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MORPHOLOGICAL CHARACTERIZATION OF MUTANT POPULATION OF LATHYRUS (*LATHYRUS SATIVUS* L.)

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ABSTRACT

Thirty three genotypes of grass pea (*Lathyrus Sativus* L.) were characterized during *Rabi*, 2023-24 at Research cum Instructional Farm, Department of genetics and Plant Breeding, IGKV, Raipur, Chhattisgarh, for morphological characters *viz.,* Epicotyl and hypocotyl colour, seedling vigour, plant growth rates, plant growth habit, plant type, nodes per plant, internode length, stem wing width, stem waxy, stem section shape, branch arrangement, anthocyanin in leaf, leaf type, numbers of leaflet per leaf, leaf colour, prominence on leaf vein, leaf size, leaflet shape, leaf petiole colour, leaf tendrils, top and lower leaves petiole end, leaf pubescence, leaf scale type, flower size and flower bud size, number of leaflet per leaf, flower colour, flower vein colour, calyx colour, number of pods per peduncle, pod curvature, pod shape, seed shape, seed coat colour, seed size, seed coat surface, seed coat pattern, seed eye width, cotyledon colour as per descriptor of *Lathyrus* germplasm characterization. Variability was observed for all morphological characters studied but for trait prominence on leaf vein and leaf pubescence all genotypes have prominence of leaf vein and absence of leaf pubescence. The results help in protection of genotypes besides aiding for further utilization, with some repetition to produce variability in mutant population of lathyrus.

***Keywords*:** Characterization, Descriptor, Mutant population, Grass pea.

Introduction

Grass pea (*Lathyrus Sativus* L.) is a grain legume crop that is self-pollinated and has chromosomal number 2n=14. It is member of fabacece family. The grasspea is potentially an extremely valuable pulse crop. It is a quick maturing annual which is agronomically undemanding and is tolerant of both drought and water logging. It is well adapted to production in the cool season (winter) of warm temperate and subtropical areas. The descriptor for *Lathyrus* are mainly based on diversity observed for three most important useful and widely cultivated species of genus Lathyrus: *L. sativus, L. cicero* and *L. orchus*, all cool season species propagating themselves by seed. (Smartt *et al*., 1994). However, these descriptors also can be used for other *Lathyrus* species. Inspite of the benefits, it is viewed as an orphan crop. The need of increasing the utilization of genetic resources to enhance the productivity of the crop has long been well recognized. Further scope of crop improvement depends on the conserved use of genetic variability and diversity in plant breeding programmes. The concept of DUS was fundamental to the characterization of variety as a unique creation (Sahu *et al*., 2018). The foremost objective of this study was a phenotypic characterization of lathyrus genotypes based on the DUS descriptors for various morphological characters. (Pandey, 2000) Hence an attempt has been made in present investigation to characterize thirty-three genotypes for morphological characters.

