I J T A
© Serials Publications
National Academy of Agricultural Science (NAAS) Rating : 3.03

Correlation, genetic variability and heritability studies in selected local collections of grass pea (*Lathyrus sativus* L.)

S. R. Kamdi[1], Shubhangi P. Bhasme[2], P. S. Neharkar[3], G. J. Bhagat[4] P. R. Kadu[5] and S. S. Karhale[6]

ABSTRACT: *For assessment variability, heritability and correlation, 26 grass pea local collections were evaluated in Randomised Block design with checks viz., Ratan, Prateek and Mahateora. Seed yield exhibited maximum genotypic variability followed by number of pods per plant. For all the traits, phenotypic coefficients of variations were higher than the genotypic coefficient of variations. The small differences were observed between genotypic and phenotypic variability for all characters except few traits suggesting these characters were less influenced by environments. High value of broad sense heritability was observed for seed yield (71.98%) and day to 50% flowering (54.59%). Moderate range of broad sense heritability was reported in number of pods per plant (39.22%) and 100 seed weight (42.88%). Correlations between traits were investigated that revealed highly positive and significant genotypic, phenotypic and environment correlations were between seed yield with plant height, number of branches per plant, number of pods per plant and 100 seed weight. Plant height showed highly positive and significantly genotypic, phenotypic and environment correlations with number of branches per plant, number of pods per plant and 100 seed weight. Genotypic, phenotypic and environment correlations between number of branches per plant and number of pods per plant and 100 seed weight was highly positive and significant. Similarly, genotypic, phenotypic and environment correlations between number of pods per plant with 100 seed weight was also highly positive and significant.*

Kew word: Lathyrus sativus*(L.)*, *Grasspea, Local collection, Variability and Correlation.*

INTRODUCTION

Grass pea *Lathyrus sativus* (L.) is mainly grown as *utera* crop with paddy in Eastern Vidarbha region on approximately 60,000 ha area but, the yield potential is nearly half as compared to India. The reasons for low productivity may the most of tribal farmers grow low yielding local varieties. However, these local varieties have various desirable characteristics such tolerance to drought, resistant to many pests and disease, early maturity, rich in protein and minerals and also having low β-ODAP (β-N-oxalyl-L-α,β-diaminopropionic acid) content and bold seed size etc.

Seed of grass pea local varieties have been collected from trial farmers of Eastern Vidarbha Zone of Maharashtra and evaluated to estimate variability and correlations between yield and it's contributing characters. The variable population will provide a valuable genetic material to develop genotypes with high seed yield whereas correlation is essential to understand the nature of association of the yield components for agronomic manipulation to achieve goal of the maximum yield. The knowledge of genetic variation is also useful to conserve the valuable genetically variable land races for future.

MATERIAL AND METHOD

For assessment correlation, 26 grass pea local collections were selected from primary yield evaluation conducted 2011-12 and evaluated in Randomised Block design with checks viz., Ratan, Prateek and Mahateora at College of Agriculture, Gadchiroli during 2011-12. Each local collection was grown in a four rows of 4m lengths in three replications. Distance between rows was 30 cm and 10 cm between plants in a row. All the recommended cultural practices and packages were followed to raise a good and healthy crop. In each entry, five

1. 4. and 6. Assistant Professor, 2. Ex- student, College of Agriculture, Nagpur and 3. and 5. Associate professor, College of Agriculture, Gadchiroli, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (Maharashtra).

**Corresponding author E-mail: sandeepkamdi@gmail.com, sandeepkamdi@rediffmail.com*

competitive plants were selected randomly, data recorded on seven quantitative viz., seed yield, pods per plant, plant height, 100 seed weight, days to 50 % flowering and days to maturity. The simple correlations for all characters were calculated and test for significance as per the procedure given by Singh and Chaudhary (1985).

RESULT AND DISCUSSION

Mean Value, Standard Error, Coefficient of Variation and Heritability for seed yield and yield contributing traits of selected local collections of grass pea are presented in table 1. Seed yield exhibited maximum genotypic variability followed by number of pods per plant. Coefficient of genotypic variability was smaller in days to 50% flowering, day to maturity, plant height, number branches per plant and 100 seed weight. For all the traits, phenotypic coefficients of variations were higher than the genotypic coefficient of variations. The small differences were observed between genotypic and phenotypic variability for all characters except plant height, number of branches per plant and number of branches plant suggesting these characters were less influenced by environments. Seed yield, number of branches per plant and number of branches plant showed wide range of phenotypic variation. Coefficients of genotypic and phenotypic variation indicate that there is good scope for yield improvement through selection for seed yield and number of pods per plant. These results confirm the earlier finding of Kumar and Dubey 1996, and Kumar and Dubey, 2001.

