on the plants was obtained by summing up the bolls picked during all pickings and average of number of bolls per plant was calculated. For boll weight (g), three samples each of 100 seeds from each plot were weighted and finally averaged. Average boll weight (g) was calculated by dividing the total plants seed cotton yield with respective number of bolls per plant. Seed cotton picked from selected plants during all the pickings was weighted in grams using electric balance. After that the yield of seed cotton per plant was calculated. Seed cotton yield kg ha<sup>-1</sup> was computed from seed cotton yield per plot. Data collected on different parameters were analyzed statistically by using M STAT-C programme (Anonymous, 1986) for analysis of variance and means were separated using Fisher's protected least significant difference (LSD) test at 5% probability level (steel *et al.*, 1997).

## Results and Discussion

### Plant population (m<sup>-2</sup>)

Data concerning average number of germination counts is shown in Table 1 during both years 2016 and 2017. Statistical analysis of the data revealed that the effect of various planting methods have non significant results on germination counts for the both

growing seasons. Average maximum germination counts were recorded as 6.8 in T<sub>2</sub> where cotton sown on ridges for the both kharif season 2016-17. On the other hand, lowest value was recorded as 5.95 where did flat sowing of cotton for both years respectively. Ridges provide loose fertile layer of soil that results well developed root system (Bucher, 2007; Ao et al. 2010).

**Table 1: The effect of various planting methods on the growth and yield of seed cotton during 2016 and 2017.**

Year	Treatments	Average germination counts (m <sup>-2</sup> )	Average plant height (cm)	No. of Bolls/plant	Boll weight (g)	Average seed cotton yield (kg/ ha)
2017	T <sub>1</sub>	4.6c	131c	19.6c	2.37c	1581.4c
	T <sub>2</sub>	5.3a	151.6a	30.8a	3.18a	1828.5a
	T <sub>3</sub>	5.0a	140b	22.6b	2.95b	1680.2b
<b>LSD(0.05)</b>		<b>Non-significant</b>	<b>4.86</b>	<b>2.03</b>	<b>Non-significant</b>	<b>68.50</b>
2016	T <sub>1</sub>	7.3c	138.6c	50.6c	2.3c	1942.3c
	T <sub>2</sub>	8.3a	144.3a	57a	3.1a	2508.8a
	T <sub>3</sub>	8.0b	141.6b	54.1b	2.7b	2185.1b
<b>LSD(0.05)</b>		<b>Non-significant</b>	<b>1.59</b>	<b>1.53</b>	<b>Non-significant</b>	<b>84.03</b>

### Plant height (cm):

Planting methods significantly increased plant height. planting of cotton on ridges resulted in proportionate increase in the plant height of cotton variety IUB-13 as mentioned in Table-2. The taller plants (147.9cm)

were recorded on cotton variety where cotton was sown on ridges during both years 2016-17. The height observed (140.8 cm) where cotton was sown on beds. The minimum height (140.8cm) was observed where cotton was sown on flat land.

**Table 2: Average values of all parameters from 2016-2017**

Treatments	Average germination counts (m <sup>-2</sup> )	Average plant height (cm)	No. of Bolls/plant	Boll weight (g)	Average seed cotton yield (kg/ ha)
T <sub>1</sub>	5.95c	134.8c	35.1c	2.3c	1761.8c
T <sub>2</sub>	6.8a	147.9a	43.9a	3.1a	2168.6a
T <sub>3</sub>	6.5b	140.8b	38.3b	2.8b	1932.6b

### No. cotton bolls per plant:

Planting methods significantly affected on no. of cotton bolls/plant. cotton sowing on ridges resulted in proportionate increase in the number of cotton bolls/plant as mentioned in Table-2. The greater no. of bolls/plant (43.9) was recorded on cotton variety IUB-

13 where cotton plant was sown on ridges during both years 2016-17. The no. of bolls/plant (38.3) was observed where cotton sown on beds. The minimum no.of cotton bolls/plant (35.1) was observed where flat sowing of cotton was done. Iftikhar et al. (2010) reported that cultivation of cotton on beds gave better yield than flat sowing method.

**Boll weight (g):**

Average boll weight is one of the major components of seed cotton yield in cotton. Data given in Table-2 indicates the non significant influence of boll weight. Maximum boll weight (3.1g) was recorded where cotton was sown on ridges during both years 2016-17. The minimum boll weight (2.3) was observed in case of flat sowing.

**Seed cotton yield kg ha<sup>-1</sup>:**

Data pertaining to seed cotton yield per hectare as influenced by planting methods as mentioned in Table-2 indicates that ridge sowing had significant

effect on the seed cotton yield per hectare. Maximum seed cotton yield per hectare (2168.60kg ha<sup>-1</sup>) was recorded where cotton was sown on ridges (IUB-13) cotton variety followed by bed sowing (1932.6kg ha<sup>-1</sup>). The lowest seed cotton yield (1761.8kg ha<sup>-1</sup>) was obtained where flat sowing of cotton was done during both years 2016-17. Wang et al. (2004) and Ortega et al. (2008) reported that raised bed and ridge planting is the most efficient method of planting for wheat, maize and cotton crops. Ridge sowing of cotton has been found to improve the soil physical properties such as increased soil moisture content and decreased root penetration resistance and also enhances the emergence and seed cotton yield (Gursoy et al. 2011).

**Table 3: Percentage increase in cotton yield (kg/ha) between various planting methods for the year 2016 and 2017.**

Treatments	Combined Avg. yield of 2016 and 2017 (kg/ha)	Percentage increase in wheat yield (%)
T1	1761.8c	-
T2	2168.6a	23
T3	1932.6	9.6

Table 3 shows that the highest yield was produced in T<sub>2</sub> (where cotton sown on ridges as compared with bed sowing and flat sowing methods with 23% yield increase for both study years i.e.2016-17.

