

Variability studies in local collections of grasspea (*Lathyrus sativus* L.) of Eastern Vidarbha Zone of Maharashtra, India

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ABSTRACT: Variability is basis for any crop improvement programme. For assessment of variability, hundred grass pea local collections were collected from the tribal farmers of Eastern Vidarbha Zone (Gadchiroli, Chandrapur, Gondia, Bhandara and Nagpur) of Maharashtra, India and evaluated in augmented design for yield and its contributing characters along with checks viz., Ratan, Prateek and Mahateora at College of Agriculture, Gadchiroli during 2011-12. Local collection showed significant variation for yield per plant (1.68 to 3.89 g), pods per plant (13 to 26), height of plant (24.4 to 34.7), 100 seed weight (6.36 to 9.66), number of branches per plant (4.7 to 7.4), days to flowering (53 to 64) and days to maturity (88 to 99). Five local collections were significantly superior over all checks for yield per plant. Similarly, 13 local collections for pods per plant and 14 local collections for number of branches per plant were significantly superior over all checks.

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

INTRODUCTION

Presently *Lathyrus* is third important legume after chickpea and pigeon pea, predominantly grown in India, Bangladesh, Nepal, Pakistan, Ethiopia and Syria. It is an annual legume crop with high protein content and used as food, feed and forage crop. It is resistance to many diseases and pests compared other legume. It can be grown in nearly all type of soils as well as adverse climatic conditions and low in put environment. Despite its superior properties, use of grass pea has been restricted by the presence of anti nutritional factors particularly of the neurotoxic β -N-oxalyl-L- α,β -diaminopropionic acid (β -ODAP) causes neurolathyrism.

Due to its superior properties, low water and inputs requirement, it is mainly grown in dry areas and relay cropping or *utera* system of cropping with paddy. Under these conditions, farmers give more emphasis for its fodder and consider grain yield as bonus (Pandey *et al.* 1995). For increasing seed yield with low toxicity and fodder yield, it is necessary to focus breeding programme on getting genotypes with high seed yield along with low toxicity and more fodder yield. To start breeding programme, there is need of genetical variable populations. Hence, in

present investigation seed of grass pea local varieties have been collected from the triable farmers of Eastern Vidarbha region and evaluated to estimate variability. In addition to above the knowledge of genetic variation is also useful tool in gene bank management, helping in the establishment of core collections, facilitating efficient sampling and utilization of germplasm (identifying and/or eliminating duplicates in the gene stock).

MATERIAL AND METHOD

Variability is basis for any crop improvement programme. For assessment of variability, hundred grass pea local collections were collected from the tribal farmers of Eastern Vidarbha Zone (Gadchiroli, Chandrapur, Gondia, Bhandara and Nagpur) of Maharashtra India. District wise collection of local collections is given table 1. All local collections were evaluated in augmented design along with checks viz., Ratan, Prateek and Mahateora at College of Agriculture, Gadchiroli during 2011-12. Each local collection within the block was grown in a four rows of 4m lengths. 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

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competitive plants were selected randomly, data recorded on seven quantitative viz., seed yield per plant, pods per plant, plant height, 100 seed weight, days to 50 % flowering and days to maturity. Data were statistical analysed as per augmented design II (Sharma 1998).

Table 1
District Wise Collection of Seed of Local Varieties from Tribal Farmers of Eastern Vidarbha Zone

SN.	District	No. of germplasm lines collected
1.	Gadchiroli	64
2.	Chandrapur	10
3.	Bhandara	16
4.	Gondia	10
5.	Nagpur	—

RESULT AND DISCUSSION

Mean, standard error and range of variation estimated for each trait in local collection are shown in table 2 and Mean value for seed yield and its contributing characters in local collections of grass pea is given table 3. Result showed that local collections showed highly significant variation for all traits under investigation. The highest coefficient of variability was observed in seed yield per plant (19.93) which was followed by pod per plant (16.76) and number of branches per plant (13.37). High coefficient of variability for these traits has been previously reported by (Kumar and Dubey 2001). Grass pea is cultivated for many purposes but main objective of it's cultivation is seed. Improvement in seed yield is important objective grass pea breeding programme. Variation for seed yield should be present. In present investigation, variation for seed yield per plant ranged from 1.68 to 3.89 g with mean value 2.58 g. Earlier, variation for seed yield was reported between 0.5 to 19.7 g by Pandey *et. al.* (1997) for 100 lines of Indian grass pea whereas it was between 7.20 and 21.19 g for 32 lines (Ribinski *et. al.* 2008). Basaran *et. al.* (2013) observed 4.58 to 15.59 g seed yield per plant

in for 52 lines of Turkish grass pea. Pods per plant were 13 to 26 showing mean value of 18.22. A range of 6.52 and 46.80 was observed by Kumar and Dubey (2001) for pods per plant whereas Pandey *et. al.* (1997) reported 7 to 257 pods per plant and Basaran *et. al.* (2013) observed 14.40 to 45.00 pods per plant with mean of 26.94.

