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Adaptability of bread wheat cultivars and breeding lines under cold arid conditions of Ladakh

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SUMMARY

Twenty bread wheat genotypes were evaluated for yield and its components for stability over four years under cold arid conditions of Leh. Seven quantitative traits were studied for the purpose and showed presence of significant GXE interaction for all the traits. The non-linear component of G x E interaction was highly significant for the yield and all contributing traits studied. The results revealed that twelve genotypes *viz.*, Kailash, Mansarovar, VL770, VL733, HS 365, SWL 3, SWL 5, Sonalika, SEL 494, Singchen, SWL 10 and Leh local exhibited stable performance with respect to grain yield over the years. It was also revealed that stability for grain yield was influenced by stability of yield components, particularly biological yield, and harvest index and 1000-seed weight.

Key words : G x E interaction, Wheat, Cold arid, Ladakh.

Wheat is second major crop of Ladakh after barley and grown as summer crop in entire cold arid region. However with the change in food habits, area under wheat is steadily increasing in the region (Sharma, *et al*., 1999). Research efforts made so far resulted in introduction and development of some varieties and lines for replacement of local cultivars from the cultivation. The cold arid environments are most harshing, unstable and unpredictable and keeps changing year to year, which affect the performance of varieties to a great extent. Identification of stable variety is a need of the region. Therefore, the present study was undertaken to know the adaptability of some newly developed lines and cultivars of wheat in this cold arid region of the country.

MATERIALS AND METHODS

The present study was undertaken at Thicksey farm, Regional Agricultural Research Station, SEUAST-K, Leh (Ladakh) during summer season for four consecutive years (1998-2001). The experimental material comprised of twenty varieties/lines of bread wheat including Leh local (local check). The genotypes were evaluated in randomized block design with three replications. Each entry was sown in a plot size of 3 m x 1.38 m, which consisted six rows of 3 m length spaced at 23 cm. Days to maturity, grain yield (kg) and biological yield (kg) were recorded on net plot basis, while data on plant height (cm), ear length (cm) was taken on a random sample of 10 plants from each plot excluding border rows. The 1000 seed weight (g) was recorded on five random samples drawn from each plot and harvest index (%) was calculated as percent fraction of grain yield over biological yield. Stability analysis was performed following the Eberhart and Russell (1966) model as it used by several other workers (Singh and Singh, 1980 and Nanda *et al*.,1983) for identifying stable genotypes in wheat. Deviation of bi values from unity and significance of deviation from regression ($S2d_i$) was tested by t-test and F-test, respectively.

RESULTS AND DISCUSSION

The pooled analysis of variance revealed the presence of sufficient genetic variability for all the traits studied (Table 1). The results also showed the significance of genotype X environment interaction for all the traits. Significant GXE interaction for yield and yield contributing traits in wheat had been reported by various other workers under different microclimatic cultivation conditions (El-Haddod, 1975 and Mondal and Das, 1985). However, linear component of variety X environment interaction was found significant for plant height only. It indicated that varieties do not differ for their regression on environmental index for this trait. For all the traits studied the non-linear (pooled deviation) component of GXE interaction was significant, that was due to presence of high genetic diversity in the material (Paroda and Hays,

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