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PHENOTYPIC STABILITY FOR YIELD IN CHICKPEA

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The nature and magnitude of genotype X environment interaction in 14 genotypes of chickpea (*Cicer arietinum* L.) were studied for determination of yield and calculation of phenotypic stability. The study indicated that GL-769 gave the highest yield under favourable environments. However, E-5, CM-72 and CM-68 were the most stable genotypes by being less sensitive to changes in the environment.

Key words: Cicer arietinum L., Genotype X Environment interactions, Yield stability.

INTRODUCTION

Chickpea (*Cicer arietinum* L.), the most important pulse crop of Pakistan, is grown over a wide range of agroclimatic conditions throughout the country. Hence, newly developed genotypes and promising lines have not been tested for general and specific adaptability. The present investigation was carried out to collect information on genotype X environment interaction, which is of great use for a breeding programme, as it provides a measure for stability across the environments.

MATERIALS AND METHODS

The material used in this study consisted of 14 chickpea genotypes. The trials were planted during rabi 1984-85 at 8 locations *viz.* Islamabad, Serai Naurang (Bannu), D.I. Khan, Lahore, Karak, Faisalabad, Dokri and Tandojam. The experimental material was planted in a randomized complete block design with 4 replications. Each plot consisted of 6 rows of 4 meter length. The spacing between the rows was 30 cm. and within the rows was 10 cm. Phenotypic stability values were calculated by the method suggested by Ebberhart and Russell [5].

RESULTS AND DISCUSSION

The analysis of variance showed that differences among genotypes and environments were highly significant (Table 1). The partitioning of genotype X environment interaction into linear [G X E (linear)] and non linear (pooled deviation) components showed that both were significant and thus, important in the genotype X environment interaction. Similiar results were reported by a number of workers [1,2,3,4]. The higher values of the linear component, relative to the non linear component, suggest the possibility of prediction across environments.

Stability parameters viz. mean ($\overline{X}$), regression coefficient (b) and mean square deviation (S^2_d) were computed for the individual genotypes (Table 2). The highest yield was recorded for GL-769 (1875 Kgs/ha). However, GL-769 performed well only under favourable environments and was not suitable for general cultivation as reflected by the above unity regression (b= 1.78) and significant deviation from linearity. The other high yielding genotypes viz. RC-32, AUG-1432 and CM-1 were also sensitive to environmental changes as indicated by above unity stability values. However, these genotypes had non significant deviations from regression and were adapted to the favourable environments with little deviation from a linear response to environmental changes. Only three genotypes, viz. E-5, CM-72 and CM-68 had above average yield, unity

Table 1. Analysis of variance for yield data.

Source of variation	D.F.	M.S.
Genotypes (G)	13	19.8**
Environments (E)	7	514.9**
Genotypes X Environment (G X E)	91	31.4**
E + (G X E)	98	65.9**
G X E (Linear)	13	143.2**
Pooled deviation	84	11.6**
Pooled error	336	4.9

** = $p < 0.01$.

Table 2. Yield stability parameters for 14 chickpea genotypes.

Genotypes	$\bar{X}$(Kg/ha)	b	S^2_d
GL-769	1875	1.78	33**
AUG-1433	1621	1.54	6
ICC-11514	1349	1.97	8
C-141	1251	0.83	45**
CM-88	1348	2.12	8
E-5	1617	1.04	6
AUG-1430	1179	1.04	7
RC-32	1720	1.53	8
CM-2	1423	1.44	7
NEC 138-2	1065	1.06	10
CM-1	1509	2.03	9
AUG-1432	924	1.21	11
CM-72	1470	1.02	7
CM-68	1467	1.13	8
MEAN	1415		
S.E.	68.64		
C.V.	18.14		

Continued

**Significant when tested against pooled deviation mean square at p = 0.01.

regression and non significant deviation values. Thus, these three genotypes were most stable, being the least affected by changes in the environment.

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