

## Stability analysis for grain yield and quality parameters in barley (*Hordeum vulgare* L.) germplasm

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### ABSTRACT

Thirty five genotypes of barley (*H. vulgare* L.) were evaluated for grain yield /plant, 1000 grain weight, number of seeds/ spike, tillers/ plant, malt percentage and starch percentage under eight environments. Pooled analysis of variance for all the traits indicated high difference among the genotypes and environments. The mean squares due to varieties were found significant for all the six traits indicating presence of sufficient variability for these traits. It is clear from the results that the linear and non-linear component of GXE interaction played an important role in all the traits under study. Following the stability criteria, seven genotypes for grain yield, ten for 1000 grain wt. Six for number of seeds spike, four for tillers/ plant, seven for malt and four for starch percentage were identified as desirable and stable under varying environmental conditions.

**Key words :** Barley, Linear, Non-linear and GXE interaction.

### INTRODUCTION

Barley is an important cereal crop in the world agriculture. The barley grains are primarily used for human consumption in various preparations as a feed for livestock and to a limited extent for the manufacture of beverages. Barley based agro-industries are market bear, pearl barley, lemon barley, water and lime barley. The barley grains available to the industries possess higher husk and protein content and less carbohydrate, which results in poor malting qualities. The continuous decline in barley area and production during 80's and 90's triggered a shortage for good quality grains of malting. Due to progress in agriculture and easily availability of fine grains cereals like wheat and rice, it has been pushed to be utilizing only as feed/ industrial crop. In order to check this declining trend, high yielding varieties with stability of production are needed. Several models, including regression approach model of Yates and Cochran (1938) static model of Plasted and Peterson (1959) and Ecovalence model of Wricke (1962) have been proposed for the estimation of genotype X environment interaction. Later on Finlay and Wilkinson (1963) used the regression approach model to select stable genotypes in barley. Eberhart and Russell (1966) later improved regression approach model and added another parameter, deviation from regression ( $S^2_{di}$ ) besides regression coefficient ( $b_i$ ) for stability. They defined a stable genotype with unit regression and least deviation from regression. Perkins and Jinks (1968) used the same two parameters, but at the same time modified the method of estimation of regression coefficient. The potential of genotypes and stability of their performance can be judged by multi environment testing. Sometimes the uni-location trials can also serve the purpose provided different environments are created by different sowing dates, using various spacing and dose of fertilizers and irrigation levels, etc. Therefore, the present investigation was conducted to assess the genotype X environment interaction and stability of barley

germplasm under varying environments.

### MATERIALS AND METHODS

The experimental material consisted of 35 genotypes of barley obtained from National Bureau of Plant Genetic Resources (NBPGR), Pusa Campus, New Delhi. These were evaluated at experimental farm of Kisan Post Graduate College Simbhaoli, Distt. Ghaziabad (UP) during rabi seasons of 1997-1998 and 1998-1999 in randomized block design with three replications in eight different environments, which were created by using two fertility levels (40:20:20 and 20:20:20 NPK) and two levels of irrigation (Three and one). Each genotype was grown in a 2 m row length with a spacing of 25 cm. All the recommended cultural and agronomic practices were followed to raise the crop. Five randomly selected plants/plot/ replication in each genotypes were labeled and observations were recorded for tillers/ plant, number of seeds/ spike, grain yield / plant, 1000 grain / wt., malt percentage and starch percentage and data were subjected to stability analysis as per the method proposed by Eberhart and Russell (1966).

### RESULTS AND DISCUSSION

In present investigation, the pooled analysis of variance for different characters is presented (Table 1). The mean squares due to varieties were found significant for all the characters under study indicating the presence of sufficient variability for these traits. Coasta *et al.*, (2001) observed significant differences among barley cultivars for grain yield, plant height and heading date. The linear component of G X E interaction played an important role in all the characters under study. As earlier reported by May *et al.*, (1993), Fekadu Fufa (1995), Das *et al.*, (1998) and Salem *et al.*, (1998) and Upreti (1999). The non-linear component of G X E interaction and variance due to deviation were significant only for three characters i.e., number of seeds/ spike, malt and starch percentage reflecting considerable genetic diversity for these traits. All the three parameter of stability for six traits are presented in Table 2.

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