Materials and Methods

Thirty-three mutant genotypes including two national checks (Mahateora and Prateek) of grass pea were sown, in randomized block design with two replications at (21o16'N latitude and 81o36'N longitude and 298.56 m above MSL) Research cum Instructional Farm, Department of genetics and Plant Breeding, IGKV, Raipur, Chhattisgarh, during *Rabi*, 2023-24. Each genotype was represented by six rows of four-meter length in each replication with a spacing of 4 cm. between rows and 40 cm within row. Morphological characters were recorded as per descriptor of *Lathyrus* germplasm characterization (IPGRI, Rome 2000). The qualitative characters were recorded as visual assessment by a single observation of group of plants and part of plants (VG) or individual plants (VS). The quantitative characters were measured by a single observation of group of plants (MG) or single plants or parts (MS). Epicotyl colouration (EC) and Hypocotyl colouration (HC) was grouped as green purple (3), light green (1) and green (2). Seedling vigour was grouped aes poor (3), intermediate (5) and vigourous (7). Plant growth rate-I (PGR-I) and Plant growth rate-II (PGR-II) was grouped as high (7), medium (5) and low (3). Plant type was grouped as indeterminate (1) and determinate (2). Nodes per plant (N/P) was grouped as many (7) and medium (5). Internode length (IL) was grouped as long (7), medium (5) and small (3). Stem colour coating (SCC) was grouped as light green (1) or green (2). Stem wing width (SWW) was grouped as medium (5), narrow (7), wide (3). Stem waxy (SW) was grouped as absent (0) and present (1). Stem section shape (SSS) was grouped as square (2) or round (1). Branch arrangement (BA) was grouped as for mainly on lower part (2) and mainly on middle part (3). Anthocyanin colouration (AH) was grouped as absent (0) or present (1). Leaf type (LT) was grouped as bipinnate (4) or multipennate (5). Number of leaflets per leaf was grouped as two pair (2) or one pair (1). Leaf colour (LC) was grouped as dark green (3) or green (2). Prominence of leaf vein (PLV) was grouped as for No (0) and for Yes (1). Leaf size (LS) was grouped as large (7), medium (5), small (3). Leaflet shape (LLS) was grouped as ovate-lanceolate (3), lanceolate (2), linear (1). Leaf petiole colour (LPC) was grouped as green (1), purple green (2). Leaf tendrils (LT) was grouped as short (1), medium (2), long (3). Top leaves petiole end (TLPE) was grouped as tendril compound (3), tendril simple (2). Lower leaves petiole end (LLPE) was grouped as tendril simple (2), tendril subulate (3). Leaf pubescence (LP) was grouped as absent (0) and present (1). Leaf scale type (LST) was grouped as linear (2) or subulate (1). Flower bud size (FBS) was grouped as globular (1) or intermediate (2). Flower size (FS) was grouped as small (1) or medium (2). Number of leaflets per leaf (NLL) was grouped as two pair (2) or one pair (1). Flower colour (FC) was grouped as pink (7), blue (3), white (1), white blue (2). Flower vein colour (FVC) was grouped as Violet (3) or Grey (2). Calyx colour (CC) was grouped as green-purple (2), green (3). Number of pods per peduncle (NPPP) was grouped one (1), two (2), three (3). Pod curvature (PC) was grouped as straight (1) or slightly curved (2). Pod shape (PS) was grouped as broad linear (5), broad elliptical (6). Seed shape (SS) was grouped as rhomboid (3), triangular (2). Seed coat colour (SCC) was grouped as grey mottled (9), grey white (1). Seed size (SS) was grouped as small (1), medium (2). Seed coat surface (SCS) was grouped as smooth (1), tubercular (2). Seed coat pattern (SCP) was grouped as marbled (1), dotted (2). Seed eye width (SEW) was grouped as narrow (3), medium (5). Cotyledon colour (CC) was grouped as yellow (1) or orange (2).

Results and Discussion

Relative and absolute frequency percentages were observed for each trait and details of descriptor values were given in Table 1 and Fig. 1; Table 2; and Table 3, respectively. In order to find distinctiveness among genotypes both qualitative and quantitative characters were used for evaluation. Qualitative traits were considered as morphological markers in the identification of genotypes because they are less influenced by the environment. Morphological traits were important for varietal description. No plant of any genotype studied showed a deviation to characteristics from the mentioned morphological characters. Variability was observed for all morphological characters studied but leaf veins were not prominent in all genotypes and pigmentation on leaf was not found in any genotypes. For epicotyl and hypocotyl colouration green purple colour was present in 2 genotypes (6.06%), light green colour was present in 22 genotypes (66.66%) and green colour was present in 9 genotypes (27.27%). Seedling vigour was poor in 8 genotypes (24.24%), intermediate in 14 genotypes (42.42%) and vigorous in 11 genotypes (33.33%). Plant growth rate I and Plant growth rate II was high in 17 genotypes (51.51%), medium in 10 genotypes (30.30%) and low in 6 genotypes (18.18%). Plant growth habit was prostrate in 5 genotypes (15.15%),

