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Characterization and Evaluation of some Genotypes of *Lathyrus* sps. in Terai Region of West Bengal

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ABSTRACT: An investigation was carried out in the university farm for 10 genotypes of *lathyrus* species to find out the best genotypes(s) which may be grown in this terai region of West Bengal. Characterization and evaluation genotypes were done according to DUS descriptors developed by International Plant Genetic Resources Institute, Rome, Italy (IPGRI 2000). From the statistical analysis by CRBD, the results of genotypes like BK-7-1 was found to have maximum plant height, leaf length, pods per plant, pod length, seeds per pod, yield per plant, biological yield per plant, and biological yield per plot. WBK-10, BK-2, BK-27-1, BK-7-1 yield per plot, and high seed index were found in WBK-10, Bidhan-2, BK-2 along with BK-7-1. Seeds per plant were found highest in WBK-10. In seeds per pod, maximum was found in BK-27-1. Pods per plant were also found highest in BK-7-1. Challenges of the study is indeterminate habit of the plant where collection of data should be very carefully done starting from first pod setting in any genotype flowering and physiological pod maturity stage which goes on because of their indeterminate growth habit. From the investigation, BK-7-1 was evaluated to be the best genotype, followed by BK-2, BK-27-1, WBK-10, Bidhan-2, Kaikhali local and Berhampur Local which were found newly as genotypes and can be selected and later can be released as varieties considering all the yield attributes of this investigation.

Keywords: DUS descriptors, CRBD, Seed index, Plant height, Seed per pod, seeds per plant, Genotype, Terai region.

INTRODUCTION

Grass pea (*Lathyrus sativus* L.) is a annual legume important crop which grows in several drought prone areas of the crop including Eurasia, North America, temperate South America and East Africa (Vas Patto *et al.*, 2006, Yan *et al*, 2006 and Dixit *et al.*, 2016). It is gaining popularity as a plant that is suited to dry environments and has high quantities of protein and other beneficial characteristics, a component that is becoming increasingly difficult to get in many developing countries. The grass pea [*Lathyrus sativus* (L.)] is a food and fodder crop that belongs to the family Leguminosae (Fabaceae) and subfamily Papilionoideae, tribe Vicieae (= Fabaea) has chromosome number 2n =14. It is also known as Teora in Hindi, Khesari in Bengali and Kisara in Nepali. There are 187 species and subspecies in the genus *Lathyrus*, which may be found in both the old and new Worlds (Allkin *et al.*, 1983). Only one species (*Lathyrus sativus* L.) is widely farmed as a food crop (Jackson and Yunus 1984), whereas other species such as *L. cicera*, *L. clymenum*, and *L. ochrus* are used mostly for fodder. Vavilov, (1951) identified two distinct *Lathyrus* origin centers. The Central Asiatic Centre, which covers northwest India, Afghanistan, Tajikistan, and Uzbekistan, as well as western Tian-Shan, was one of them. The Abyssinian Centre was the second. In addition, Vavilov observed trends in diversity similar to those observed in other pulses such as lentils and broad beans, where smaller-seeded forms were found in southern and southwest Asia, whereas the majority of highly cultivated forms with *Pieris brassicae* seeds and flowers were found throughout the Mediterranean region (Jackson and Yunus 1984). Grass pea is a typical orphan legume crop, such as cowpea (*Vigna unguiculata*), groundnut (*Arachis hypogaea*), and bambara groundnut (*Vigna subterranea*) (Cullis and Kunert 2017). In Ethiopia grass pea is used to be taken as roasted whole seeds, boiled whole seeds, traditional sauce, local drink and the green unripe pods are taken on their way from school to home by local boys (Fikre *et al.*, 2011). Grass pea, like other orphan legumes, is still an untouched treasure for compounds that can contribute to human health. For instance, it is the only known dietary source of L-homoarginine.

