

EVALUATION OF PLANTING METHODS FOR GRAIN YIELD AND YIELD COMPONENTS OF WHEAT

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ABSTRACT

The present experiment was conducted at Agricultural Research Farm, NWFP agricultural University Peshawar during 2004-05, to evaluate the effect of different planting methods on yield components of wheat, using randomized complete block design with four replications. Planting methods evaluated were: Line planting (20cm apart), Line planting (30cm apart), Cross planting, Broadcast planting, Single row on ridge, and Double row on single ridge. Line planted wheat 30cm apart produced significantly higher number of spikes m^{-2} (164), thousand grain weight (39.85g) and grain yield (5164 kg ha^{-1}), while broadcast method produced least number of spike m^{-2} (104), number of grains spike⁻¹ (57), thousand grain weight (32.09 g) and grain yield (4088 kg ha^{-1}). This study shows that line planting 30cm apart gives better results for grain yield of wheat than broadcast and other planting methods studied.

INTRODUCTION

Wheat is grown in Pakistan on more than 8 million ha. Despite the availability of high yielding varieties for different ecological zones, the average wheat grain yield in the country is around 2500 Kg ha^{-1} . Lower wheat grain yield could be due to unavailability of pure seed of recommended varieties, delay in planting, inappropriate planting methods, imbalance use of fertilizers and inefficient water management. The selection of suitable planting method plays an important role in the placement of seed at proper depth, which ensures better emergence and subsequent crop growth.

Planting method has a significant effect on water, nitrogen and phosphorus economy, energy savings and soil compaction (Trodson *et al.* 1989). Absorption of photosynthetically active radiations has also been found to be influenced by planting methods (Lal *et al.* 1991). Influence crop growth and development. Mishra and Tiwari (1999) have reported lower root weight in broadcast method as compared to non-conventional planting methods. Furthermore weed density is also higher in conventional planting methods as compared to the nontraditional methods e.g. cross planting. This makes a significant impact on final crop growth and thus on grain yield.

Previous studies show that different planting methods have varying response under different experimental conditions. Hassan and Hassan (1994) have shown that wheat planted in furrows gives maximum 1000-grain weight, straw yield and grain yield. Drilling in lines and cross planting was found to be the best at Johart, Assam during studies made by Gogoi and Kalita (1995). Shaalan *et al.* (1977) reported that the

plant density, ears m^{-2} , number of grains per ear, 1000-grain weight and grain yield were higher in drill planted wheat than broadcasted wheat. Higher wheat grain yields with drill planting as compared to broadcast were also reported by Kipps (1970). Dawelbeitand and Babiker (1997) have reported maximum yield for seed drilling and ridging after broadcasting than broadcasting alone. Row Planting and placement of fertilizers in rows have shown maximum yield than broadcasting (Mishra and Tiwari, 1999). In Pakistan, wheat is planted through broadcasting on a large area after rice harvesting. This method not only requires higher seed rate but also results in lower plant population. Thus evaluation of improved planting methods is critical for subsequent recommendation. Thus present study was conducted to evaluate the effectiveness of different planting methods on grain yield and yield components of wheat.

MATERIALS AND METHODS

The experiment was conducted at Agricultural Research Farm NWFP agricultural University Peshawar during 2004-05, to evaluate the effect of different planting methods on grain yield and yield components of wheat. The experiment was laid out in randomized complete block design with four replications, using plot size of 3 x 4.5 m. All recommended agronomic practices were uniformly applied to all of the experimental units. Fertilizer dose of NPK at the rate of 135-55-00 Kg ha^{-1} was applied to all the plots.

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Wheat cultivar Fakhre-sarhad was planted, at the rate of 100 Kg ha⁻¹ seed rate, using following planting methods for evaluation:

- i. Line planting (20cm apart): planting in line with 20cm row to row distance
- ii. Line planting (20cm apart): planting in line with 20cm row to row distance
- iii. Cross planting: planting in lines from west to east and then from north to south in the same plot to be perpendicular to the first one.
- iv. Broadcast planting: planting the seeds as broadcast
- v. Single row on ridge: planting single row on ridge
- vi. Double row on single ridge: planting double rows on both sides of the ridge

The data were statistically analyzed using analysis of variance appropriate for Randomized Complete Block design. Means were compared using LSD test at 0.05 level of probability when the F-value was significant (Steel and Torrie, 1984).

RESULTS AND DISCUSSION

Number of Spikes m⁻²

Data regarding number of spikes m⁻² are shown in Table 1. Analysis of the data revealed that planting methods significantly affected number of spikes m⁻². Maximum number of spikes m⁻² was produced by seed planted in 30cm apart lines (164) followed by double row on ridge (150), while minimum number of spike was produced by broadcast method of planting (104). These results are in agreement with Shaalan *et al.* (1977) who reported more number of spikes m⁻² for drill planted wheat than broadcasted wheat.