semi-erect in 14 genotypes (42.42%) and spreading in 14 genotypes (42.42%). Plant type was indeterminate in 8 genotypes (24.24%), determinate in 25 genotypes (75.75%). Nodes per plant were many in 12 genotypes (36.36%), medium in 21 genotypes (63.63%). Internode length was long in 8 genotypes (24.24%), medium in 13 genotypes (39.39%) and small in 12 genotypes (36.36%). Stem colour coating was light green in 19 genotypes (57.57%), green in 14 genotypes (42.42%). Stem wing width was medium in 7 genotypes (21.21%), narrow in 16 genotypes (48.48%), and wide in 10 genotypes (30.30%). Stem waxiness was absent in all 33 genotypes (100%). Stem section shape was square in 24 genotypes (72.27%), round in 9 genotypes (27.27%). Branch arrangement was mainly on lower part in 19 genotypes (57.57%) and branch arrangement on middle part was in 14 genotypes (42.42%). Anthocyanin in leaf was absent in 24 genotypes (72.72%) and present in 9 genotypes (27.27%). Leaf type was bipinnate in 16 genotypes (48.48%) and multipennate in 17 genotypes (51.51%). Number of leaflets per leaf was two paired in 4 genotypes (12.12%), one paired in 29 genotypes (87.87%). Leaf colour was dark green coloured in 21 genotypes (63.63%), green coloured in 12 genotypes (36.36%). Prominence on leaf vein was absent in all 33 genotypes (100%). Leaf size was large in 9 genotypes (27.27%), medium in 11 genotypes (33.33%) and small in 13 genotypes (39.39%). Leaflet shape was ovate-lanceolate in 13 genotypes (39.39%), lanceolate in 8 genotypes (24.24%) and linear in 12 genotypes (36.36%). Leaf petiole colour was green in 29 genotypes (87.87%), purple green in 4 genotypes (12.12%). Leaf tendrils was short in 3 genotypes (9.09%), medium in 23 genotypes (69.69%) and long in 7 genotypes (21.21%). Top leaves petiole end was tendril compound in 26 genotypes (78.78%) and 7 genotypes (21.21%) was in tendril simple. Lower leaves petiole end was tendril simple in 28 genotypes (84.84%) and tendril subulate in 5 genotypes (15.15%). Leaf pubescence was absent in all 33 genotypes (100%). Leaf scale type was linear in 21 genotypes (63.63%), subulate in 12 genotypes (36.36%). Flower bud size was globular in 28 genotypes (84.84%) and intermediate in 5 genotypes (15.15%). Flower size was small in size in 6 genotypes (18.18%), medium in size in 27 genotypes (81.81%). Number of leaflets per leaf was two paired in 4 genotypes (12.12%), one paired in 29 genotypes (87.87%). Flower colour was pink in 14 genotypes (42.42%), blue in 7 genotypes (21.21%), white in 10 genotypes (30.30%), white-blue in 2 genotypes (6.06%). Flower vein colour was violet in 21 genotypes (63.63%), 12 genotypes were in grey colour (36.36%). Calyx colour was green-purple in 11 genotypes (33.33%), green in 22 genotypes (66.66%). Number of pods per peduncle was one in 13 genotypes (39.39%), two in 11 genotypes (33.33%), three in 9 genotypes (27.27%). Pod curvature was straight in 22 genotypes (66.66%) and slightly curved in 11 genotypes (33.33%). Pod shape was broad linear in 18 genotypes (54.54%), broad elliptical in 15 genotypes (45.45%). Seed shape was rhomboid in 19 genotypes (57.57%) and triangular in 14 genotypes (42.42%). Seed coat colour was grey mottled in 25 genotypes (75.75%) and grey white coloured in 8 genotypes (24.24%). Seed size was small in 10 genotypes (30.30%) and medium in 23 genotypes (69.69%). Seed coat surface was smooth in 13 genotypes (39.39%) and tubercular in 20 genotypes (60.60%). Seed coat pattern was marbled in 13 genotypes (39.39%) and dotted in 20 genotypes (60.60%). Seed eye width was narrow in 23 genotypes (69.69%), medium in 10 genotypes (30.30%). Cotyledon colour was yellow in 16 genotypes (48.48%), orange in 17 genotypes (51.51%).

The present study indicates that among the characters, prominence on leaf vein, stem waxiness and leaf pubescence were showing most stable and uniform identification, prominence of leaf vein was absent in all genotypes, stem waxiness was absent in all genotypes and leaf pubescence was absent in all thirty-three genotypes; it was in accordance with results are shown by Sahu *et al.* (2022) during characterization of forty-four local lathyrus genotypes.

Selection of mutant genotypes with diverse trait might result in a higher magnitude of heterosis or the possibility of recovering transgressive segregants for certain traits. Vedna and Prasad (2001). Wide variations were observed for most of the characters observed in M_6 mutant population; by the result of mutagenesis. These traits can also be used in identifying traits during crossing and varietal developmental programme in lathyrus.

Table 1 : Frequency of descriptor scores in 33 genotypes of *Lathyrus sativus* L. for different morphological characters.

