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Comparative efficacy of different high yielding wheat varieties in ecological zone of Bahawalnagar.

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Keywords

Pass Transistor, three-dimensional integrated circuit (3D IC), differential signal transmission.

Abstract

A field experiment was conducted during winter seasons 2013-14 and 2014-15 at farmer's field of Adaptive Research Station Bahawalnagar. Six wheat varieties i.e Aari-2011, Punjab-2011, Lasani-2008, Faisalabad-2008, Millat-2011 and Aas-2011 were evaluated in a three replicated RCBD method. Results revealed that all the yield and yield parameters were significantly affected by the performance of each wheat variety. The average of two years result revealed that significant maximum plant population i.e 202, tillers 345.9, height 100.2, 1000 grain weight 39.5 and grain yield of 3790.5 kg ha^{-1} was obtained by the wheat variety Aari-2011 with % increase 14.1 than all other wheat varieties. Punjab-2011 and Faisalabad-2008 also performs better with a yield of 3694.5 and 3643.0 kg ha^{-1} and % increase of 11.2 and 9.6.

Introduction

Wheat (*Triticum aestivum* L.) plays a vital role in Pakistan economy and cultivated for food and feed. In Pakistan, it is grown on large area owing to number of manageable problems, per hectare yield is far below than the inherent potential of wheat varieties sown in Pakistan. Among the constraints, sowing of the crop at sub optimal time is of great importance because it does not ensure favorable environmental conditions and proper duration for growth (Iqbal et al. 2001). Many factors responsible for low yield of wheat such as cultivation of old varieties, sowing date, low seed rate, low fertilizer rates etc. The introduction of new varieties with high yield potential and wide range of adaptability is an important factor responsible for enhancing wheat production. Different varieties respond differently to applied nutrient fertilizer and hence differ in their yield potential. As cultivars differ significantly regarding fertile tillers m^{-2}, spike length, number of grains per spike, grain and straw yield (Naeem, 2001; Ali et al. 2010). All plants needed the same mineral elements; however, the quantity, rate and timing of uptake vary with crop, variety, climate, soil characteristics and management. Plants require a balanced supply of nutrients throughout their development. Mostly they have accumulated most of their nutrients during flowering and ripening stages. Approximately 50 to 90 percent of N and P in the plant at flowering moves from the leaves and stem to the developing seed (Chapin, et al. 1988).The environment under which crop is grown create a tremendous impact on the growth, development and yielding ability of wheat crop. The crop needs optimum conditions during its growth and development to attain good yield. Research has established that every wheat cultivar has its own definite requirements of

temperature and light for growth, flowering and finally the production of grains (Haider, 2007; Aslani and Mehrvar, 2012). A serious decline in grain yield of wheat due to delay in sowing is reported by a number of researchers (Kumar et al. 2000; Subhan et al. 2004; Sial et al. 2005). Sowing at improper time not only affects wheat germination and growth but also disturbs grain development (Haq & Khan, 2002). The optimum time of sowing of wheat varies with agro ecological locations. For instance, it was noted that grain yield of three long duration wheat varieties was improved when sowing date was advanced from November 15 to October 25 (Randhawa et al. 1981). Proper amount and time of fertilizer application is considered a key to the bumper crop. Time of fertilizer application can affect the Nitrogen utilization efficiency by cereals (Ragheb et al. 1993). Late sowing and sub optimum temperature at sowing affects uniform stand establishment of wheat crop which results in yield reduction (Farooq et al. 2008, Tanweer et al. 2009; Khokhar et al. 2010 and Ali et al. 2010) reported that significantly higher wheat grain yield was obtained by sowing at November 10 followed by same variety sown on November 20. Donaldson et al. (2001) reported that early sowing resulted in increased wheat straw production and generally higher grain yield compared with mid to late sowing date. Kumar et al. (2000) also reported that wheat growth was better when sown on 20th November than on 1st November or December. The improvement of 35-50% in wheat has been achieved by the introduction of newly high yielding cultivars (Whiteman, 1985). The problems like leaf and yellow rusts which cause considerable economic losses to wheat. Wheat Research Institute has released many varieties i.e. Seher-2006, Faisalabad-2006, AaS-2002 and Faisalabad 2008 which are not only disease resistant but also high yielding and has successfully faced the existing threats to meet the national wheat requirements (Hussain et al. 2009 Khan and Hussain 2006 and M. Hussain 2008). Wheat variety having the higher yield potential, disease and insect resistance and better adaptability is the need of the day because low seed yield is also attributed to non availability of pure seed of improved varieties along with low inputs and poor management practices (Ahmad et al. 2005, Sarwar & Ahmad 2003 and Bakhsh et al. 2005) also reported that the yield per unit area may be increased substantially through the evolution of high yielding genotypes, bearing a good combination of all yield components and disease resistance. The average yield of wheat in Pakistan is comparatively low than the developed and developing countries of the world, due to certain biotic and abiotic factors faced during the whole crop growth period (Anonymous, 2013).