Therefore, as nutraceutical, grass pea is an excellent example of a potential "functional food" (Singh and Rao 2013; Llorent-Martínez *et al.,* 2017). The amino acid L-homoarginine provides benefits in cardiovascular disease treatments (Rao, 2011; Singh and Rao 2013; van Wyk *et al.,* 2016) and in overcoming the consequences of hypoxia, i.e., the inadequate oxygen supply at the tissue level, associated with cancer tumor development (Ke and Costa 2006; Jammulamadaka *et al.,* 2011). Thus, a daily dietary intake of L-homoarginine through small quantities of grass pea may be valuable for human health and deserves to be studied further (Rao, 2011). One of the physiological functions with possible therapeutic potentials is the activation of protein kinase C, which adds a new dimension to explore its potential in the treatment of Alzheimer's disease, hypoxia, and long-term potentiating of neurons essential for memory (Singh and Rao 2013).

In this investigation, i) according to DUS descriptors of grass pea, characterization of 10 numbers of grass pea genotypes was investigated in both plant and pod characters ii) each genotype will be evaluated according to DUS descriptors and evaluated individually in consecutive growing seasons (2019-20) and (2020-21).

MATERIALS AND METHODS

The experiment was placed in the Uttar Banga Krishi Vishwavidyalaya's "Research cum Instructional Farm" at Pundibari, Cooch-Behar, West Bengal, India. The field is located at 26° 19' 86" N latitude, 89°23' 53" E longitude, and is 43 meters above mean sea level. The experimental field's soil came from the Teesta alluvial plain group. During the experimental phase, the crop receives very little rain during the growing cycle of the grass pea. In April in both the year precipitation was quite high than other crop growing months.

Table 1: List of *Lathyrus* genotypes.

Sr. No.	Genotypes
1.	Berhampore Local
2.	WBK-10
3.	BK-2
4.	BK-27-1
5.	BK-37-2 (Bidhan-1)
6.	BK-7-1
7.	Kaikhali Local
8.	Bidhan-2
9.	Pundibari Local
10.	Alipurduar Local

A fertilizer dose of N: P_2O_5: K_2O @ 20:50:20 (kg/ha) applied in a typical plot at the time of sowing is sufficient for better yields. A total of ten genotypes were used in the study. Seeds are infected with Rhizobium and PSB culture at a rate of 5 to 7 grams per kilogram of seed. Planting was done with healthy seeds of all kinds. Three rows of seeds were sown in each allotment. At each site, the row to row and plant to plant distances were kept at 30 cm and 10 cm, respectively. The exhibition ran from the second week of November 2019 until the second week of November 2020.

Statistical design: Data from experimental plants of each character was compared to each replication, and statistical analysis was performed. The experiment was designed using a completely randomized block design in the experimental field. A standard technique was used to estimate the analysis of variance (Singh and Chaudhary, 1979). The overall variation across genotypes for various characteristics was evaluated for significance using the analysis of variance approach and the "F" test.

RESULTS AND DISCUSSION

Analysis of Variance: Analysis of variance of 10 genotypes was evaluated for two consecutive seasons/years (2019-20) and (2020-21) in 15 physiological, biological yield, and yield characters were done according to DUS descriptors and presented in Table 2.

Mean sum of squares due to year (season) of all the physiological and yield characters were found to be significant in all characters except in plant height (8.015), leaf length (0.0054), leaf breadth (0.005320), pod length (0.003496), pod width (0.000005), seeds per plant (1685.6) and yield (166.98). In these characters, the influence of seasons/year did not play any significant role in determining the expression of characters. In the case of genotypes, the mean sum of square of all the physiological characters was found significant except yield per plant (166.98) which indicated presence of genetic diversity among all these characters. In the case of year × replication, seasonal effect and replication did not show any significance in any of the characters including yield characters which indicated no significant influence of seasons on replications of different physiological characters on the expression of the characters. In the case of genotype × environment interaction, days to 50% maturity (3.5), pods per plant (52.18), pod width (0.000313), seeds per plant (986.1), yield per plant (123.88), and biological yield per plant (9.79) and biological yield per plot (0.1015) were all found non-significant and rest of the characters were found significant.

