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ASSESSMENT OF GENOTYPE - ENVIRONMENTAL INTERACTIONS FOR SELECTION OF STABLE GENOTYPES IN KODO MILLET

S.K. Billaiya

Tribal Agricultural Research Station Dindori - 481 880 (India)

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ABSTRACT

Nine geographically diverse genotypes of kodo millet were tested in six environments to judge the stability in days to maturity and grain yield. The differences among genotypes and environments were highly significant. DPS 141, DPS 34 and DPS 48 were early in maturity, high yielder, average responsive and stable. GPUK3 and RBK 148 were early average yielder and responsive to stress environment. These genotypes can be used in breeding programme for genetic improvement in grain yield with wider adaptability in kodo millet.

Key words: Genotype, environment and Kodo millet.

Kodo millet (*Paspalum scrobiculatum* L.) is rich source of protein and minerals in diet of tribal and weaker section in Madhya Pradesh. The state is global leader in production of kodo millet. However, the productivity of this crop is far below the exceptation because of its civilization in diverse and extreme agro-ecological conditions. There is thus need to identify the genotypes having stability in performance for general cultivation as well as donor in breeding programme. The present investigation was planned with this objectives and view.

Nine genotypes of diverse origin i.e. Coimbtore, Dindori, Banglore, Pune and Rewa were selected for the present study. These genotypes were evaluated in randomized complete block design with there replications at three diverse location in two subsequent years. In this way, each genotype was tested in six environments. Each genotype was grown in the rows plot of three-meter length. The spacing between and with the row was maintained at 22.5 cm and 7.5 cm, respectively. The fertilizer was applied @ 40:20:0 kg NPK/ha. Observation on grain yield and days to maturity ware recorded. The method of Eberhart and Russell (1996) was used for estimation of stability parameters after satisfying the requirament of homogeneity of error by Bartlet's test. The anaysis was carried out by using statistical package IRRISTAT developed at international Rice Research Institute, Manlila, Phillipines.

The mean square due to genotypes and environment were highly significant for days to maturity and grain yield (Table -1). It revealed the presence of considerable variation among genotypes and environment for both the characters. The mean square due to genotypes x environment regression and deviation from regression were also significant for both the traits (Table -1) It revealed the genetic control of response of genotypes to environment for both the traits, hence satisfying the requirement of stability analysis. Yadav *et al.,* (1996) and Singh *et al.* (1997) have also emphasized the genetic control of response of genotypes and environments for seed yield in kodo millet.

A narrow range of variation between 97.50 to 102.50 days were recorded for days to maturity among tested genotypes (Table –2). The range of regression coefficient was in between 0.846 to 1.211. Similarly, deviation from regression varied from 1.24 to 8.86 for these characters. All the genotypes except PSC 1 were identified as average responsive and stable for days to maturity. PRC 1 was responsive to favourable condition and stable for this trait.

Grain yield was in between 20.64 to

Table -1: Stability analysis of variance for days to maturity and grain yield in kodo millet

Source of variation	d.f.	Days to maturity	Grain yield (q/ha)
Genotypes	8	20.542**	27.604**
Environment	5	819.111**	520.493**
Genotype x environment	40	4.003**	14.441**
G x E regression	8	5.070*	26.101**
Deviation from regression	32	3.736**	11.564**
Pooled Error	108	0.748	2.826

** Significant at P = 0.01

Table -2: Stability parameters for fodder yield and crude protein yield in oat

S.No.	Genotypes	Grain yield (q/ha) $\bar{X}$	bi	S^2di	Days to maturity $\bar{X}$	bi	S^2di
1.	TNAU 43	22.27	1.365	18.28	101.17	0.976	1.24
2.	TNAU 51	20.64	1.417*	2.93	101.83	1.022	8.86
3.	DPS 34	25.74	1.010	9.72	102.50	1.088	2.62
4.	DPS 48	25.40	1.095	19.13	98.33	0.989	5.97
5.	DPS 141	27.23	1.004	5.01	97.83	0.897	2.61
6.	DPS 158	25.61	0.744	7.32	97.50	1.010	1.91
7.	GPUK 3	23.94	0.876*	0.48	99.33	0.962	2.65
8.	PSC 1	22.83	1.056	21.92	100.00	1.211*	1.78
9.	RBK 154	22.22	0.433	7.73	101.50	0.846	2.04
	Mean	23.98	1.00		100.00	1.00	

* Significantly deviate from unity

27.23 q/ha among the tested genotypes. DPS 141 recorded the highest grain yield followed by DPS 34, DPS 158 and DPS 48 (Table –2). The lowest grain yield was noted in TNAU 51. The regression coefficient was in between 0.774 to 1.417. DPS 141, DPS 34 and DPS 48 were high yielder, average responsive and stable for grain yield. GPUK 3 and RBK 154 were found responsive to favourable conditions and stable. These genotypes appeared as promising donors for genetic manipulation in grain yield with stability in kodo millet.

It is concluded from the present study that DPS 141, DPS 34 and DPS 48 were early maturing, high yielder, average responsive and stable. GPUK 3 and RBK 148 were early, average yielder and responsive to stress environment. These genotypes can be used in breeding programme for genetic improvement in grain yield with wider adaptability in kodo millet. The present study further suggests the testing of large number of genotypes over years and locations in order to identify the genotypes with wider adaptability in kodo millet.

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