S No.	Character	Descriptor score									
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0**
1	EC	22	9	2	-	-	-	-	-	-	-
2	HC	22	9	2	-	-	-	-	-	-	-
3	SV	-	-	8	-	14	-	11	-	-	-
4	PGR-I	-	-	6	-	10	-	17	-	-	-
5	PGR-II	-	-	6	-	10	-	17	-	-	-
6	PGH	5	14	14	-	-	-	-	-	-	-
7	PT	8	25	-	-	-	-	-	-	-	-
8	N/P	-	-	-	-	21	-	12	-	-	-
9	IL	-	-	12	-	13	-	8	-	-	-
10	SCC	19	14	-	-	-	-	-	-	-	-
11	SWW	-	-	10	-	7	-	16	-	-	-
12	SW	-	-	-	-	-	-	-	-	-	33
13	SSC	9	24	-	-	-	-	-	-	-	-
14	BA	-	19	14	-	-	-	-	-	-	-
15	AL	9	-	-	-	-	-	-	-	-	24
16	LT	-	-	-	16	17	-	-	-	-	-
17	NLL	29	4	-	-	-	-	-	-	-	-
18	LC	-	12	21	-	-	-	-	-	-	-
19	PLV	-	-	-	-	-	-	-	-	-	33
20	LS	-	-	13	-	11	-	-	-	9	-
21	LLS	12	8	13	-	-	-	-	-	-	-
22	LPC	29	4	-	-	-	-	-	-	-	-
23	LTD	3	23	7	-	-	-	-	-	-	-
24	TLPE	-	7	26	-	-	-	-	-	-	-
25	LLPE	-	5	28	-	-	-	-	-	-	-
26	LP	-	-	-	-	-	-	-	-	-	33
27	LST	12	21	-	-	-	-	-	-	-	-
28	FBS	28	5	-	-	-	-	-	-	-	-
29	FS	6	27	-	-	-	-	-	-	-	-
30	NLL	29	4	-	-	-	-	-	-	-	-
31	FC	10	2	7	-	-	-	14	-	-	-
32	FVC	-	12	21	-	-	-	-	-	-	-
33	CC	-	11	22	-	-	-	-	-	-	-
34	NPPP	13	11	9	-	-	-	-	-	-	-
35	PC	22	11	-	-	-	-	-	-	-	-
36	PS	-	-	-	-	18	15	-	-	-	-
37	SS	-	14	19	-	-	-	-	-	-	-
38	SCC	8	-	-	-	-	-	-	-	25	-
39	SS	10	23	-	-	-	-	-	-	-	-
40	SCS	13	20	-	-	-	-	-	-	-	-
41	SCP	13	20	-	-	-	-	-	-	-	-
42	SEW	-	-	23	-	10	-	-	-	-	-
43	CC	16	17	-	-	-	-	-	-	-	-

*EC : Epicotyl colour (1= Light Green, 2= Green, 3= Green-Purple); HC : Hypocotyl (1= Light Green, 2= Green, 3= Green-Purple); SV : Seedling Vigour (3= Poor, 5= Intermediate, 7= Vigorous); PGR-I : Plant Growth Rate-I (3= Low, 5=Medium, 7= High); PGR-II: Plant Growth Rate-II (3= Low, 5=Medium, 7= High); PGH: Plant Growth Habit(1= Prostrate, 2= Spreading, 3= Semi-erect); PH: Plant type (1= Indeterminate, 2=Determinate); N/S: Nodes/Plant (5= Medium, 7= Many); IL: Internode Length (3= Small, 5= Medium, 7= Long), SCC: Stem Colour Coating (1= Light Green, 2=Green); SWW: Stem Wing Width (3= Wide, 5= Medium, 7= Narrow); Stem Waxy: (0= Absent, 1= Present); SSS: Stem Section Shape (1= Round, 2= Square); BA: Branch Arrangement (2= Mainly on lower part, 3= Mainly on middle part); AL: Anthocyanine in leaf (0= Absent, 1=Present); LT: Leaf Type (4= Bipinnate, 5=Multipinnate); NLL: Number of Leaflet (1= One pair, 2=Two pair); LC: Leaf Colour (2= Green, 3= Dark Green); PLV: Prominence of leaf vein (0= No, 1= Yes); LS: Leaf Size (3= Small, 5= Medium, 7= Large), LLS= Leaflet Shape (1= Linear, 2= Lanceolate, 3= Ovate-Lanceolate); LPC: Leaf Petiole Colour (1= Green, 2=Purple Green); LT: Leaf tendrils (1= Short, 2= Medium, 3= Long); TLPE: Tops Leaves Petiole Ends (2= Tendril Simple, 3= Tendril Compound); LLPE: Lower leaves petiole Ends (2= Tendril simple, 3=Tendril subulate); LP: Leaf pubescence (0= Absent, 1= Present); LST: Leaf Scale Type (1= Subulate, 2= Linear); FBS: Flower Bud Size (1= Globular, 2= Indeterminate); FS: Flower Size (1= Small, 2= Medium); NLL: Number of Leaflet per Leaf (1= One pair, 2= Two pair); FC: Flower Colour (1= White, 2=White Blue, 3= Blue, 7= Pink); FVC: Flower Vein Colour (2= Grey, 3= Violet); CC: Calyx Colour (2= Green Purple, 3= Green); NPPP: Number of Pods per peduncle (1= One, 2=Two, 3= Three); PC: Pod Curvature (1= Straight, 2=Slightly curved); PS: Pod Shape (5= Broad linear, 6= Broad elliptical); SS: Seed Shape (2= Triangular, 3= Rhomboid); SCC: Seed Coat Colour (1= Grey White, 9= Grey mottled); SS: Seed Size (1= Small, 2= Medium); SCS: Seed coat surface (1= Smooth, 2= Tubercular); SCP: Seed Coat pattern (1= Marled, 2=Dotted); SEW: Seed Eye Width (3= Narrow, 5= Medium); CC: Cotyledon colour (1=Yellow, 2=Orange).