Bahawalnagar is located in the southern side of District Pakpattan. Climate of the District is mainly arid in the south Western Part. Average annual rain ranges from 130 mm to 275 mm. Average day time temperatures during Rabi growing season (November to March) is 20°C while night time temperature is 12°C. Relative humidity during this period ranged from 80-90%. The soil of the District Bahawalnagar is mainly formed by alluvial sediments. Keeping in view the importance of wheat crop, the present study was conducted to compare different wheat varieties and to see which variety of wheat performs better in grain yield production under the ecological zone of Bahawalnagar.

Materials and Methods

The experiment was conducted at farmer's field of Adaptive Research Station Bahawalnagar during two consecutive years 2013-14 and 2014-15. The objective of this study was to check the efficacy of different wheat varieties under the ecological zone of Bahawalnagar. The experiment was laid out in Randomized Complete Block design (RCBD) with three replications. Six wheat varieties i.e Aari-2011, Punjab-2011, Lasani-2008, Faisalabad-2008, Millat-2011 and Aas-2011 as mention in table 1 were checked out for yield and yield parameters case. Recommended seed rate of each wheat variety was used. The previous crop was cotton in this field which was sown on 2nd fortnight of May. Cotton picking was done from the month of October to December. All the wheat varieties were sown on same time in the 2nd week of November. The fertilizer application to wheat varieties and all other agronomic practices were same during both years. Weedicides were used for the control of narrow and broad leaved weeds during mid January and February. Harvesting was done during 1st week of May.

Following growth and yield parameters were recorded.

1. Germination count/m^2
2. Tillers/m^2
3. Plant height (cm)
4. 1000 grain weight(g)
5. Yield kg/ha

Data were analyzed statistically with M-stat package and means were compared by DMR test at 5 percent probability level (Duncan, 1955).

Table 1- Different seeding techniques of wheat in standing cotton as relay cropping system.

Treatments	Wheat Varieties
T_1	Aari-2011
T_2	Punjab-2011
T_3	Lasani-2008
T_4	Faisalabad-2008
T_5	Millat-2011
T_6	Aas-2011

Results and Discussion

Germination count (m^{-2})

Data concerning germination counts m^{-2} is shown in Table 1. Statistical analysis of the data revealed that the different wheat varieties shows significant results on germination counts for the growing seasons. Average values for germination counts m^{-2} of different wheat varieties ranged from 164 to 222 m^{-2}. During the year (2013-14) average germination counts m^{-2} observed from different wheat varieties such as Aari-11, Punjab-11, Lasani-08, Fsd-08, Millat-11 and Aas-11 was 222, 215, 207, 210, 205 and 203 m^{-2} respectively. The maximum germination counts m^{-2} was observed as 222 m^{-2} for Aari-11 wheat variety and minimum as 203 m^{-2} in case of wheat variety Aas-11. During the year (2014-15) average germination counts m^{-2} observed from different wheat varieties such as Aari-11, Punjab-11, Lasani-08, Fsd-08, Millat-11 and Aas-11 were 182, 176, 170, 179, 173 and 164 m^{-2} respectively. The maximum germination counts m^{-2} was observed as 182 m^{-2} for Aari-11 wheat variety and minimum as 164 m^{-2} in case of wheat variety Aas-11. An adequate moisture supply was continued for facilitating seed germination and seedling establishment (Zhang, 2007). The variation among wheat varieties for the germination counts m^{-2} due to many biotic, abiotic and other varietal characters. Sorour et al. (1995) reported significant differences in the emergence.m^{-2} of wheat seeds.

Number of tiller (m^{-2})

Different wheat varieties have a significant effect on tillering counts m^{-2}. Data regarding number of tillers m^{-2} is presented in table 1. Average values for tillers m^{-2} of different wheat varieties ranged from 317.5 to 358.4 tillers m^{-2}. During the year (2013-14) average tillers m^{-2} observed from different wheat varieties such as Aari-11, Punjab-11, Lasani-08, Fsd-08, Millat-11 and Aas-11 was 358.4, 340.2, 332.4, 338.7, 322.2 and 318.6 respectively. The maximum tillers m^{-2} was observed as 358.4 m^{-2} for Aari-11 wheat variety and minimum as318.6 m^{-2} in case of wheat variety Aas-11. During the year (2014-15) average tillers m^{-2} observed from different wheat varieties such as Aari-11, Punjab-11, Lasani-08, Fsd-08, Millat-11 and Aas-11 were 333.5, 326.2, 325.1, 328.6, 322.4 and 317.5 m^{-2} respectively. The maximum tillers m^{-2} was observed as 333.5 tillers m^{-2} for Aari-11 wheat variety and minimum as 317.5 tillers m^{-2} in case of wheat variety Aas-11.