This result indicated that genotypes performed differently in two seasons/years having the influence of environmental factors on the genotypes in the characters and strong genetic diversity are present among them and non-significant characters did not perform differently in two seasons/years and variability and genetic diversity of these characters were not found. Abate *et al.,* (2018) studied 426 accessions of grass pea for estimating variability. They found that the mean square from the analysis of variance was highly significant among grass pea accessions for the traits like plant height, number of primary branches, number of pods per plant, number of seeds per pod, days to flowering, days to maturity, 100 seed weight, seed yield/plant, biomass, and harvest index.

Also they concluded the presence of genetic diversity among grass pea accessions and the possibility of

improving these traits through strong selection. Parihar *et al*., (2016) further reported that in 368 diverse, indigenous, and exotic accessions of grass pea where in ANOVA of metric traits showed all accessions were significantly different from each other and a high amount of variability existed for most of the traits studied.

Table 2: Analysis of variance of physiological characters of Grass pea.

Sources of variation		Mean sum of squares															
	Df	DFF	DM	BPP	PH	LL	LB	PPP	PL	PW	SPP	SPPL	SI	YLD	RL	BYLD	BYLD/ PLOT
Year	1	3360.0****	2496.15****	3.9015****	8.015	0.0054	0.005320	810.34****	0.003496	0.000005	1.17292****	1685.6	1.6934****	166.98	86.905****	52.76**	0.4978**
Genotypes	9	26.0**	92.74*****	0.3727***	179.694***	3.7457****	0.017486****	326.01****	0.026245****	0.006075****	0.03267*	4674.9****	17.4722****	140.41	13.959**	406.52****	4.0679****
Year X Rep	4	8.3	20.23	0.2923*	104.902	0.0875	0.002868	43.23	0.001049	0.000445	0.03556	603.8	0.0199	153.03	8.050	12.32	0.1270
Year × Genotypes	9	3.5	68.96*****	0.2826**	149.128**	0.1310**	0.007182*	52.18	0.014223**	0.000313	0.03777**	986.1	1.4288****	123.88	15.883***	9.79	0.1015
Error	36	10.5	11.77	0.1138	60.749	0.0517	0.003931	50.15	0.005035	0.000599	0.01743	729.0	0.0132	111.42	5.265	10.39	0.1036

*, **, ***, **** signifies 0.1%, 0.05, 0.01 and 0.001 level of significance respectively.
DFF- Days to 50% flowering; DM - Days to maturity; BPP - Branches per plant; PH - Plant Height; LL - Leaf length; LB - Leaf breadth; PPP - Pods per plant; PL - Pod length; PW - Pod Width; SPP - Seeds per Pod; SPPL - Seeds per Plant; SI - Seed Index: 100 seed wt.; RL - Root Length, BYLD - Biological yield per plant (Dry); BYLD/PLOT- Biological yield per plot (Dry); df- Degrees of freedom and Rep- Replication.

Plant Height: In the mean data analysis of two years (2019-20) and (2020-21), BK-7-1 was found to have the highest plant height (68.10 cm), the minimum was found in BK-37-2 (Bidhan-1) (50.36 cm). From Duncan's DMRT test it was found that other than four genotypes Bidhan-1 (50.36 cm) variety, Bidhan-2 (56.53 cm) variety, Kaikhali local (54.54 cm), and Alipurduar Local (53.74 cm), all the other genotypes were statistically at par with highest plant length found in BK-7-1 (68.10 cm) **(**Table 3). Dikshit *et al.*, (2014) reported plant height character had quantitative characteristics with a modest CV.

Table 3: Mean table of physiological and biological yield characters of 10 genotypes of *Lathyrus* (*Lathyrus sativus*) in 2019-20 and 2020-21 in Terai region of West Bengal.