**Conclusion**

The results concluded that various planting methods have varied effects on seed cotton yield and other growth parameters. It has significantly (p<0.05) affected germination, plant height, boll weight and yield during both years of the study. cotton on ridges has improved seed cotton yield (2168.6 kg/ha) over 2 years in comparison with other methods. Therefore under ecological zone of Rahim Yar Khan, ridge sowing for cotton crop can be recommended for better production.

**References**

- Ahmad, N. 2000. Integrated plant nutrition management in Pakistan: status and opportunities. In: Proc. Symp. Integrated plant nutrition management, NFDC, Islamabad. pp. 18-39.
- Ahmed, A.U.H., R.Ali, S.I Zamir and N. Mahmood. 2009. Growth, yield and quality

- performance of cotton cultivars BH-160 (*Gossypium hirsutum* L.) as influenced by different plant spacing. JAPS, 19:189-192.
- Ali, M., L. Ali, M.Q. Waqar and M.A. Ali. 2012. Bed planting: A new crop establishment method for wheat ( L.) in cotton-wheat cropping system of Southern Punjab. Int. J. Agric. Appl. Sci. 4(1): 8-14.
- Alias, A., M. Usman, E. Ullah and E.A. Warraich. (2003). Effect of different phosphorus levels on growth and yield of two cultivars of maize. Int. J. Agric. Biol. 5: 142-147.
- Anonymous. 1986, MSTATC Microcomputer Statistical Programme. Michigan State University Michigan, Lansing,USA.
- Anonymous, (2013). “Economic survey of Pakistan”, Ministry of Food and Agriculture, Islamabad. pp. 17-33.
- Ao, J., J. Fu, J. Tian, X. Yan and H. Liao. (2010). Genetic variability for root morph-architecture traits and root growth dynamics as related to phosphorus efficiency in soybean. Func. Plant Biol. 37: 304-312.
- Bucher, M. (2007). Functional biology of plant phosphate uptake at root and mycorrhiza interfaces. New Phytol. 173: 11-26.

9. Gursoy, S., A. Sessiz, E. Karademir, C. Karademir, B. Kolay, M. Ur un and S.S. Malhi. 2011. Effects of ridge and conventional tillage systems on soil properties and cotton growth. *Int. J. Plant Prod.* 5(3): 227-236.
10. Iftikhar, T., L. Babar, S. Zahoor and N.G. Khan. 2010. Impact of land pattern and hydrological properties of soil on cotton yield. *Pak. J. Bot.* 42(5): 3023-3028.
11. Liu, M.X. and Q.G. Yong. 2008. Effects of ridge-furrow tillage on soil water and crop yield in semiarid region. The 2nd International Conference on 16-18 May, 2008.
12. Mishra, M. K. J and R. C, Tiwari. 1999. Effect of seeding methods and fertilizer application on weed biomass and yield of wheat (*Triticum aestivum* L.). *Indian J. Agron.* 44(2): 353-356.
13. Ortega, A.L., E.V. Mir and E.E. Rangel. 2008. Nitrogen management and wheat genotype performance in a planting system on narrow raised beds. *Cereal Res. Commun.*, 36: 343-352.
14. Ozyigit, I.I., M.V. Kahraman and O. Ercan. 2007. Relation between explant age, total phenols and regeneration response in tissue cultured cotton (*Gossypium hirsutum* L.) *African J. of Biotechnology*, 6(1): 003-008.
15. Quanqi, L., C. Yuhai, L. Mengyu, Z. Xunb, D. Baodi and Y. Songlie. (2008). Water potential characteristics and yield of summer maize in different planting patterns. *J. Plant Soil Environ.* 1: 14–19.
16. Siddique, M.F. and J. Bakht. 2005. Effect of planting methods and nitrogen levels on the yield and yield components of maize. M.Sc (Hons) Thesis, Department of Agronomy, KPK Agric. Univ., Peshawar.
17. Soleymani A, Shahrajabian MH (2012). The effects of Fe, Mn and Zn foliar application on yield, ash and protein percentage of forage sorghum in climatic condition of Esfahan. *Inter J Bio* 4: 3–7.
18. Steel, R.G.D., J.H. Torrie and D.A. Dickey. 1997. Principles and Procedures of Statistics. A biochemical approach. 3<sup>rd</sup> Ed. McGraw Hill Book. Int. Co. New York: pp172-177.
19. Troedson, R. J., R. J, Law., K. F, Byth and G. L, Wiloon. 1989. Response of field grown wheat to saturated soil culture. *Field Crop Res.* 21: 171-187.
20. Wang, F., W. Xuqing and K. Sayre. 2004. Comparison of conventional, flood irrigated, flat planting with furrow irrigated, raised bed planting for winter wheat in China. *Field Crops Res.*, 87: 35-42.

<b>Access this Article in Online</b>	
	Website: <a href="http://www.ijarbs.com">www.ijarbs.com</a>
Quick Response Code	Subject: Agricultural Sciences
DOI: <a href="https://doi.org/10.22192/ijarbs.2018.05.05.012">10.22192/ijarbs.2018.05.05.012</a>	

**How to cite this article:**

Muhammad Aslam, Tanweer Ahmed, Ashiq Hussin Sanghi and Laila Khalid. (2018). Demonstration and evaluation of the effect of the yield response of seed cotton yield to various planting methods in ecological zone of Rahim Yar Khan. *Int. J. Adv. Res. Biol. Sci.* 5(5): 95-99.  
 DOI: <http://dx.doi.org/10.22192/ijarbs.2018.05.05.012>