High value of broad sense heritability was observed for seed yield (71.98%) and day to 50% flowering (54.59%). Moderate range of broad sense heritability was reported in number of pods per plant (39.22%) and 100 seed weight (42.88 %). Day to maturity (29.71 %), Plant height (19.87 %) and number branches per plant (21.30 %) exhibited lowest range of broad sense heritability. Similar types of results were also confirmed by Kumar and Dubey 1996 and Kumar and Dubey, 2001.

The phenotypic, genotypic and environmental coefficient of correlations between yield and its contributing characters in selected local collections of grass pea are shown in table 2. The result revealed that strong positive and significant correlations were observed for most of the characters. At phenotypic level, coefficient of correlations between traits were investigated that revealed highly positive and significant correlations were between seed yield with plant height, number of branches per plant, number of pods per plant and 100 seed weight. These characters are indicating their major role in determining seed yield of grass pea. Similar observations were reported by Kumar and Dubey (2001) and Basaran *et al.* (2013). Similarly Pandey *et al.* (2000) evaluated 126 accessions of *Lathyrus sativus* L. for yield and its attributes and reported that day to maturity, branches per plant, plant height and pods per plant were positively associated with seed yield per plant. Likewise, Kumar and Dubey (1996) and Kaul *et al.* (1982) reported that seed yield was significantly and positively correlated with number of pods per plant. Similarly, a positive correlation of seed yield with 1000 seed weight was reported by Rybinski *et. al.* (2008). But, seed yield was negatively correlated with days to 50% flowering and days to maturity. Similar finding was reported by Kumar and Dubey in 2001.

Plant height was highly positively and significantly correlated with number of branches per plant, number of pods per plant and 100 seed weight. However, plant height was negatively correlated with days to 50% flowering and days to maturity. Correlation between number of branches per plant and number of pods per plant and 100 seed weight was highly positive and significant. But, number of branches per plant was negatively correlated with days to 50% flowering and days to maturity. Similarly, number of pods per plant was also highly positive and significantly correlated with 100 seed weight and number of pods per plant was negatively correlated with days to 50% flowering and days to maturity. Correlation between days to 50% flowering and days to maturity was highly positive and significant. Kumar and Dubey (2001) studied correlation in yield contributing traits and reported significantly positive correlations of plant height with number of branches per plant, number of pods per plant and 100 seed weight, number of branches with number of pods per plant and 100 seed weight.

At genotypic level, correlations between seed yield with plant height, number of branches per plant, number of pods per plant and 100 seed weight was highly positive and significant. But, seed yield was positively correlated with days to 50% flowering and negatively correlated with days to maturity. Plant height exhibited highly positive and significant correlation with number of branches per plant, number of pods per plant and 100 seed weight. However, plant height was negatively correlated with days to 50% flowering and days to maturity. Number of branches per plant was highly significant and

Table 1
Mean Value, Standard Error, Coefficient of Variation and Heritability for seed yield and yield contributing traits of selected local collections of grass pea

Characters	*Mean ± S. E.*	*C. V.*			*Heritability*
		Genotypic	*Phenotypic*	*Environmental*	
Seed Yield	178.58 ± 17.60	27.36	32.24	17.07	71.98
Days to 50 % flowering	47.06 ± 0.58	2.35	3.18	2.14	54.59
Day to maturity	93.16 ± 0.82	0.99	1.83	1.53	29.71
Plant height	19.30 ± 1.01	4.50	10.09	9.03	19.87
No. branches / plant	7.21 ± 0.57	7.16	15.51	13.76	21.30
No of pods / plant	17.56 ± 1.56	12.34	19.71	15.37	39.22
100 seed weight	5.61 ± 0.14	3.72	5.69	4.30	42.88

Table 2
Genotypic, phenotypic and environmental correlations between yield and its contributing characters in selected local collections of grass pea