Sr. No.	Genotype	Plant Height (cm)	Leaf Length (cm)	Leaf Width (cm)	Branches/ plant	Days to 50% Flower	Pods/Plant	Pod Length (cm)	Pod Width (cm)	Seeds/Pod	Root Length (cm)	Days to Maturity	Seeds/ Plant
		Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
1.	Berhampore Local	61.47	5.67	0.85	4.52	62.67	35.42	2.86	0.88	3.68	11.97	93.2	133.02
2.	WBK-10	61.78	6.89	0.91	4.18	64.50	38.55	3.02	0.98	3.69	12.95	123.0	159.33
3.	BK-2	61.88	6.89	0.94	4.22	69.00	36.82	3.00	0.98	3.66	12.31	120.7	121.00
4.	BK-27-1	61.29	7.11	1.00	4.20	67.00	35.23	3.02	0.99	3.71	13.75	123.3	111.93
5.	BK-37-2 (Bidhan-1)	50.36	7.06	0.96	4.30	67.83	29.00	2.92	0.95	3.54	10.82	114.7	97.05
6.	BK-7-1	68.10	8.36	0.96	4.25	68.00	46.90	3.11	0.98	3.55	14.71	121.2	142.34
7.	Kaikhali Local	54.54	7.89	0.84	3.68	66.33	34.50	3.01	0.97	3.69	12.05	112.8	113.18
8.	Bidhan-2	56.53	8.13	0.94	4.08	68.33	25.45	3.00	0.98	3.55	13.56	124.2	82.47
9.	Pundibari Local	64.75	7.87	0.99	4.35	68.67	25.30	2.99	0.97	3.54	12.05	117.7	82.77
10.	Alipurduar Local	53.74	7.50	0.97	3.80	68.83	22.75	2.98	0.97	3.54	9.36	93.2	74.88
Mean		59.44	7.34	0.93	4.16	67.12	32.99	2.99	0.96	3.62	12.35	117.1	111.80
Range		50.36-68.10	5.67-8.36	0.84-1.00	3.68-4.52	62.67-69.00	22.75-46.90	2.86-3.11	0.88-0.99	3.54-3.71	9.36-14.71	93.2-124.2	74.88-159.33
SEM±		3.18	0.09	0.02	0.13	1.32	2.89	0.02	0.01	0.05	0.93	1.40	11.02
C.D.		9.12	0.26	0.07	0.39	3.79	8.29	0.08	0.02	0.15	2.68	4.01	31.61
C.V.		13.11	3.09	6.71	8.11	4.82	21.46	2.37	2.54	3.65	18.57	2.85	24.15

Contd…

Sr. No	Genotype	100 Seed Weight(gm)	Yield/ Plant (gm)	B. Yield/Plant (gm)	B. Yield/PloT (kg)
		Mean	Mean	Mean	Mean
1.	Berhampore Local	4.87	5.75	10.96	1.10
2.	WBK-10	8.30	11.32	18.07	1.89
3.	BK-2	7.72	11.89	28.20	2.74
4.	BK-27-1	7.14	9.09	20.36	1.71
5.	BK-37-2 (Bidhan-1)	6.63	7.14	9.08	0.93
6.	BK-7-1	7.76	11.23	32.23	3.24
7.	Kaikhali Local	5.70	6.78	10.47	0.91
8.	Bidhan-2	7.89	7.75	10.70	2.42
9.	Pundibari Local	6.03	4.97	12.41	1.08
10.	Alipurduar Local	5.76	3.97	10.51	0.79
Mean		6.78	7.99	16.30	1.68
Range		4.87-8.30	3.97-11.89	9.08-32.23	0.79-3.24
SEM±		0.04	0.754	1.31	0.131
C.D.		0.13	2.156	3.77	0.375
C.V		1.59	23.136	19.77	19.671

Leaf Length: In the mean data analysis of two years (2019-20) and (2020-21), the highest value was found in BK-7-1 (8.36 cm). From Duncan's DMRT test it was found that BK-7-1 (8.36 cm) and Bidhan-2 (8.13 cm), Kaikhali Local (7.89 cm), and Pundibari Local (7.87 cm), WBK-10 (6.89 cm) BK-2 (6.89 cm), BK-27-1 (7.11 cm), and Bidhan-1 (7.06 cm) were statistically at par with each other and non-significant, but Alipurduar Local (7.50 cm) was found to be significantly different from all the other genotypes **(**Table 3). A similar result was found by Jackson and Yunus (1984) where a lot of morphological diversity, notably in vegetative features like leaf length, while floral traits were found significantly less variable.

