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Seasonal variation on the productivity of cluster bean [*Cyamopsis tetragonoloba* L. (Taub)]

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ABSTRACT

An investigation was carried in two seasons, season I during (July-Sep) 2015 and season II during (Feb-April) 2016 with thirty-five genotypes of cluster bean to identify superior genotypes for further crop breeding programmes. The results revealed that the season I showed relatively superior mean performance with respect to plant height, number of pods, and pod yield per plant when compared to season II. During season I, genotypes CT-31, CT-26, CT-32, CT-27 showed better performance in terms of pod yield per plant, and, number of pods per plant. During season II, genotypes CT-31, CT-26, CT-33 showed better performance in terms of pod yield per plant, number of pods per plant.

KEYWORDS: Cluster bean, mean performance, yield, season.

INTRODUCTION

Clusterbean (*Cyamopsis tetragonoloba*) is an important leguminous crop but it is categorized as an underexploited vegetable. This plant belongs to the family Fabaceae [1]. In total, India and Pakistan produces a significant amount of clusterbean [2]. Though clusterbean has been under cultivation for vegetable purpose, its potentiality is not fully exploited [3]. Therefore, there is a need for identification or development of clusterbean genotypes suited for vegetable purpose for southern zone of Tamilnadu. This calls for an evaluation of local or related genotypes to know the potentiality and variability. Genetic evaluation deserves considerable importance from the point of view for identifying the improved genotypes in the germplasm.

MATERIALS AND METHODS

The present study was carried out at vegetable field unit, Department of Horticulture, Faculty of Agriculture, Annamalai University in two seasons viz., season I (July-Sep 2015) and season II (Feb-April 2016). The materials used and methods followed are described below.

EXPERIMENTAL MATERIALS

A total of 35 genotypes, among them 30 were collected from National Bureau of Plant Genetic Resources (NBPGR), 3 from Andhra Pradesh, 1 from Gujarat and 1 from Tamil Nadu used

as biological materials for this study. The details of genotypes are furnished in Table 1.

The total of 35 genotypes were sown in a randomized block design (RBD) with 3 replications in 2 seasons during July-Sep 2015 and Feb-April 2016. Each genotype was sown at a spacing of 45 X 25cm under irrigated condition. All the recommended agronomic practices were followed and plants were randomly selected from each genotype per treatment for observation.

Eight plants are randomly selected from each treatment in each replication and tagged. The observations like plant height, number of pods per plant and green pod yield per plant were recorded.

RESULT AND DISCUSSION

Plant Height

In season I, the plant height ranged from 50.21 to 89.33 cm (Table 2). The genotype CT-31 was found to record the highest plant height (89.33 cm) followed by CT-28 (88.79 cm) and CT-12 (87.22cm) while the lowest plant height was noticed in CT-2 (50.21 cm).

In season II, the plant height ranged from 50.02 to 88.45 cm (Table 2). The genotype CT-31 was found to record the highest plant height of (88.45cm) followed by CT-28 (86.35 cm) and

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Table 1: Particulars of genotypes of cluster beans used in the study

Accession No.	Nature of the area	Accession No.	Nature of the area
1	IC 28272 (NBPGR Accession)	19	IC 369861 (NBPGR Accession)
2	IC 116616 (NBPGR Accession)	20	IC 369868 (NBPGR Accession)
3	IC 116780 (NBPGR Accession)	21	IC 370473 (NBPGR Accession)
4	IC 258087 (NBPGR Accession)	22	IC 370478 (NBPGR Accession)
5	IC 258089 (NBPGR Accession)	23	IC 370490 (NBPGR Accession)
6	IC 258090 (NBPGR Accession)	24	IC 370498 (NBPGR Accession)
7	IC 258092 (NBPGR Accession)	25	IC 373427 (NBPGR Accession)
8	IC 285174 (NBPGR Accession)	26	IC 373438 (NBPGR Accession)
9	IC 311440 (NBPGR Accession)	27	IC 373467 (NBPGR Accession)
10	IC 311441 (NBPGR Accession)	28	IC 373480 (NBPGR Accession)
11	IC 311444 (NBPGR Accession)	29	IC 373497 (NBPGR Accession)
12	IC 311449 (NBPGR Accession)	30	IC 373557 (NBPGR Accession)
13	IC 324032 (NBPGR Accession)	31	PUSA NAVABAHAR (TN Local)
14	IC 325811 (NBPGR Accession)	32	MILAN-51 (Gujarat Local)
15	IC 329030 (NBPGR Accession)	33	SELECTION (Tirupati Local)
16	IC 329033 (NBPGR Accession)	34	BAPATLA (Bapatla Local)
17	IC 329036 (NBPGR Accession)	35	LAKSHMI (A.P Local)
18	IC 329038 (NBPGR Accession)	-	-