Plant height (cm)

Data concerning plant height is shown in Table 1. Statistical analysis of the data showed that plant height has non-significantly ($P \leq 0.05$) affect by the different wheat varieties. Average values for plant height of different wheat varieties ranged from 87.6 to 112.5 cm. During the year (2013-14) average plant height observed from different wheat varieties such as Aari-11, Punjab-11, Lasani-08, Fsd-08, Millat-11 and Aas-11 was 105.2, 103.4, 102.6, 106.1, 101.3 and 112.5 cm respectively. The maximum plant height was observed as 112.5 cm for Aas-11 wheat variety and minimum as 101.3cm in case of wheat variety Millat-11. During the year (2014-15) average plant height observed from different wheat varieties such as Aari-11, Punjab-11, Lasani-08, Fsd-08, Millat-11 and Aas-11 was 95.3, 89.5, 90.7, 93.9, 87.6 and 99.3 cm respectively. The maximum plant height was observed as 99.3 cm for Aas-11 wheat variety and minimum as 87.6 cm in case of wheat variety Millat-11. The possible reason for this variation could be the availability of more space, light and nutrients to wheat plants and water applied. The results are similar with Javadi et al. (2004) that reported that there was no significant difference in plant height among the wheat varieties.

1000-grain weight (g)

Data recorded on thousand-grain weight is shown in Table 1 for the two growing seasons. Analysis of the data revealed that 1000-grain weight has a significantly ($P \leq 0.05$) affect on all wheat varieties. Average values for 1000 grain weight (g) of different wheat varieties ranged from 33 to 42 (g). During the year (2013-14) average 1000 grain weight (g) observed from different wheat varieties such as Aari-11, Punjab-11, Lasani-08, Fsd-08, Millat-11 and Aas-11 was 40, 42, 38, 42, 36 and 37 respectively. The maximum grain weight (g) was observed as 42 (g) for Punjab-11 and Fsd-08 wheat varieties and minimum as 36 (g) in case of wheat variety Millat-11. During the year (2014-15) average 1000 grain weight (g) observed from different wheat varieties such as Aari-11, Punjab-11, Lasani-08, Fsd-08, Millat-11 and Aas-11 was 39, 40, 38, 39, 36 and 33 respectively. The maximum 1000 grain weight (g) was observed as 40 (g) for Punjab-11 wheat variety and minimum as 33 (g) in case of wheat variety Aas-11.

Grain yield (kg ha^{-1})

Data recorded on grain yield kg ha^{-1} is shown in Table 1 for the two growing seasons. Analysis of the data revealed that grain yield kg ha^{-1} has a significantly ($P \leq 0.05$) affect on all wheat varieties. Average values for grain yield kg ha^{-1} of different wheat varieties ranged from 3096 to 4243 kg ha^{-1}. During the year (2013-14) grain yield kg ha^{-1} observed from different wheat varieties such as Aari-11, Punjab-11, Lasani-08, Fsd-08, Millat-11 and Aas-11 was 4243, 4102, 3849, 4057, 3761 and 3547 kg ha^{-1} respectively. The maximum grain yield kg ha^{-1} was observed as 4243 for Aari-11 and 4102 kg ha^{-1} for Punjab-11 wheat varieties and minimum as 3547 kg ha^{-1} in case of wheat variety Aas-11 during the year2013-14. During the year (2014-15) average grain yield kg ha^{-1} observed from different wheat varieties such as Aari-11, Punjab-11, Lasani-08, Fsd-08, Millat-11 and Aas-11 was 3338, 3287, 3234, 3229, 3154 and 3096 kg ha^{-1} respectively. The maximum grain yield kg ha^{-1} was observed as 3338 kg ha^{-1} for Aari-11 wheat variety and minimum as 3096 kg ha^{-1} in case of wheat variety Aas-11 during the year 2014-15

Table 1: The efficacy of different Wheat varieties on grain yield and yield components during Rabi season 2013-14 and 2014-15.