Table 2 : Frequency distribution for different morphological characters of *Lathyrus sativus* L.

S No	Morphological character	Total No. of genotypes	Frequency (%)
1	Epicotyl Colour : i Green-Purple	2	6.06
	ii Light Green	22	66.66
	iii Green	9	27.27
2	Hypocotyl Colour : i Green-Purple	2	6.06
	ii Light Green	22	66.66
	iii Green	9	27.27
3	Seedling Vigour : i Poor	8	24.24
	ii Intermediate	14	42.42
	iii Vigorous	11	33.33
4	Plant growth rate-I : i High	17	51.51
	ii Medium	10	30.30
	iii Low	6	18.18
5	Plant growth rate-II : i High	17	51.51
	ii Medium	10	30.30
	iii Low	6	18.18
6	Plant growth habit : i Prostrate	5	15.15
	ii Semi-erect	14	42.42
	iii Spreading	14	42.42
7	Plant type : i Intermediate	8	24.24
	ii Determeniate	25	75.75
8	Nodes/Plant : i Many	12	36.36
	ii Medium	21	63.63
9	Internode Length : i Long	8	24.24
	ii Medium	13	39.39
	iii Small	12	36.36
10	Stem coating colour : i Light Green	19	57.57
	ii Green	14	42.42
11	Stem wing width : i Medium	7	21.21
	ii Narrow	16	48.48
	iii Wide	10	30.30
12	Stem waxy : i Absent		
	ii Present	33	100
13	Stem Section Shape : i Square	24	72.72
	ii Round	9	27.27

14	Branch Arrangement :		
	i Mainly on lower part	19	57.57
	ii Mainly on middle part	14	42.42
15	Anthocyanine in leaf : i Absent	24	72.72
	ii Present	9	27.27
16	Leaf type : i Bipinnate	16	48.48
	ii Multipinnate	17	51.51
17	No. of leaflet/Leaf : i Two pair	4	12.12
	ii One pair	29	87.87
18	Leaf Colour : i Dark green	21	63.63
	ii Green	12	36.36
19	Prominance on leaf vein : i No	33	100
	ii Yes		
20	Leaf size : i Large	9	27.27
	ii Medium	11	33.33
	iii Small	13	39.39
21	Leaflet Shape : i Ovate-lanceolate	13	39.39
	ii Lanceolate	8	24.24
	iii Linear	12	36.36
22	Leaf petiole colour : i Green	29	87.87
	ii Purple Green	4	12.12
23	Leaf tendrils : i Short	3	9.09
	ii Medium	23	69.69
	iii Long	7	21.21
24	Top leaves petiole end :		
	i Tendril Compound	26	78.78
	ii Tendril simple	7	21.21
25	Lower leaves petiole end :		
	i Tendril simple .	28	84.84
	ii Tendril subulate	5	15.15
26	Leaf pubescence : i Absent		
	ii Present	33	100
27	Leaf Scale type : i Linear	21	63.63
	ii Subulate	12	36.36
28	Flower bud size : i Globular	28	84.84
	ii Intermediate	5	15.15
29	Flower size : i Small	6	18.18
	ii Medium	27	81.81
30	No. of leaflet per leaf : i Two pair	4	12.12
	ii One pair	29	87.87
31	Flower Colour : i Pink	14	42.42
	ii Blue	7	21.21
	iii White	10	30.30
	iv White Blue	2	6.06
32	Flower Vein Colour : i Violet	21	63.63
	ii Grey	12	36.36
33	Calyx Colour : i Green-Purple	11	33.33
	ii Green	22	66.66
34	No. of pods per peduncle :		
	i One	13	39.39
	ii Two	11	33.33
	iii Three	9	27.27

35	Pod Curvature : i Straight	22	66.66
	ii Slightly curved	11	33.33
36	Pod Shape: i Broad linear	18	54.54
	ii Broad elliptical	15	45.45
37	Seed Shape : i Rhomboid	19	57.57
	ii Triangular	14	42.42
38	Seed Coat colour : i Grey mottled	25	75.75
	ii Grey White	8	24.24
39	Seed Size : i Small	10	30.30
	ii Medium	23	69.69
40	Seed coat surface : i Smooth	13	39.39
	ii Tubercular	20	60.60
41	Seed coat pattern : i Marbled	13	39.39
	ii Dotted	20	60.60
42	Seed eye Width : i Narrow	23	69.69
	ii Medium	10	30.30
43	Cotyledon colour : i Yellow	16	48.48
	ii Orange	17	51.51

Table 3 : Morphological characters for *Lathyrus sativus* L.