Table 2: Mean performance of genotypes for plant height (cm)

Accession No.	Genotype	Mean performance of genotypes for plant height (cm)		
		Season I	Season II	Pooled
1	CT-1	55.05	52.02	54.91
2	CT-2	50.21	50.02	49.28
3	CT-3	54.24	54.23	52.24
4	CT-4	55.93	53.96	52.94
5	CT-5	58.35	55.95	56.15
6	CT-6	54.75	52.91	51.33
7	CT-7	65.64	60.41	63.02
8	CT-8	59.37	52.13	55.75
9	CT-9	86.70	77.18	72.94
10	CT-10	71.32	68.08	64.70
11	CT-11	80.53	78.59	64.06
12	CT-12	87.22	85.22	76.72
13	CT-13	84.20	83.49	77.85
14	CT-14	81.62	79.61	69.12
15	CT-15	67.12	63.46	65.29
16	CT-16	72.51	70.31	71.23
17	CT-17	74.93	72.29	70.25
18	CT-18	68.96	65.25	67.11
19	CT-19	72.35	71.66	69.85
20	CT-20	72.03	69.00	70.51
21	CT-21	74.55	72.64	70.59
22	CT-22	81.34	79.85	72.09
23	CT-23	80.56	79.39	78.87
24	CT-24	86.20	85.27	83.21
25	CT-25	85.05	83.11	82.11
26	CT-26	85.54	82.50	83.21
27	CT-27	84.76	83.23	82.56
28	CT-28	88.79	86.35	84.56
29	CT-29	86.56	84.38	85.01
30	CT-30	87.00	85.47	86.23
31	CT-31	89.33	88.45	88.21
32	CT-32	70.22	69.79	68.21
33	CT-33	77.78	71.33	74.55
34	CT-34	68.46	66.42	67.44
35	CT-35	69.98	76.89	73.43
Range		50.21-89.33	50.02-88.45	51.33-88.21
Grand mean		82.36	77.86	80.60
SE		0.59	0.87	0.52
CD at 5 % level		1.66	2.44	1.45
at 1%		2.21	3.24	1.93

CT-24 (85.27cm) while the lowest plant height was noticed in CT-1 (50.02cm). Among the two seasons, the genotypes in season I performed well for this character when compared to season II.

Number of Pods Per Plant

In season I, the number of pods per plant ranged from 14.48 to 29.49 (Table 3). The genotype CT-26 (29.89) was found to record highest number of pods per plant followed by CT-31 (29.31) and CT-34 (29.30) while the lowest number of pods per plant was noticed in CT-8 (14.48).

In season II, the number of pods per plant ranged from 12.84 to 28.64 (Table 3) The genotype CT-31 (28.64) was found to record highest number of pods per plant followed by CT-26 (28.64) and CT-20 (28.48) while the lowest number of pods per plant was noticed in CT-24 (14.32). Genotypes in season I performed well for the trait number of pods per plant when compared to season II.

Green Pod Yield Per Plant

In season I, the green pod yield per plant ranged from 109.74 to 320.11 gm (Table 4). The genotype CT-31 (320.11 gm.) was found to be highest pod yield followed by CT-26 (301.78 gm) and CT-32 (281.02 gm) while the least was noticed in CT-18 (109.74 gm.)

In season II, the green pod yield per plant ranged from 100.01 to 316.30 gm. The genotype CT-31 (316.30 gm.) was found to record the highest pod yield followed by T-26 (297.02 gm) and CT-32 (277.03 gm) while the least was noticed in CT-17 (100.01 gm.), followed by CT-26 (294.41 gm) and CT-32 (279.02 gm) while the lowest was noticed in CT-17 (106.92 gm.). The genotypes in season I performed well compared to season II for the character green pod yield per plant.

During season I, the genotype CT-31 showed best performance in pod yield per plant than in season II, followed by genotypes