	Correlation	*Days to 50 % flowering*	*Day to maturity*	*Plant height*	*No. branches / plant*	*No. of pods / plant*	*100 seed weight*
Seed Yield	GC	0.01	-0.04	0.72**	0.96**	0.97**	0.97**
	PC	-0.14	-0.13	0.68**	0.73**	0.93**	0.89**
	EC	-0.38	-0.26*	0.87**	0.75**	0.93**	0.88**
Days to 50 % flowering	GC		0.98**	-0.06	-0.04	0.09	0.13
	PC		0.91**	-0.16	-0.13	-0.17	-0.11
	EC		0.87**	-0.24*	-0.19	-0.41**	-0.34**
Day to maturity	GC			-0.02	-0.08	0.01	0.06
	PC			-0.10	-0.12	-0.14	-0.08
	EC			-0.12	-0.14	-0.22*	-0.16
Plant height	GC				0.26*	0.61**	0.48**
	PC				0.60**	0.77**	0.70**
	EC				0.68**	0.86**	0.84**
No. branches / plant	GC					0.84**	0.81**
	PC					0.74**	0.73**
	EC					0.72**	0.72**
No. of pods / plant	GC						0.93**
	PC						0.91**
	EC						o.89**

*, **Correlation is significant at the 0.01 and 0.05 level respectively.

positively correlated with number of pods per plant and 100 seed weight but, number of branches per plant was negatively correlated with days to 50% flowering and days to maturity. Similarly, number of pods per plant was also highly positive and significantly correlated with 100 seed weight. Number of pods per plant and 100 seed weight were positively correlated with days to 50% flowering and days to maturity. Correlation between days to 50% flowering and days to maturity was highly positive and significant.

The values of phenotypic and genotypic correlations between traits under investigation were in same direction and magnitude. Thus, it is concluded that phenotypic correlations due to genotypic causes. Similarly, most of genotypic correlations were higher than phenotypic correlations. Similar findings were also reported by Kumar and Dubey 1996 and Kumar and Dubey 2001.

At environmental level, seed yield was highly positively and significantly correlated with plant height, number of branches per plant, number of pods per plant and 100 seed weight was highly positive and significant. But, seed yield showed highly significant and negative correlation with days to 50% flowering and significant and negative correlation days to maturity. Plant height was highly positive and significant correlated with number of branches per plant, number of pods per plant and 100 seed weight. However, plant height was significantly and negatively correlated with days to 50% flowering and negatively correlated with days to maturity. Number of branches per plant was highly significant and positively correlated with number of pods per plant and 100 seed weight but, number of branches per plant was negatively correlated with days to 50% flowering and days to maturity. Similarly, number of pods per plant was also highly positive and

significantly correlated with 100 seed weight and number of pods per plant was highly significant and negatively correlated with days to 50% flowering and significant and negatively correlated with days to maturity. Correlation between days to 50% flowering and days to maturity was highly positive and significant. 100 seed weight was highly significant and negatively correlated with days to 50% flowering and negatively correlated with days to maturity. Thus, significant environmental correlations between traits under investigation suggested that their associations are subjected environmental fluctuations.

In present study, highly positive and significant correlations observed between seed yield and other traits would be favorable to breeders for their simultaneous genetic improvement. Similar seed yield exhibited high heritability should be taken into consideration during selection for higher yield in grass pea.

REFERENCES

Basaran Ugur, Zeki Acar, Meral Karacan and Atiye Nur Onar (2013), Variation and correlation of morpho-agronomic traits and biochemical content (protein and B-ODAP) in Turkish grass pea (*Lathyrus sativus* L.) landraces. *Turkish Journal of Field Crops*, 18(2): 166-173.

Kaul A. K., Islam M.Q., Begam K., (1982), Variability for various agronomic characters and neurotoxin content in some cultivars of keshari (*Lathyrus sativus* L.) in Bangladesh. *Bangladesh Journal of Botany,* 11: 158-167.

Kumar Sushil and Dubey D. K., (1996), Variability and correlation studies in grass pea (*Lathyrus sativus* L.). *FABIS Newletter,* 38/39: 26-30.

Kumar Sushil and Dubey D. K., (2001), Variability, heritability and correlation studies in grass pea (*Lathyrus sativus* L.). *Lathyrus Lathyrism Newletter,* 2:79-81.

Pandey R.L, Geda A.K. and Chandrakar H.K. (2000), Evaluation of lathyrus varieties for grain yield and ODAP content. Annual Progress Report PP 4-5.

Rybinski W., Szot B. and Rusinek R. (2008), Estimation of morphological traits and mechanical properties of grass pea seed (*Lathyrus sativus* L.) originating from EU countries. *International Agrophysics,* 22: 261-275.

Singh R. K. and Chaudhary B. D. (1985), Biometrical methods in quantitative genetic analysis. *Kalyani Publication, New Delhi*, PP:7-8.