Year	Treatments	Average germination counts (m^{-2})	Avg. Tiller counts (m^{-2})	Average plant height (cm)	Average 1000-grain weight (g)	Average grain yield (kg/ ha)
2013-14	T_1	222a	358.4a	105.2	40b	4243a
	T_2	215b	340.2b	103.4	42a	4102ab
	T_3	207cd	332.4c	102.6	38c	3849d
	T_4	210c	338.7b	106.1	42a	4057c
	T_5	205cd	322.2d	101.3	36d	3761de
	T_6	202de	318.6d	112.5	37d	3547f
LSD		**4.10**	**7.021**	**Non-significant**	**1.209**	**14.89**
2014-15	T_1	182a	333.5a	95.3	39ab	3338a
	T_2	176cb	326.2bc	89.5	40a	3287b
	T_3	170cd	325.1bc	90.7	38b	3234c
	T_4	179ab	328.6b	93.9	39ab	3229cd
	T_5	173c	322.4d	87.6	36c	3154e
	T_6	164d	317.5e	99.3	33d	3096f
LSD		**5.02**	**4.210**	**Non-significant**	**1.421**	**7.905**

Table 2: Average values of all parameters from 2013-2015

Treatments	Average germination counts (m^{-2})	Avg. Tiller counts (m^{-2})	Average plant height (cm)	Average 1000-grain weight (g)	Average grain yield (kg/ ha)
T_1	202	345.9	100.2	39.5	3790.5
T_2	195.5	333.2	96.40	41.0	3694.5
T_3	188.5	328.7	96.60	38.0	3541.5
T_4	194.5	333.6	100.0	40.5	3643.0
T_5	189.0	322.3	94.40	36.0	3457.5
T_6	183.0	318.3	105.9	35.0	3321.5

Table.2 shows the average values of all yield parameters during both years. In which all the wheat varieties produced better yield, while in case of comparison in most of the yield parameters Aari-11 wheat variety performs better and produced highest germination counts m^{-2} (202), tillers m^{-2} (345.9), plant height cm (100.2), 1000 grain weight g (39.5) and grain yield kg ha^{-1} (3790.5).

Table 3: Percentage increase in wheat yield (kg/ha) of Different Wheat varieties for the year 2013-14 and 2014-15

Treatments	Combined Avg. yield of 2013-14 and 2014-15 (kg/ha)	Percentage increase in wheat yield (%)
Aari-11	3790.5	14.1
Punjab-11	3694.5	11.2
08-Lasani	3541.5	6.6
Fsd-08	3643.0	9.6
Millat-11	3457.5	4.0
Aas-11	3321.5	-

Table 3 shows that the highest grain yield was produced in T_1 for Aari-11 wheat variety with 14.1% yield increase during both study years i.e., 2013-14 and 2014-15 in comparison with Aas-11 wheat variety (T_5) which produced the least avg. yield i.e., 3321.5 kg/ha. Treatment T_2 Punjab-11 wheat variety also performed.

References

1. Ahmad, M., L.H. Akhtar, M. Arshad, A.H. Tariq, S.Z. Siddiqi, M. Hussain, A. Rashid, G. Hussain, M. Aslam, M. Safdar and M.M. Akhtar. 2005. Development of a high yielding wheat variety "Bahawalpur-97" for Southern Punjab, Pakistan. Pak. J. Sci. Ind. Res., 48(1): 42-46
2. Ali MA, Ali M, Sattar M and Ali L, 2010. Sowing date effect on yield of different wheat varieties. J. Agri. Res. 48: 157-162.
3. Anon. 2013. Screening of wheat against yellow and leaf rusts under NUWYT and NWDSN during 2012-13 CDRP, Institute of Plant and Environmental Protection NARC, PARC, Islamabad.