Height of plant showed variation ranging from 24.4 to 34.7 cm with mean value 31.33 cm. In earlier studies, variation for plant height was between 31.4 and 67.4 cm (Ribinski *et. al.* 2008) and 30.14 and 56.00 with mean of 37.43 (Basaran *et. al.* 2013). Hundred seed weight was more variable, ranging from 6.36 to 9.66 g and showed mean value of 7.49. Variability for seed weight was observed by various researchers. Variations for 1000 seed weight of European genotypes of grass pea were ranged from 120 to 660g (Grela *et. al.* 2010) for 31 accessions and 87 to 510 g with mean of 271 g for 32 accessions (Ribinski *et. al.* 2008). The range for 1000 seed weight was reported by Basaran *et. al.* (2013) from 79.93 to 152.3 g. Joshi (1997) observed that 1000 seed weight varied from 27 to 65 g for the lines from Nepal. The range for number of branches per plant was 4.7 to 7.4 exhibiting mean value of 6.08. Kumar and Dubey (2001) observed up to 40 numbers of branches in plant. Range of this trait was 4.00 to 6.46 reported by Ribinski *et. al.* (2008) and 6.10 to 13.00 reported by Basaran *et. al.* (2013). Variation for days to 50% flowering ranged from 53 to 64 with mean value 60 and for days to maturity ranged from 88 to 99 with mean value 94.12. Number of the days to flowering was 58 to 66 observed by (Grela *et. al.* 2010) from 104 to 129 days in 24 Indian genotypes by Kumari 2001.

Local collections namely CAGL-10, CAGL-65, CAGL-73, CAGL-74 and CAGL-61 were significantly superior over all checks for yield per plant. For pods per plant, 13 local collections (CAGL-10, CAGL-11, CAGL-17, CAGL-42, CAGL-61, CAGL-62, CAGL-64, CAGL-65, CAGL-68, CAGL-73, CAGL-74, CAGL-75 and CAGL-76) were found to be significantly superior

Table 2
Mean Value, Standard Error, Coefficient of Variation and Range for Seed Yield and its Contributing Characters in Local Collections of Grass Pea

	Mean	Standard error	C. V.	Range	
				Min.	Max.
Seed yield per plant (g)	2.58	0.29	19.93	1.68	3.89
Pods per plant	18.22	1.94	16.76	13.00	26.00
Plant height (cm)	31.33	3.36	5.34	24.4	34.7
100 seed weight (g)	7.49	0.89	7.52	6.36	9.66
Number of branches / plant	6.08	0.96	13.37	4.7	7.4
Days to 50 % flowering	60.00	3.52	4.89	53	64
Days to maturity	94.12	2.46	2.52	88	99

Table 3
Mean Value for Seed Yield and its Contributing Characters in Local Collections of Grass Pea

