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Comparative Suitability of Wheat, Triticale, Barley, and Oat in the Ecology of Kohat, Pakistan

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Abstract
Four different cereals specie *viz.* Wheat (*Triticum aestivum L.*), Triticale (*Tritico secale*), Barley (*Hordeum vulgare L.*) and Oat (*Avena sativa*) were tested for yield and yield components at Barani Agricultural Research Station, Kohat Khyber Pakhtunkhwa Pakistan under rainfed conditions during the year 2010-11. Maximum grain yield of 3133 kg/ha was recorded for wheat, followed by 3071, 2254 and 1800 kg/ha for Triticale, oat and barley respectively. The maximum height of 258 cm was noted for oat, followed by Triticale and barley attaining a plant height of 124 and 108 cm respectively, while minimum plant height of 96 cm was noted for Wheat. Further, maximum 301 ears/m^2 were observed for barley, whereas minimum for wheat (241). Minimum days to maturity were taken by barley (145 days), while Triticale and oat took maximum days to maturity (172 days). Therefore, Triticale could be used as alternative of wheat having comparative yield under rainfed condition.
Keywords: *Triticum aestivum*; Triticale; Barley; agronomic characters; Pakistan.

INTRODUCTION

Wheat (*Triticum aestivum* L.) is a staple food crop of Pakistan. Wheat flour is a major dietary and its straw is a major cattle fodder in winter months. The Wheat occupies a central position in the farming system of Pakistan. However, farmers grow low yielding local cultivars, which are susceptible to diseases like rusts, smuts and lodging. The yield in such places is about 30 percent lower than national average. Low yield of Wheat may be attributed to poor soil fertility, lack of irrigation water, weeds infestation, use of old agronomic practices and varieties of low yield. High yield potential varieties play a pivotal role in increasing per hectare yield under optimum growing season. Although many high yielding Wheat varieties have been evolved and recommended for general cultivation in the past but their performance under farmer's field is not up to the mark as these have lost their adaptability to environmental conditions.

Triticale (*Triticosecale*) is a potential cereal to give better yield under moister stressed condition. It exhibited better performance than Wheat regarding yield, plant height and other characters with very high level of resistance to Wheat diseases. All these evidences prove that Triticale can compete with the long established cereal crop like Wheat in many situations including drought (Zaheer, 1991).

Oats (*Avena sativa* L.) is one of the most important rabi cereal fodder crops grown in Pakistan under irrigated and barani conditions. It is quick growing palatable, succulent and nutritious crop. The Oat fodder cultivation generally has 40-60-0 kg NPK/ hectare nutrient requirements while water requirement is 4-6 irrigations.

Barley has accumulated a vast array of genetic variability, which was maintained by landraces grown across the globe. Over the past hundred years, these heterogeneous landraces have gradually been replaced by homogeneous pedigreed lines in industrialized countries. However, landraces are still widely grown in developing countries, particularly in harsh environments. Due to seasonal variation in rainfall distribution crop yield is also variable from year to year. Severity, timing and duration of drought will vary from year to year, and cultivar successful in one dry year may fail in another (Ceccarelli and Grando, 1996). Due to above facts an experiment was design to select high yielding cereal cultivar which can give good production both in winter and spring (late rainfall) could be useful alternatives to the current practices which are dominated by long duration winter wheat and Barley.

MATERIALS AND METHODS

A field experiment was conducted at Barani Agricultural Research Station Kohat Khyber Pakhtunkhwa Pakistan during 2010-11. Four different cereals i.e. Wheat, Triticale, Barley and Oat were tested for yield and yield components. The experiment was laid out in RCB design with three replications. Sowing was done in rows 5 m long and 30 cm apart at proper wattar conditions. Normal fertilizer dose of N and P_2O_5 @ 80:58 kg/ha was applied at sowing time. All agronomic practices were kept normal and uniform. The experiment was planted on 11.11.2010 and were harvested at proper maturity on 15.06.2011. Data were recorded on plant height (cm), Number of ears/m^2, days to maturity and grain yield (kg ha^{-1}). Data recorded on each trait was subject to analysis of variance techniques appropriate for randomized complete block design using computer software Statistix ver. 8.1. Means were separated using LSD test at 5 % level of probability.

RESULTS AND DISCUSSION

Plant height

Data presented in the Table 1 indicated that all the species differed significantly for plant height. Maximum plant height of 158 cm was noted for Oat, followed by Triticale and Barley attaining height of 124 and 108 cm respectively, while minimum plant height of 96 cm was noted for wheat. The current results were closely related with Wajid (2002) who mentioned that various cultivars of wheat, Barley and Oat had a significant variation in plant height. The variation in plant height could be due to genetic make-up of the varieties. Zaman *et al*. (2006) explained that plant height may differ in varieties due to environmental conditions which in turn cause variation in hormonal balance and cell division rate.

No. of ears m^{-2}

Table 1 show that the cereal crop species differed significantly for producing different of ears m^2. Maximum number of 301 ears m^{-2} were recorded for Barley, followed by 256, 243 and 243 ears m^{-2} produced by Oat, Triticale and Wheat respectively. Similar results were also reported by Amanullah et al. (2004), they reported significant difference among oat varieties grown under the agro climatic conditions of Peshawar valley.

Days to maturity

As per Table1 the crop species differed significantly for days to maturity. Maximum no. of 172 days to maturity was taken by Oat and Triticale, while wheat and Barley matured in 159 and 145 days respectively. These results agree with those of Wajid et.al. (2002), that days to maturity were significantly affected by wheat, Barley and Oat. Maximum of 175 days to maturity were taken by Oat. Masood et al. (2005) also reported significance difference among genotypes for maturity in wheat.

Grain yield (kg/ha)

It is evident from the data (Table 1) that all the crop species tested in the trial were significantly different for producing grain yield kg/ha. Maximum grain yield of 3133 kg/ha was recorded for wheat, followed by 3071, 2254 & 1800 kg/ha for Triticale, Oat and Barley respectively. Wajid (2002) reported that various cultivars of wheat, Barley and Oat had a significant effect on grain yield.

CONCLUSION

Maximum grain yield of 3133 kg/ha was recorded for wheat, followed by 3071, 2254 and 1800 kg/ha for Triticale, Oat and Barley respectively. The maximum height of 258 cm was noted for Oat, followed by Triticale and Barley attaining a plant height of 124 and 108 cm respectively, while minimum plant height of 96 cm was noted for wheat.

S#	Crop species/Variety	Plant height (cm)	No. of ears/m2	Days to maturity	Grain yield kg/ha
1	Wheat (KT-2010)	96 D	241 B	159 B	3133 A
2	Triticale (Armadillo)	124 B	243 B	172 A	3071 B
3	Barley (Rakhshan-10)	108 C	301 A	145 C	1800 D
4	Oat (Jasper)	258 A	256 B	172 A	2254 C
$LSD_{(0.05)}$		9.21	16.39	7.13	13.20

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