Leaf width: In the mean data analysis of two years (2019-20) and (2020-21), leaf width was found to be maximum in BK-27-1 (1.00 cm) and the minimum was found in Kaikhali Local (0.84 cm). From Duncan's DMRT test, it was found that BK-2 (0.94 cm), Bidhan-1 (0.96 cm), BK-7-1 (0.96 cm), Pundibari Local (0.99 cm), Alipurduar Local (0.97cm), Bidhan-2 (0.94 cm) all are statistically at par and non-significant with each other. Berhampur Local (0.85 cm), WBK-10 (0.91 cm), and Kaikhali Local (0.84 cm) all were statistically at par and non-significant with each other. They were also found to be statistically significantly different from all the rest of the genotypes/varieties **(**Table 3). Jakson and Yunus (1984) found similar results in leaf breadth analysis in grass pea.

Branches Per plant: In the mean data analysis of two years (2019-20) and (2020-21), highest value was observed in Berhampur Local (4.52 cm) and lowest in Kaikhali Local (3.68 cm). Berhampur Local (4.52 cm), WBK-10 (4.18 cm), BK-2 (4.22 cm), BK-27-1 (4.20 cm), Bidhan-1 (4.30 cm), BK-7-1 (4.25), Pundibari Local (4.35 cm) all were found to statistically at par and non-significant with each other. Kaikhali Local (3.68 cm) and Alipurduar Local (3.80 cm) were found to be statistically at par and non-significant with each other. However Kaikhali Local (3.68 cm) was statistically significant with all the genotypes of Berhampur Local (4.52 cm), WBK-10 (4.18 cm), BK-2 (4.22 cm), BK-27-1 (4.20 cm), Bidhan-1 (4.30 cm), BK-7-1 (4.25), Pundibari Local (4.35 cm) (Table 3).

A similar result was found by Dikshit *et al.*, (2014), the number of main branches had a moderate CV among the quantitative characteristics**.**

Days to 50% Flowering: In the mean data analysis of two years (2019-20) and (2020-21), it was found the highest number of days to 50% flowering was found BK-2 (69.00) and the lowest was found in (62.67) Berhampur Local. From Duncan's DMRT test it was found that other than Berhampur Local ((62.67) and WBK-10 (64.50), all the other genotypes were statistically at par and non-significant to each other. These genotypes Berhampur Local (62.67) and WBK-10 (64.50) were found to be statistically at par and non-significant to each other **(**Table 3).

Pods per plant: In the mean data analysis of two years (2019-20) and (2020-21), maximum pods per plant were found in genotype BK-7-1 (46.90) and the minimum was found in Alipurduar Local (22.75). From Duncan's DMRT test it was found that BK-7-1 (46.90) was found to be statistically significantly different from all the estimated values of all the genotypes in this investigation. Berhampur Local (35.42), WBK-10 (38.55), BK-2 (36.82), BK-27-1 (35.23), Kaikhali Local (34.50) were found to be statistically at par and non-significant with each other **(**Table 3). Pandey *et al*., (2002) found pod/plant variability was previously found to be rather high.

Pod Length: In the mean data analysis of two years (2019-20) and (2020-21), maximum pod length was found in BK-7-1 (3.11 cm) and the minimum was found in Berhampur Local (2.86 cm). BK-7-1 (3.11 cm) was found to be statistically significantly different from each genotype taken for investigation.WBK-10 (3.02 cm), BK-2 (3.00 cm), BK-27-1 (3.02 cm), Kaikhali Local (3.01 cm), Bidhan-2 (3.00 cm), Pundibari Local (2.98 cm), Alipurduar Local (2.99 cm) all were statistically at par and non-significant with each other **(**Table 3). Dikshit *et al.*, (2014) discovered a positive and substantial connection between pod length and seeds per pod and pod length were found significant character for characterization.

Pod width: In the mean data analysis of two years (2019-20) and (2020-21), it was found maximum pod width in BK-27-1 (0.99 cm) and the minimum was in

Berhampur Local (0.88 cm). From Duncan's DMRT test, it was found that except for BK-27-1 (0.99 cm), all other genotypes were non-significant and statistically at par with each other **(**Table 3). Parihar *et al.,* (2016) also found similar results in this character in their characterization studies.

