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PHENOTYPIC STABILITY FOR HARVEST INDEX IN BLACK GRAM*

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Phenotypic stability for harvest index was studied by growing 31 genotypes of black gram in three environments of cultural practices. Main effects as well as both components of G x E interaction (linear and non-linear effects were significant. Ten genotypes were found responsive to favourable environment. Three genotypes viz; H-70-3, KMU-3 and H-70-11 with higher mean values of harvest index were found stable to existing environments. Study reveals the possibility of exploring harvest index in crop improvement programme.

Yield increases in pulse crops are attributed to the change n plant type that mainly includes morphological changes and physiological functions. Harvest index expressed as per cent of economic yield to biological yield (Donald. 1962) has drawn special significance in recent past (Rosielle and Frey, 1975). An improved harvest index reflects increased physiological activities to mobilize and translocate the photosynthates to the organs of economic importance. In view of importance, harvest index therefore, needs assessment for phenotypic stability under varied environments. To a great concen however, information on harvest index for stability, in black gram, an important pulse crop of India are not available in literature. Present investigation was therefore, planned to assess harvest index stability in thirty one genotypes of black gram.

MATERIAL AND METHODS

During *Kharif* 1978, thirty one genetically diverse cultivars of black gram (*Vigna mungo* L. (Hepper) were grown at the experimental farm of Haryana Agricultural University. Hissar. Randomized block design with three replications was used. The environments consisted of 30x15 cm on 6th July and August and 50x15 cm on 6th August. Each cultivar was represented by 5 m long single row. Equal number of plants were spaced in each row. Data on harvest index were recorded on 5 randomly selected plants for each variety. Data were subjected to stability analysis following Eberhart and Russell (1966).

RESULTS AND DISCUSSION

Pooled analysis for variance (Table 1) showed that mean differences bet-

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ween genotypes and environments were highly significant (P = 0.01). This indicated that there was enough variability amongst the genotypes and environments under study. The mean square values due to genotype environment interaction were also found significant revealing that varieties interacted with the environments. It may also be inferred that both linear and non-linear components were important for harvest index in the present population of black gram.

Mean values on harvest index under three environments and two parameters of stability (bibiand S^2d) for 31 genotypes are given in the table 2. Since, harvest index indicates the stability of plants to mobilize photosynthates to economic parts. general mean observed to the extent of 33.60% reflects that only one third of the total photosynthates were translocated to the development of grains. Harvest index varied widely with the environment and ranged from 29.29% in Env. I (early sowing, normal spacing) to 37.29% in Env. III. (late sowing, more spacing). This indicates that productivity of blackgram increased under late sowing with more spacing. Mean harvest index across environments varied from 26.04% (H-76-9) to 42.74% (H 76.3), reflecting possibility of selecting cultivars rich in harvest index.

Ten genotypes, viz; 4-5-2, H-76-12 H-76-18, JU-1, H-76-13, H-76-7, BP-3, H-76, UG-157 and KMU-1 with significant bi component were considered responsive to favourable environment whereas, three viz; H-76-1, H-76-4 and Pant U-30 with non-significant negative bi tended to responc towards poor environment. Rest of the eighteen genotypes however gave average response.

It may be noted from the data of table 3 that 18 genotypes with non-significant S^2d component were characterized stable whereas rest were unstable under present set of environment. Amongst the stable genotypes eight viz; H-76-12, H-76-1, H-76-7, H-76-15, UG-157, H-76-6, Pant U-30 and KMU-1, with negative non-significant S^2d component were considered stable to poor environment

The cultivars H-76-3, and H-76-5, with maximum harvest index were non-responsive and unstable to environment variations. The third ranking cultivar KMU 3 (41.04%) was, however, non responsive and stable. On the contrary, two genotypes viz; H-76-1 and Pant U-30 looked responsive and stable to poor environment. The poorest cultivar H-76-9 (26.0%) was non responsive and stable.

To conclude, the population under study exhibited wide range of mean performance, responsiveness and stability to harvest index. Three genotypes viz; H-70-3, UMS-3 and H-70-11 characterized with fairly high mean performance and stable under varied environment are placeable on records. These genotypes therefore, can hold great promise in further crop improvement programme.

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Table 1 : Stability analysis of variance for harvest indexin black gram.

Source of variation	D. F.	Mean square
Genotypes	30	51.45**
Environment (L)	2	504-90**
G x E (L)	30	14.29**
G x E	60	13.31**
Pooled deviation	31	10.01**
Pooled error	180	2.06

* Singnificant at 1% level of probability.

TABLE 2. Estimates of stability parameters for the genotypes

Genotype	Mean	bi	S^2di
UG-117	35.2	1.07	41.47*
H76-3	42.7	1.07	32.44*
4-5-2	38 9	2.41*	12.42*
H76-9	26.0	0.93	2.64
H76-12	37.1	1.34*	—0.63
H76-18	28 1	1.26*	9.33*
H76-10	35.5	0.54	34 71*
JU-1	31.7	2.37*	35.32*
Buland shahar local	28.8	1.20	0.44
Pant U-26	34.3	0.71	0.42
UG-152	30.5	0.08	5.16
H70-3	35.3	0.58	0.19
H76-1	35.5	—0 05	—0.67
Culrure-1	34.1	0.94	3.65
H76-13	31.8	1.73*	11.03*
H-76-4	32 5	—0.59	0.33
H76-7	34 1	1.57*	- 0.55
H76-15	32.2	1 20	—0.41
BP-3	27.8	1.28*	8.43
KMU-3	41.0	0.55	0.20
H76-16	34.3	1.43*	7.76*
M_3	26 9	0 71	42.89*
H76-8	31.6	0.69	12.65*
UG-157	29.7	1.79*	-0.58
H76-5	42.4	0 96	8.78*
H76-11	36.6	1:11	2.32
H76-6	34.3	1.17	—0.40
T9	33.7	0.87	5.01
Pant U-30	33 4	—0.29	—0.68
H76-2	31.0	0.90	16.02*
KMU-1	33.2	1.38*	—0.65
Mean	33.6	1.0	—
SEm ±	2.2	0.55	—

* Significant at 5 per cent level of significance