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EVALUATION OF AGRONOMIC TRAITS FOR YIELD AND YIELD COMPONENTS IN WHEAT GENOTYPES WITH RESPECT TO PLANTING DATES

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ABSTRACT

Fourteen genotypes including two checks varieties were evaluated for agronomic traits and their adaptability study on two different sowing dates at the experimental farm of Nuclear Institute for Food and Agriculture, Tarnab, Peshawar, Pakistan. The combined analysis of variance showed that there were significant variations among genotypes, dates of sowing and their interaction. Based on regression coefficient (b_i) and mean square deviation from linear regression ($\overline{S}^{2}_{di}$) for the individual genotypes regarding the parameters Viz. plant height, spike length, spikelets spike^{-1}, number of tillers plant^{-1} and grain yield (kg) plot^{-1} under consideration, most of the genotypes responded negatively with respect to all the traits under late planting condition. However, some of the genotypes such as CT-09117, CT-09137, CT-09141 and SRN-09111 revealed stable performance with respect to the yield assorted traits. They have been recommended for the late planting conditions where sowing is delayed due to some unavoidable circumstances than the other elite wheat genotypes.

KEYWORDS

Normal and late sowing, yield components, environmental effects, *Triticum aestivum* L.

1. INTRODUCTION

Wheat (*Triticum aestivum* L.) is one of the most important grass family (*Poaceae*) cereal crop throughout the world [1]. The world's leading wheat producing countries are United States, China, India, Russian Federation, Australia, France, Germany, Canada, United Kingdom, Ukraine, Turkey, Pakistan, Argentina and Kazakhstan [2]. In Pakistan wheat is grown on an area of about 8.3 million ha with average yield ranging from 2.7 to 4.2 tons ha^{-1} and total production of 23.7 million tons [3].

Stability in performance is one of the most important property of a genotype for wide cultivation. That is why multi-locational trials are conducted for number of years to estimate the performance and phenotypic stability. Sometimes the uni-locational trials can also serve the purpose provided different environments are created by planting experimental material at different sowing dates on the same location [4]. This differential yield response of genotypes in different environment is called genotype × environment (G×E) interaction [5]. Grain yield being a polygenic character and is greatly affected by different environmental conditions. Therefore, a wide research work is required to develop such varieties which could give high yield across different environments [6]. The demand for wheat is increasing, because of the rapid increase in the population growth rate. Because of urbanization and industrialization, land and water resources are being decline.

It is therefore, a great need to increase wheat production within the available resources in order to meet the increasing demand for food. Wheat breeders are engaged to improve the yield potential by developing new cultivars having desirable genetic make-up [7]. To release a new variety for wide cultivation stability in performance is one of the most desirable properties of genotypes. The present study was designed to determine environmental effects on yield and yield related agronomic traits with respect to the performance of some elite wheat genotypes.

2. MATERIALS AND METHODS

The present research work was carried out at the experimental farm of Nuclear Institute for Food and Agriculture (NIFA)in 2012-2013, Peshawar, Pakistan with two experimental sets where each set had 12 genotypes (WL-0916-2, CT-09065, CT-09117, CT-09137, CT-09141, CT-09149, SRN-09048, SRN-09063, SRN-09065, SRN-09087, SRN-09102 and SRN-09111and two check cultivars (Bathoor-08 and Pirsabak-08). Data on five randomly selected plants from each plot were recorded and average value was calculated for plant height (cm), number of productive tillers plant^{-1}, spike length (cm), number of spikelets spike^{-1} and grain yield plot^{-1} (kg).

The data collected on 5 randomly selected plants from each plot were averaged separately for each parameter and were subjected to the analysis of variance using Gen Stat 12th statistical software [8]. To detect the presence of genotype by environment (different sowing dates) interaction and to partition the variation due to genotype, date and genotype by date interaction, a pooled analysis of variance was computed. After substantiation a significant genotype by environment interaction through F-test, univariate stability parameters were performed in accordance with the coefficient of regression ($\boldsymbol{b_i}$) by using Eberhart and Russell's model as stability test [9]. Regression coefficient (***bi***) was calculated as a parameter of measuring the response of a particular genotype on varying environments (dates) with respect to each parameter.

The environmental index ($\boldsymbol{I_j}$) for each genotype was computed in order to determine the deviation of mean of all the genotypes at given date from the overall mean. Using MS Excel program for Windows, as outlined by a researchers, variance of means over different sowing dates with regard to individual genotype (σ^{2}_{Vi}) and mean square deviations ($\overline{S}^{2}_{di}$) from linear regression were also worked out as the parameter of stability [10].

3. RESULTS AND DISCUSSION

3.1 Plant Height

The combined analysis of variance (Table1) indicated highly significant difference for mean square plant height with respect to genotypes and sowing dates. However, mean square values for plant height with respect

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