Seeds per Pod: In the mean data analysis of two years (2019-20) and (2020-21), the highest seeds per pod were found in BK-27-1 (3.71) and the minimum was found in Pundibari local (3.54) and Alipurduar Local (3.54). From the Duncan's DMRT test it was found that Berhampur Local (3.68), WBK-10 (3.69), BK-2 (3.66), Kaikhali Local (3.69) all were statistically at par and non-significant with each other with the highest value found in BK-27-1(3.71) **(**Table 3). Similar results were found by Dikshit *et al.,* (2014) found a moderate CV for the number of seeds per pod among the quantitative characteristics.

Root Length: In the mean data analysis of two years (2019-20) and (2020-21), the highest root length was observed in BK-7-1 (14.71 cm) and the lowest was observed in Alipurduar Local (9.36 cm). From Duncan's DMRT test, it was found that BK-7-1(14.71 cm) which was found highest was statistically significantly at par with WBK-10 (12.95 cm), BK-2 (12.31 cm), BK-27-1(13.75 cm), Bidhan-2 (13.56 cm), Kaikhali-Local (12.05 cm) and non-significant with each other **(**Table 3). Zode *et al*., (1999) investigated 10 genotypes for morpho-physiological characteristics and found that genotypes RLS-2 and PS-6 performed considerably better in root length and other traits.

Days to Maturity: In the mean data analysis of two years (2019-20) and (2020-21), it was found that the maximum number of days to maturity was found in Bidhan-2 (124.2) whereas the minimum number of days to maturity was found in Berhampur Local (93.2). From Duncan's DMRT test, it was found that WBK-10 (123.00), BK-2 (120.7), BK-27-1 (123.3), BK-7-1 (121.2) were all statistically at par and non-significant with each other with the highest value Bidhan-2 (124.2). The lowest values found in genotypes Alipurduar Local (93.2) and Berhampur Local (93.2) was found to be statistically at par and non-significant with each other **(**Table 3). Similar results were found by Tsegaye *et al.,* (2005), who found a significant difference (P0.05) in days to maturity, 100 seed weight, and grain yield.

Seeds per Plant: In the mean data analysis of two years (2019-20) and (2020-21), it was found that the highest number of seeds per plant was found in WBK-10 (159.33) and the lowest was found in Alipurduar Local (74.88). From Duncan's DMRT test, it was found that BK-7-1 (142.32) was found to be statistically at par and non-significant with WBK-10 (159.33). Alipurduar Local (74.33), Pundibari Local (82.77), Bidhan-2 (82.47), Bidhan-1(97.05) were statistically at par and gm), Pundibari Local (12.41 gm), and Alipurduar Local (10.51 gm) were all statistically at par and non-non-significant with Alipurduar Local (74.33) (Table 3). Kumar and Dubey (2001) also found seeds per plant as one of the important characters for characterization and variability studies.

Test Weight (100 seed wt.): In the mean data analysis of two years (2019-20) and (2020-21), the highest 100 seed wt was found in WBK-10 (8.30 gm) and the minimum was found in Berhampur Local (4.87 gm). From Duncan's DMRT test, it was found that BK-7-1 (7.76 gm) and Bidhan-2 (7.89 gm) were mutually statistically at par and non-significant with each other. Again, Kaikhali Local (5.70) and Alipurduar Local (5.76) were found to be mutually statistically at par and non-significant with each other. Again, BK-7-1 (7.76) and BK-2 (7.72) were mutually statistically at par and non-significant with each other. WBK-10 (8.30 gm) was found to be statistically significantly different with values of all the genotypes of this character (Table 3). Similar results were found by Rybinski *et al.,* (2008), the experimental items exhibited a wide range of diversity in terms of weight of 100 seeds, reflecting forms that were generally small-seeded (from 5 to 15 g), medium-seeded (from 15 to 25 g), and coarse-seeded (from 25 to 35 g) (over 25 g).