Table 3: Mean performance of genotypes for number of pods per plant

Accession No.	Genotype	Mean performance of genotypes for number of pods per plant		
		Season I	Season II	Pooled
1	CT-1	24.97	22.44	22.20
2	CT-2	21.36	20.87	24.08
3	CT-3	18.92	16.94	15.93
4	CT-4	20.26	18.34	17.80
5	CT-5	16.95	15.44	15.19
6	CB-6	20.71	19.40	20.05
7	CT-7	25.04	22.48	22.76
8	CT-8	14.48	13.48	13.98
9	CT-9	15.94	14.83	17.89
10	CT-10	28.52	27.82	24.17
11	CT-11	25.9	23.13	21.20
12	CT-12	24.73	22.00	20.87
13	CT-13	20.06	19.08	19.57
14	CT-14	23.20	22.84	18.06
15	CT-15	23.59	21.31	19.95
16	CT-16	25.82	22.17	24.00
17	CT-17	21.88	20.78	20.83
18	CT-18	20.49	19.60	21.55
19	CT-19	22.76	21.01	19.38
20	CT-20	29.41	28.48	24.44
21	CT-21	20.27	18.72	19.49
22	CT-22	26.65	25.75	22.70
23	CT-23	16.23	16.84	16.53
24	CT-24	15.21	14.32	17.26
25	CT-25	17.51	16.29	18.90
26	CT-26	29.49	28.57	28.01
27	CT-27	29.12	27.44	26.47
28	CT-28	28.71	27.81	23.26
29	CT-29	28.11	26.23	24.32
30	CT-30	23.26	22.16	20.71
31	CT-31	29.31	28.64	26.95
32	CT-32	27.28	26.68	24.98
33	CT-33	29.65	27.21	24.28
34	CT-34	29.30	28.06	22.47
35	CT-35	20.36	21.04	22.00
Range		14.48-29.49	14.32 -28.64	13.98-28.01
Grand mean		23.73	21.91	20.32
SE		0.85	0.50	0.46
CD at 5 % level		2.40	1.40	1.29
at 1%		3.19	1.86	1.72

CT-26, CT-32 recorded higher pod yield per plant and component traits.

In season II, the genotype CT-31 (316.30 gm.), CT- 26 (297.20 gm.), CT-32(277.03gm) showed better performance in terms of pod yield per plant. It is of interest to note that the genotypes CT-31, CT-26, CT-32 performed well in both seasons. Similar results reported in cluster bean by [4,5].

Based on mean performance, two genotypes CT-31 and CT-26 were selected as best genotypes for the coastal ecosystem by virtue of their higher yield potential combined with desirable component characters in both seasons. All the cluster bean accessions in general showed superior performance with reference to growth and yield in season I. In the season II, because of increase in pest and disease incidence due to

Table 4: mean performance of genotypes for green pod yield per plant (gm)

Accession No.	Genotype	Mean performance of genotypes for green yield per plant		
		Season I	Season II	Pooled
1	CT-1	116.25	114.08	115.16
2	CT-2	119.87	110.22	115.04
3	CT-3	118.74	114.04	116.39
4	CT-4	123.70	121.69	122.69
5	CT-5	160.38	155.73	158.05
6	CT-6	234.54	230.98	232.76
7	CT-7	195.39	190.98	193.18
8	CT-8	138.74	135.82	137.28
9	CT-9	140.75	133.70	137.22
10	CT-10	174.23	169.11	171.67
11	CT-11	224.53	220.23	222.38
12	CT-12	110.49	107.80	109.28
13	CT-13	180.07	176.76	179.41
14	CT-14	230.12	225.47	227.79
15	CT-15	201.68	199.68	200.68
16	CT-16	180.74	177.23	178.98
17	CT-17	113.84	100.01	106.92
18	CT-18	109.74	104.25	106.99
19	CT-19	120.59	119.35	118.47
20	CT-20	137.71	133.89	135.80
21	CT-21	122.74	118.02	129.38
22	CT-22	200.02	194.12	197.50
23	CT-23	190.11	187.21	188.66
24	CT-24	129.88	125.00	127.44
25	CT-25	200.01	198.02	199.01
26	CT-26	301.78	297.02	294.41
27	CT-27	235.85	220.79	228.32
28	CT-28	224.20	219.22	221.71
29	CT-29	153.87	150.11	151.99
30	CT-30	146.44	140.29	143.36
31	CT-31	320.11	316.30	319.04
32	CT-32	281.02	277.03	279.02
33	CT-33	188.69	185.78	187.23
34	CT-34	224.20	220.03	222.11
35	CT-35	206.69	200.27	202.39
Range		109.74-320.11	100.01-316.30	106.92-319.04
Grand mean		178.84	173.12	172.58
SE		0.77	1.24	0.72
CD at 5 % level		2.17	3.47	2.02
at 1%		2.89	4.61	2.68

increase in temperature may be the probable reason for reduced yield in summer whereas in the season I because of favorable temperature all the genotypes showed superior mean performance. Hence season I is adjudged as the best season for sowing cluster bean.

AUTHOR'S CONTRIBUTION

Authors contributed equally to the overall study and manuscript preparation and approved the final version of the manuscript for publication.

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