S. No	Genotypes	Characters																			
		EC	HC	SV	PGR-I	PGR-II	PGH	PT	NPP	IL	SCC	SWW	SW	SSS	BA	AP	LT	NPP	LC	PLV	LS
1	CGLPM-1	3	3	7	7	7	3	2	7	7	2	5	0	1	3	0	5	2	3	0	5
2	CGLPM -2	1	1	5	5	5	3	2	5	5	1	7	0	2	3	0	4	1	3	0	3
3	CGLPM -3	1	1	5	5	5	3	2	5	5	1	7	0	2	3	0	4	1	3	0	3
4	CGLPM -4	1	1	5	5	5	3	1	5	5	1	7	0	2	3	0	4	1	3	0	7
5	CGLPM -5	1	1	5	5	5	2	1	5	5	1	7	0	2	2	1	5	1	3	0	7
6	CGLPM -6	2	2	3	3	3	1	1	5	3	1	3	0	1	2	1	5	1	3	0	3
7	CGLPM -7	1	1	3	3	3	1	1	5	3	1	3	0	1	2	1	5	1	3	0	3
8	CGLPM -8	1	1	5	5	5	3	2	5	3	1	3	0	1	2	1	4	1	3	0	7
9	CGLPM -9	1	1	3	3	3	1	1	5	5	1	7	0	1	3	0	5	1	3	0	3
10	CGLPM-10	2	2	5	7	7	2	2	7	7	2	7	0	2	3	0	4	1	2	0	3
11	CGLPM-11	2	2	7	7	7	3	1	7	7	2	7	0	2	3	0	5	1	2	0	3
12	CGLPM-12	2	2	7	7	7	3	2	7	7	2	5	0	2	2	0	4	1	2	0	5
13	CGLPM-13	2	2	5	5	5	2	2	5	5	2	3	0	2	2	0	4	1	2	0	3
14	CGLPM-14	2	2	3	3	3	1	2	5	5	2	3	0	2	2	0	4	1	3	0	5
15	CGLPM-15	2	2	7	7	7	3	2	7	3	2	5	0	2	2	0	5	1	3	0	5
16	CGLMM-16	1	1	7	7	7	3	2	7	7	2	7	0	1	2	0	5	1	3	0	3
17	CGLMM-17	1	1	7	7	7	2	2	7	7	2	5	0	2	2	1	5	1	3	0	3
18	CGLMM-18	1	1	5	7	7	3	2	7	7	2	3	0	1	2	1	5	1	3	0	5
19	CGLMM-19	1	1	3	3	3	2	2	5	5	2	3	0	1	2	0	5	1	3	0	7
20	CGLMM -20	1	1	5	5	5	3	2	5	5	2	7	0	2	3	0	5	1	3	0	7
21	CGLMM -21	1	1	5	5	5	2	2	5	3	1	3	0	2	2	0	4	1	3	0	5
22	CGLMM -22	1	1	5	7	7	3	2	7	5	2	3	0	2	2	0	4	1	3	0	7
23	CGLMM -23	3	3	7	7	7	1	2	7	7	2	5	0	2	2	1	4	1	2	0	3
24	CGLMM-24	1	1	7	7	7	2	1	5	3	1	7	0	2	3	0	4	1	2	0	3
25	CGLMM-25	2	2	7	7	7	3	2	5	5	1	3	0	2	3	0	5	2	2	0	5

26	CGLMM-26	2	2	3	5	5	3	2	5	3	1	7	0	2	3	0	5	1	2	0	5
27	CGLMM-27	1	1	5	7	7	2	2	5	3	1	7	0	1	2	1	5	1	2	0	5
28	CGLMM-28	1	1	5	7	7	2	1	5	3	1	7	0	2	2	1	4	1	3	0	3
29	CGLMM-29	1	1	3	3	3	2	2	5	3	1	7	0	2	3	0	4	1	3	0	7
30	CGLMM -30	1	1	7	7	7	2	2	5	3	1	7	0	2	2	0	4	1	3	0	5
31	CGLMM -31	1	1	3	5	5	2	2	5	3	1	7	0	2	3	0	4	1	2	0	7
32	Mahateora	1	1	5	7	7	2	2	7	5	1	5	0	2	3	0	5	2	2	0	7
33	Prateek	1	1	7	7	7	2	2	7	5	1	5	0	2	2	0	5	2	2	0	5

Table 4 : Morphological characters for grass pea (*Lathyrus Sativus* L.) genotypes.