Yield per plant: In the mean data analysis of two years (2019-20) and (2020-21), maximum yield per plant was found in BK-2 (11.89 gm) and the minimum was found in Alipurduar Local (3.97 gm). From Duncan's DMRT test, it was found that WBK-10 (11.32 gm), BK-7-1(11.23 gm) were found to be statistically at par and non-significant with the highest value BK-2 (11.89 gm). Bidhan-1 (7.14 gm), Bidhan-2 (7.75 gm), BK-27-1(9.09 gm) were all statistically at par and non-significant with each other. Pundibari Local (3.97 gm) and Aliporeduar Local (4.97 gm) were found statistically at par and non-significant with each other. Berhampur Local (5.75 gm) and Kaikhali Local (6.78 gm) were found statistically at par and non-significant with each other **(**Table 3). The diversity in seed yield/plant was largest among the twenty grass pea genotypes, according to a report made by Mahapatra *et al.,* (2020).

Biological yield per plant: In the mean data analysis of two years (2019-20) and (2020-21), maximum biological yield per plant was found BK-7-1 (32.23 gm) and the minimum was found in Bidhan-1 (9.08 gm). From Duncan's DMRT test, it was found that BK-7-1 (32.23 gm) was found to be statistically significantly different from each of the genotypes/varieties taken for investigation. WBK-10 (18.07 gm) and BK-27-1 (20.36 gm) were statistically at par and non-significant with each other. BK-2 (28.20 gm) was found to be statistically significantly different from each of the genotypes/varieties taken for investigation. Berhampur Local (10.96 gm), Bidhan-1 (9.08 gm), Kaikhali Local (10.47 gm), Bidhan-2 (10.70 significant with each other **(**Table 3). Similar results were found by Basaran *et al*., (2012) reported there was

a range of 5.10 g/plant to 22.89 g/plant among the *Lathyrus sativus* genotypes.

Biological Yield Per plot: In the mean data analysis of two years (2019-20) and (2020-21), the highest biological yield per plot was found in BK-7-1 (3.24 kg) and the lowest was found in Alipurduar Local (0.79 kg). From Duncan's DMRT test, it was found that BK-7-1 (3.24 kg) was found to be statistically significantly different from each of the genotypes/varieties taken for investigation. Kaikhali Local (0.91 kg), Alipurduar local (0.79 kg), Berhampur Local (1.10 kg), Bidhan-1 (0.93 kg) were all statistically at par and non-significant with each other. BK-2 (2.74 kg) and Bidhan -2 (2.42 kg) were statistically at par and non-significant with each other. Berhampur Local (1.10 kg) and Pundibari local (1.08 kg) were statistically at par and non-significant with each other **(**Table 3).

CONCLUSION

BK-7-1 was found to have maximum plant height, leaf length, pods per plant, pod length, seeds per pod, yield per plant, biological yield per plant, and biological yield per plot followed by WBK-10, BK-2, and Bidhan-2, BK-27-1 where they performed good in biological yield per plot. WBK-10, BK-2, BK-27-1, BK-7-1 yield per plot, and high seed index were found in WBK-10, Bidhan-2, BK-2 along with BK-7-1. Seeds per plant were found highest in WBK-10 followed by BK-7-1, Berhampur local and BK-2. In seeds per pod, maximum was found in BK-27-1 followed by Bidhan-1, BK-2, Kaikhali local, and Berhampur Local. Pods per plant was found highest in BK-7-1 followed by WBK-10, BK-2, and Berhampur Local were found in yield-related characters along with biological yield. So, BK-7-1 is the best genotype, followed by BK-2, BK-27-1, WBK-10, Bidhan-2, Kaikhali local and Berhampur Local can be selected considering all the yield attributes of this investigation.

FUTURE SCOPE

The main problem of this crop is ODAP measurement where national and international standards were made where below 0.2 % -2% ODAP content is accepted for release of any variety. So the percentage of ODAP should always be minimized following selection methods. ODAP percentage can be measured in these populations and proper selection methods like pedigree method, mutation breeding, pure-line method, somaclonal variation can be adopted for releasing the varieties. Although this crop does not suffer from serious disease and pest attack, powdery mildew problem is observed in this crop. So, disease-resistant lines against this disease can be developed in this crop with proper breeding methods.

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