S. N.	Local collections	Seed Yield / plant (g)	Pods/ plant	Plant height (cm)	100 seed weight (g)	Number of branches/ plant	Days to 50% flowering	Days to maturity
1.	CAGL-1	2.10	15.8	30.4	8.06	5.4	64.1	98.13
2.	CAGL-2	2.27	16.8	32.5	7.70	7.4	63.1	96.13
3.	CAGL-3	2.48	17.8	34.7	9.30	7.4	63.1	97.13
4.	CAGL-4	2.41	17.8	32.0	9.63	7.4	62.1	96.13
5.	CAGL-5	2.74	18.8	31.5	7.86	7.4	63.1	97.13
6.	CAGL-6	2.71	17.8	31.0	8.10	7.4	63.1	96.13
7.	CAGL-7	2.58	17.8	31.1	7.86	6.4	63.1	95.13
8.	CAGL-8	2.72	16.8	30.9	8.46	7.4	63.1	96.13
9.	CAGL-9	2.52	16.8	31.9	8.38	5.4	64.1	97.13
10.	CAGL-10	3.89	25.8	32.7	8.50	7.4	61.1	94.13
11.	CAGL-11	3.06	22.8	32.5	8.86	6.4	64.1	96.13
12.	CAGL-12	2.87	20.8	33.1	7.68	7.4	61.1	94.13
13.	CAGL-13	2.73	19.8	32.5	7.78	7.4	62.1	95.13
14.	CAGL-14	2.53	16.8	31.1	7.70	7.4	60.1	92.13
15.	CAGL-15	2.84	18.8	33.5	8.06	7.4	63.1	96.13
16.	CAGL-16	2.49	16.8	31.5	8.70	7.4	63.1	93.13
17.	CAGL-17	3.49	23.8	34.0	9.66	6.4	62.1	95.13
18.	CAGL-18	2.38	16.8	29.7	7.62	6.4	64.1	99.13
19.	CAGL-19	3.00	21.8	33.0	7.78	6.4	62.1	95.13
20.	CAGL-20	2.77	18.8	33.2	7.74	7.4	62.1	96.13
21.	CAGL-21	1.92	14.1	32.3	7.27	5.4	62.8	96.13
22.	CAGL-22	1.91	16.1	33.1	7.31	5.4	62.8	95.13
23.	CAGL-23	1.99	15.1	32.9	7.19	6.4	62.8	97.13
24.	CAGL-24	1.81	13.1	31.0	7.13	5.4	63.8	97.13
25.	CAGL-25	2.05	15.1	32.3	7.17	6.4	62.8	96.13
26.	CAGL-26	2.01	15.1	28.5	7.18	5.4	63.8	99.13
27.	CAGL-27	1.93	16.1	30.0	7.17	6.4	63.8	97.13
28.	CAGL-28	2.13	16.1	31.1	7.67	5.4	62.8	95.13
29.	CAGL-29	2.36	19.1	30.5	7.91	6.4	63.8	96.13
30.	CAGL-30	2.20	18.1	32.5	7.55	6.4	63.8	97.13
31.	CAGL-31	2.20	17.1	29.9	7.61	6.4	63.8	97.13
32.	CAGL-32	2.35	18.1	32.9	7.39	5.4	62.8	96.13
33.	CAGL-33	2.47	18.1	31.9	7.17	6.4	62.8	94.13
34.	CAGL-34	2.34	17.1	30.7	7.35	7.4	62.8	96.13
35.	CAGL-35	2.28	17.1	30.4	7.20	6.4	61.8	94.13
36.	CAGL-36	2.65	18.1	32.5	7.40	7.4	62.8	96.13
37.	CAGL-37	1.75	13.1	34.7	7.47	6.4	62.8	96.13
38.	CAGL-38	1.94	15.1	32.0	7.39	5.4	63.8	98.13
39.	CAGL-39	2.49	16.1	31.5	7.15	6.4	61.8	95.13
40.	CAGL-40	2.17	16.1	31.0	7.27	6.4	63.8	99.13
41.	CAGL-41	1.78	13.1	31.1	6.52	5.4	58.8	93.47
42.	CAGL-42	3.40	23.1	30.9	7.03	5.4	58.8	93.47
43.	CAGL-43	3.36	21.1	31.9	6.87	5.4	58.8	92.47
44.	CAGL-44	3.28	20.1	32.7	7.79	5.4	56.8	90.47
45.	CAGL-45	2.71	17.1	32.5	6.59	5.4	57.8	92.47
46.	CAGL-46	2.66	16.1	33.1	7.87	5.4	58.8	93.47
47.	CAGL-47	2.03	14.1	32.5	6.47	5.4	57.8	93.47
48.	CAGL-48	3.30	20.1	31.1	7.07	6.4	57.8	92.47
49.	CAGL-49	2.45	18.1	33.5	6.36	5.4	57.8	91.47
50.	CAGL-50	2.93	20.1	31.5	6.83	5.4	58.8	93.47
51.	CAGL-51	2.36	16.1	34.0	7.31	5.4	58.8	94.47
52.	CAGL-52	2.23	14.1	29.7	7.51	6.4	58.8	93.47
53.	CAGL-53	2.70	16.1	33.0	6.75	5.4	57.8	91.47
54.	CAGL-54	3.06	20.1	33.2	7.51	5.4	56.8	92.47
55.	CAGL-55	2.39	17.1	32.3	6.71	6.4	56.8	91.47
56.	CAGL-56	2.47	18.1	33.1	6.37	6.4	55.8	90.47
57.	CAGL-57	2.50	18.1	32.9	7.83	6.4	58.8	94.47