S No	Genotypes	Characters																					
		LLS	**LPC**	**LT**	**TLPE**	**LLPE**	**LP**	**LST**	**FBS**	**FS**	**NLL**	**FC**	**FVC**	**CC**	**NPPP**	**PC**	**PS**	**SS**	**SCC**	**SS**	**SCS**	**SCP**	**SEW**	**CC**
1	CGLPM-1	1	1	2	2	3	0	2	2	2	2	2	2	2	1	1	5	3	9	2	2	1	5	1
2	CGLPM -2	3	1	2	2	2	0	2	1	2	1	7	3	3	2	1	5	3	9	2	2	2	3	2
3	CGLPM -3	3	1	2	2	2	0	2	1	1	1	7	3	3	3	2	5	3	9	1	2	2	3	1
4	CGLPM -4	3	1	2	3	2	0	2	1	1	1	7	3	3	3	2	5	3	9	1	2	2	3	2
5	CGLPM -5	2	1	3	3	2	0	2	1	2	1	7	3	2	2	2	6	3	9	1	2	2	5	2
6	CGLPM -6	2	1	1	3	2	0	2	1	1	1	3	2	2	1	1	6	3	9	2	2	2	5	2
7	CGLPM -7	3	1	2	3	2	0	2	1	2	1	1	2	2	1	1	6	3	9	2	1	2	3	1
8	CGLPM -8	3	1	2	3	2	0	2	1	2	1	1	2	3	1	1	6	3	9	2	1	2	3	2
9	CGLPM -9	3	1	3	3	2	0	2	1	2	1	1	3	3	1	2	6	2	9	2	2	2	3	2
10	CGLPM-10	2	1	2	3	2	0	1	1	2	1	3	3	2	1	1	5	2	9	1	2	2	5	1
11	CGLPM-11	2	2	2	3	2	0	1	1	2	2	3	3	3	1	1	6	2	1	1	2	1	3	1
12	CGLPM-12	3	1	2	3	3	0	2	1	2	1	3	2	2	1	1	5	3	1	2	1	2	5	2
13	CGLPM-13	3	1	2	3	2	0	1	1	1	1	3	2	2	2	1	5	2	1	2	1	1	3	2
14	CGLPM-14	3	1	1	3	2	0	2	1	2	1	3	2	3	2	1	6	3	1	2	1	1	3	2
15	CGLPM-15	2	1	3	3	2	0	2	1	2	1	1	2	3	3	2	6	2	9	2	2	1	3	1
16	CGLMM-16	3	1	2	3	2	0	2	1	2	1	1	3	3	2	1	5	2	9	1	2	1	5	1
17	CGLMM-17	1	2	2	2	2	0	2	1	2	1	1	3	2	1	1	6	3	9	2	1	2	5	1
18	CGLMM-18	1	1	2	3	2	0	2	1	2	1	1	2	3	1	1	5	3	9	2	1	2	5	2
19	CGLMM-19	3	1	2	3	2	0	2	1	1	1	7	2	2	1	1	5	3	1	2	1	1	3	1
20	CGLMM-20	2	1	2	3	2	0	2	1	2	1	7	3	3	1	1	6	3	1	1	2	1	3	1
21	CGLMM-21	1	1	2	3	2	0	2	1	2	2	7	3	3	1	1	6	3	9	2	2	1	3	2
22	CGLMM-22	1	1	2	2	2	0	1	2	2	1	1	2	3	2	1	6	3	9	2	2	2	5	1
23	CGLMM-23	1	1	3	3	2	0	2	1	2	1	2	3	2	3	2	5	2	9	1	2	2	5	2
24	CGLMM-24	1	1	2	3	3	0	1	1	2	1	7	3	3	2	1	6	2	9	2	2	1	3	2
25	CGLMM-25	3	1	3	3	2	0	2	2	2	1	7	2	2	2	1	5	3	1	2	2	2	3	1
26	CGLMM-26	2	1	2	2	2	0	2	1	2	1	1	3	3	3	1	6	3	9	2	1	1	3	2
27	CGLMM-27	1	2	3	2	2	0	1	1	2	1	7	3	3	2	1	5	3	9	2	1	2	3	2
28	CGLMM-28	1	1	3	3	3	0	1	1	1	1	7	3	3	3	1	5	2	9	1	1	2	3	1
29	CGLMM-29	2	1	2	3	2	0	1	1	2	1	1	3	3	3	2	5	2	9	2	2	1	3	1
30	CGLMM-30	3	1	1	3	2	0	1	1	2	1	7	3	3	2	2	6	2	1	2	2	2	3	1
31	CGLMM-31	1	2	2	3	2	0	1	1	2	1	7	3	3	2	2	5	2	9	2	2	2	3	1
32	Mahateora (C)	1	1	2	3	2	0	1	2	2	1	7	3	3	3	2	5	2	9	1	1	1	3	2
33	Prateek (C)	1	1	2	3	3	0	1	2	2	2	3	3	3	3	2	5	2	9	2	1	2	3	2