4. Aslani F and Mehrvar MR. 2012. Responses of wheat genotypes as affected by different sowing dates. Asian J. Agri. Sci. 4: 72-74.
5. Bakhsh, A., M. Arshad and S.M. Iqbal. 2005. Development of chickpea blight resistant variety (Dasht) using combination of bulk population and pedigree breeding method. Pak. J. Bot., 37(2): 325-335.
6. Chapin, F.S. III and I.F. Wardlaw. 1988. Effects of phosphorus deficiency on source sink interactions between the flag leaf and developing grain in barley. Journal of Experimental Botany. 39:165–177.
7. Donaldson E, Schillinger WF and Dofing SM, 2001. Straw production and grain yield relationships in winter wheat. Crop Sci. 41: 100-106.
8. Duncan, D.B. 1955. Multiple Ranges and Multiple F. Test Biomet. 11:1-2.
9. Farooq, M., Basra, S. M. A., Rehman, M & Saleem, B. A., 2008. Seed priming enhances the performance of late sown wheat by improving chilling tolerance. J. Agron. Crop Sci., 194: 55-60.
10. Haider, SA, 2007. Growth analysis in relation to sowing date in four varieties of wheat: A functional approach. J. Life Earth Sci. 2: 17-25.
11. Haq, N. U. & Khan, M., 2002. Effect of planting date, chlortoluran + MCPA and wheat varieties on weed control and wheat yield. Sarhad J. Agri., 18(2): 443-447.
12. Hussain, M.Hussain, S.Khan, J. Anwar and M. Akbar. 2009. Faisalabad-2008; a new high yielding and disease resistant wheat variety. J. Agric. Res. 47(4):365-74.
13. Iqbal, M. S., Yar, A., Ali, A., Anser, M. R., Iqbal, J. & Akram, H. M., 2001. Effect of sowing dates ad seed rate on grain yield of wheat. J. Agric. Res., 39(3&4): 217-221.
14. Javadi A, Rahimzada R, Yavari A. 2004. Comparison of traditional and mechanized planting methods at different levels and their impact on the performance of dryland seeding. Journal of Agricultural Engineering Research 59(5), 18-78.
15. Khan M. A. and M. Hussain 2006. AS-2002, a new high yielding disease resistant and heat resistant wheat variety. Pak. J. Agric. Res. 19(4):23-28
16. Khokhar, Z., Hussain, I., Khokhar, B. & Sohail, M., 2010. Effect of planting date on yield of wheat genotypes in sindh. Pakistan J. Agric. Res., 23(3&4): 103-107.
17. Kumar S, Bangarwa AS and Kadian VS, 2000. Response of wheat varieties to sowing dates and nitrogen level. Ann. Agric. Bio. Res. 5: 99-103.
18. M. Hussain, S.B. Khan, J. Anwar, M.M. Iqbal, F. Muhammad, F. Hussain and A. Qayyuam. 2008. A new high yielding diseases resistant variety. Seher-2006. Pak.J. Phytopathol., 30(1):159-64.
19. Naeem M, 2001. Growth, radiation use efficiency and yield of new wheat cultivars under variable nitrogen rates. M. Sc. Thesis, Dept. Agron, Univ. Agric., Faisalabad.
20. Ragheb, H.M., R.A. Dawood, and K.A. Kheiralla. 1993. Nitrogen uptake and utilization by wheat cultivars grown under saline stress. Assiut. J. Agric. Sci. 24: 97-117.
21. Randhawa, A. S., Dhillon S. S. & Dingh, D., 1981. Productivity of wheat varieties influenced by time of sowing. J. Res. Pb. Agri. Univ., 18(3): 227-233.
22. Sarwar, G. and M. Ahmad. 2003. Development of a new high yielding mungbean variety "AEM96" through induced mutations. SAARC J. Agri. 1: 173-180.
23. Sial, M. A., Arain, M. A., Khanzada, S. D., Naqvi, M. H., Dahot, M. U., & Nizamani, N.A., 2005. Yield and quality parameters of wheat genotypes as affected by sowing dates and high temperature stress. Pak. J. Bot., 37(3): 575-584.
24. Sorour, F.A., M. A. Al-Sharkawy, M. S. Osman. 1995. Influence of tillage methods on the growth and yield of corn. Libyan j.Agric.4:47-50.
25. Subhan, F., Ahmad, M., Anwar, N. H., Shah, M., Siddiq, I., Ali, J., Rahman & Sajjad, T., 2004. Response of newly developed wheat cultivars/advance lines to planting dates in the central Agro-ecological zones ofNWFP. Asian J. Plant Sci.,3(1): 87-90
26. Tanveer, S. K., Hussain, I., Asif, M., Mujahid, M. Y., Muhammad, S., Qamar, M. & Asim M., 2009. Performance of different wheat varieties/lines as affected by different planting dates and seeding rates under high rainfall area of potohar. Pak. J. Agri. Sci.,46(2): 102-106
27. Whiteman, P.T.S. 1985. Mountain Oases. A Tech. Rep.Agric. Studies. Deptt. Agric. Integrated Rural Dev., FAO/UNDP. Gilgit Duncan, D.B. 1955. Multiple Ranges and Multiple F. Test Biomet. 11:1-2.

28. Zhang L., 2007. Productivity and resource use in cotton and wheat relay intercropping. PhD thesis, Wageningen University, Wageningen, The Netherlands. 188 pp. ISBN: 978 90-8504-759-9.

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