contd. table 3

S. N.	Local collections	Seed Yield / plant (g)	Pods/ plant	Plant height (cm)	100 seed weight (g)	Number of branches/ plant	Days to 50% flowering	Days to maturity
58.	CAGL-58	2.25	16.1	31.0	7.35	5.4	54.8	89.47
59.	CAGL-59	2.22	15.1	32.3	6.75	6.4	55.8	90.47
60.	CAGL-60	2.49	17.1	28.5	6.47	6.4	55.8	89.47
61.	CAGL-61	3.86	26.1	30.0	7.84	7.1	54.8	90.80
62.	CAGL-62	3.14	24.1	31.1	7.18	7.1	56.8	91.80
63.	CAGL-63	2.92	22.1	30.5	7.08	6.1	55.8	91.80
64.	CAGL-64	3.10	24.1	32.5	7.06	6.1	57.8	93.80
65.	CAGL-65	3.67	24.1	29.9	7.36	6.1	54.8	89.80
66.	CAGL-66	2.38	17.1	32.9	7.02	5.1	53.8	89.80
67.	CAGL-67	2.51	18.1	31.9	7.18	6.1	54.8	89.80
68.	CAGL-68	3.15	23.1	30.7	8.34	5.1	52.8	87.80
69.	CAGL-69	2.54	19.1	31.5	7.14	5.1	55.8	91.80
70.	CAGL-70	2.95	19.1	32.5	7.36	6.1	57.8	92.80
71.	CAGL-71	2.07	16.1	35.3	7.58	6.1	57.8	92.80
72.	CAGL-72	2.47	17.1	31.3	7.58	5.1	56.8	92.80
73.	CAGL-73	3.62	24.1	33.5	7.38	6.1	54.8	90.80
74.	CAGL-74	3.65	24.1	33.7	7.46	6.1	57.8	92.80
75.	CAGL-75	3.38	23.1	32.7	7.34	7.1	57.8	93.80
76.	CAGL-76	3.18	24.1	32.9	7.10	6.1	56.8	91.80
77.	CAGL-77	2.20	16.1	31.5	7.16	7.1	56.8	90.80
78.	CAGL-78	1.98	15.1	30.9	7.10	6.1	56.8	91.80
79.	CAGL-79	2.14	16.1	31.1	7.06	5.1	55.8	91.80
80.	CAGL-80	1.91	15.1	30.4	7.02	6.1	56.8	92.80
81.	CAGL-81	2.07	15.8	30.1	7.25	4.7	61.5	95.47
82.	CAGL-82	2.37	18.8	29.3	7.37	5.7	61.5	94.47
83.	CAGL-83	2.42	17.8	29.3	7.78	6.7	60.5	94.47
84.	CAGL-84	2.83	19.8	31.5	7.86	4.7	60.5	95.47
85.	CAGL-85	2.65	18.8	30.3	7.42	6.7	60.5	94.47
86.	CAGL-86	2.97	21.8	30.7	7.58	5.7	60.5	94.47
87.	CAGL-87	2.45	17.8	29.9	7.18	6.7	60.5	93.47
88.	CAGL-88	3.48	21.8	30.1	7.26	4.7	60.5	94.47
89.	CAGL-89	2.74	18.8	30.1	7.28	5.7	59.5	92.47
90.	CAGL-90	2.65	18.8	30.1	7.46	4.7	60.5	95.47
91.	CAGL-91	2.77	19.8	28.9	7.70	6.7	61.5	95.47
92.	CAGL-92	2.78	19.8	28.9	7.46	5.7	60.5	95.47
93.	CAGL-93	3.46	18.8	29.5	7.34	5.7	59.5	92.47
94.	CAGL-94	3.42	21.8	30.3	7.66	6.7	59.5	94.47
95.	CAGL-95	1.97	14.8	29.6	7.54	4.7	62.5	96.47
96.	CAGL-96	2.58	18.8	29.5	8.30	5.7	58.5	93.47
97.	CAGL-97	1.82	14.8	28.1	7.54	5.7	59.5	94.47
98.	CAGL-98	1.94	14.8	29.1	7.26	6.7	59.5	93.47
99.	CAGL-99	1.89	13.8	27.4	7.14	4.7	60.5	95.47
100.	CAGL-100	1.68	11.8	27.8	7.34	4.7	62.5	97.47
101.	Ratan	2.86	18.2	28.4	7.87	5.2	60.4	93.20
102.	Pratik	2.77	17.8	28.2	7.77	5.0	59.6	93.60
103.	Mahateora	2.73	17.4	27.6	7.81	5.0	59.4	93.60

over checks. Similarly, 14 local collections viz., CAGL-2, CAGL-3, CAGL-4, CAGL-5, CAGL-6, CAGL-10, CAGL-12, CAGL-13, CAGL-14, CAGL-15, CAGL-16, CAGL-20, CAGL-34 and CAGL-36 were observed to be significantly superior for number of branches per plant over all checks. None of local collections were found to be significantly superior over all checks for height of plant, hundred seed weight, days to 50% flowering and days to maturity.

In the present investigation, high amount variability observed in most of the characters of local collections suggesting the existence of genetic variability in local collections of Eastern Vidarbha Zone. This genetic variability may provide a valuable genetic material to develop genotypes with high seed yield along with low toxicity and more fodder yield.

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