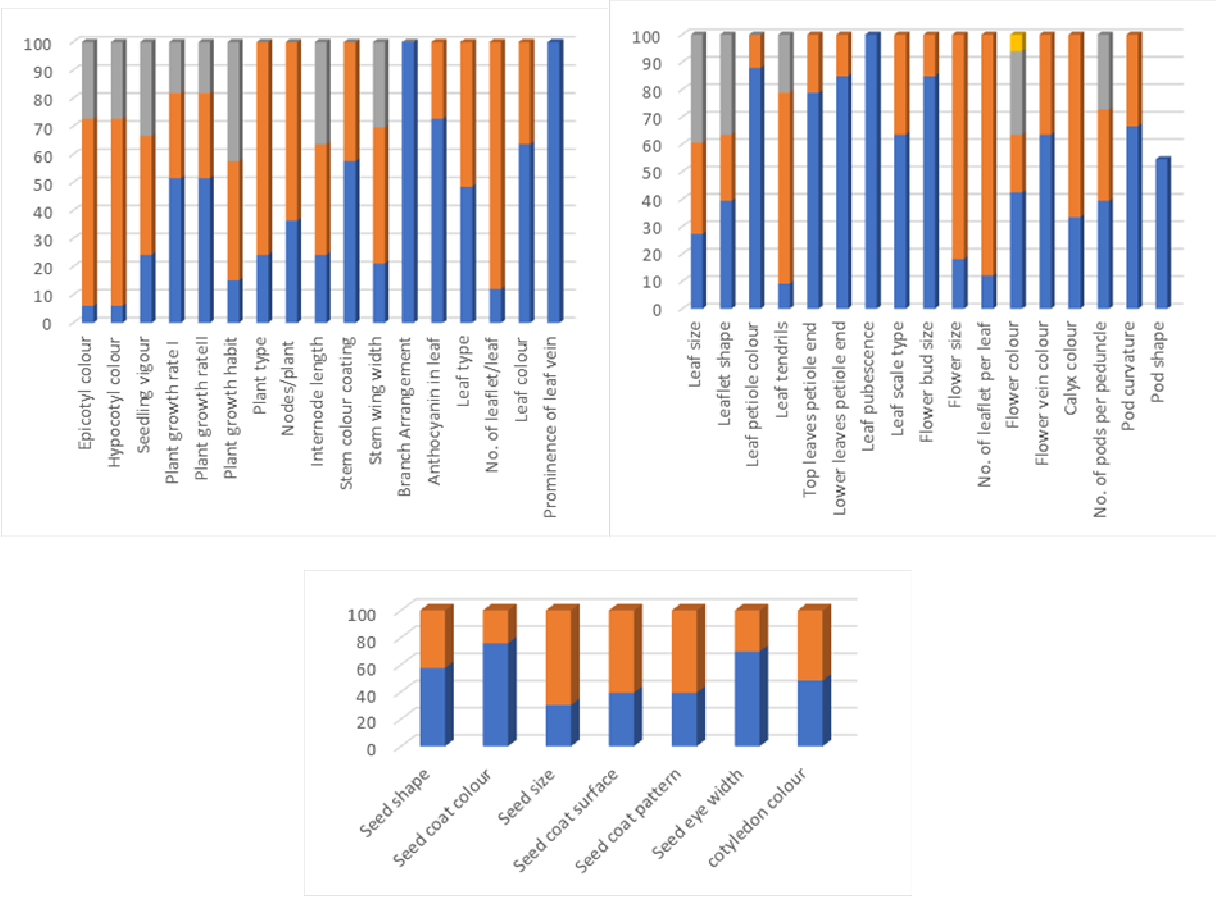

Fig. 1 : Morphological characters of *Lathyrus sativus* L.

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