Number of Grains Spike⁻¹

Data on number of grains spike⁻¹ are presented in Table I. Statistical analysis of the data showed that number of grains spike⁻¹ was not significantly affected by different planting methods. However, maximum number of grains spike⁻¹ was recorded in line planted 30 cm apart (61) followed by line planted

20 cm apart and double row on ridge (60), while minimum number of grains were recorded in cross planted and single row on ridge (57). These results are in agreement with Shaalan *et al.* (1977) and Tanveer *et al.* (2003), who reported more number of grains spike⁻¹ for improved planting method as compared to broadcasting. This may be due to the effect of planting method on water, nitrogen and phosphorus economy, energy savings and soil compaction (Trodson *et al.*, 1989).

Thousand Grain Weight (g)

Data regarding thousand grain weight are shown in Table. 1. Higher thousand grain weight was recorded in line planted 30cm apart (39.85g) followed by cross planted (37.30 g), while lower thousand grain was recorded for broadcast planting method (32.09 g). Our results are in line with previous results of Hassan and Hassan (1994) and Tanveer *et al.* (2003) who reported smaller 1000-grains weight for broadcast planted wheat as compared to wheat planted with other planting methods.

Grain Yield (kg ha⁻¹)

Data concerning grain yield are presented in Table 1 and Fig. 1. Analysis of the data revealed that significant difference was noted for grain yield. Maximum grain yield was produced by line planted 30 cm (5164 kg ha⁻¹) followed by single row on ridge (4729 kg ha⁻¹) whereas minimum grain yield was produced by broad cast planted wheat (4088 kg ha⁻¹). Hassan and Hassan (1994) and tanveer *et al.* (2003) have also reported significant difference in grain yield for various planting methods. These results are in agreement with previous results of Mishra and Tiwari, 1999, who reported maximum yield for line planting than broadcasting.

CONCLUSION AND RECOMMENDATIONS

The present study shows that improved planting methods provide better results than the commonly used conventional planting method, broadcast method. Thus, line sowing is recommended for getting higher grain yields of wheat.

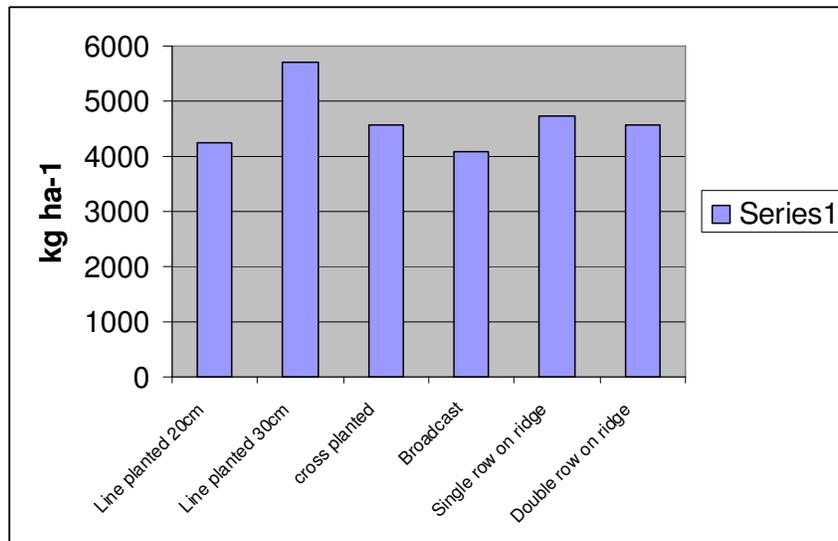


Fig. 1 Effect of Different Planting Methods on Grain Yield of wheat.

Table I: Effect of Planting Methods on number of spikes m⁻², number of grains spike⁻¹, thousand grain weight and grain yield of wheat.

Planting method	Number of Spike m ⁻²	Number of grains spike ⁻²	Thousand grains wt(g)	Grains yield kg/ha
Line planted 20cm	140 BC	60	34.21 BC	4255. BC
Line planted 30cm	164 A	61	39.85 A	5691. A
cross planted	141 BC	57	37.30 AB	4558. BC
Broad	104 D	57	32.09 C	4088. C
Cast planted				
Single row on ridge	133 C	58	34.42 BC	4729. B
Double row on ridge	150 B	60	35.98 AB	4581. BC
LSD	12.95	ns	3.877	594.5

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