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EVALUATION OF WINGED BEAN (*PSOPHOCARPUS TETRAGONOLOBUS*) GENOTYPES IN COASTAL ANDHRA PRADESH FOR GROWTH AND YIELD TRAITS

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ABSTRACT

Winged bean (*Psophocarpus tetragonolobus*) is a multipurpose, underutilized leguminous crop of the tropics that is rich in proteins and minerals. The present investigation entitled “Evaluation of winged bean (*Psophocarpus tetragonolobus*) genotypes in coastal Andhra Pradesh for growth and yield traits” was carried out during late kharif 2024-25 at Dr. YSRHU - College of Horticulture, Venkataramannagudem. For this study 15-winged bean genotypes were evaluated using Randomized Complete Block design with two replications and the data related to growth and yield parameters were recorded. Among all winged bean genotypes, Kerala local had shown maximum vine length, leaf chlorophyll content, leaf area, pod length, pod width, pod weight, number of seeds per pod. Whereas, minimum days to first flowering, days to first harvesting, maximum plant spread (m), number of pods per plant, pod yield per plant were noticed in genotype KWB-1. The genotypes Kerala local and KWB-1 were found to be superior regarding growth and yield.

Key words: Winged bean, growth, yield, mean performance

Introduction

Winged bean (*Psophocarpus tetragonolobus*) (2n=2x=18) is also known as God-sent vegetable, Goa bean, four-angled bean and princess pea. It is a protein-rich multipurpose crop that has gained significant importance. It is believed to have originated from South-East Asia, possibly Papua New Guinea. This leguminous underutilized vegetable crop is widely cultivated in countries such as Bangladesh, Burma, Thailand, Vietnam, Malaysia, Indonesia, Ghana, Nigeria and Sri Lanka. Almost all parts of the winged bean including the leaves, flowers, pods, green seeds, dried seeds and tuberous roots are edible and highly nutritious. It is grown in Assam,

Rajasthan, Tripura, Meghalaya, West Bengal, Orissa and other Southern states and it is commonly grown in small plots, backyard garden and the edges of fields. It has gained much attention in recent years among the scientists because of its fast growth, high yield and nutritional quality.

Winged bean is a self-pollinated crop and it is considered as a short-day plant. The pods are 15-22 cm in length and 2-3 cm in width with four angles that extend into crisp with papery wings. These wings may be undulated, dented or serrated. Each pod contains 5 to 20 smooth, shiny, and globular seeds with an average weight of 250 mg. (Singh *et al.*, 2022).

It is highly nutritious legume that remains underutilized but it holds great potential for enhancing food use. Unlike many major staple crops, it is resilient, capable of withstanding drought, floods, high temperatures and attack from pests and diseases. This makes it a valuable crop for areas with challenging growing conditions (Mahobia *et al.*, 2024).

Winged beans are beneficial in promoting the development of structural proteins and lowering the risk of coronary heart disease (Esan *et al.*,2020). Additionally, these miracle beans support a healthy digestive system. They are rich in various carbohydrates that nourish and sustain the gut bacteria which play a key role in breakdown of food into essential nutrients (Adegboyega *et al.*, 2019).

In Andhra Pradesh, winged bean cultivation is confined to hilly areas even though it is suitable for all parts of the state. It is grown in homestead gardens of tribal people. Keeping its high nutritive value and wider adaptability, the present study was taken up to find suitable genotypes of winged bean for cultivation under coastal humid climate of Andhra Pradesh.

Material and Methods

The experiment was conducted at Dr. YSRHU - College of Horticulture, Venkataramannagudem during late kharif 2024-25. It was laid out in Randomized Complete Block Design and replicated twice. Total fifteen-winged bean genotypes were evaluated for growth and yield traits. The genotypes IC-95230, IC-95231, EC-038824, EC-130184, EC-142600, RWBGP-76, RWBGP-78, RWBGP-81, RWBGP-85, RWBGP-88 were sourced from Uttar Banga Krishi Vishwavidyalaya (UBKV), West Bengal. The other genotypes IGKV-1 from Indira Gandhi Krishi Vishwavidyalaya (IGKV), Kerala Local from Kerala Agricultural University (KAU), Thrissur and KWB-1, KWB-2, KWB-3 were collected locally from Regional Horticultural Research Station, Kovvur. The seeds of each genotype were sown in rows with spacing of 1m between the rows and 60 cm between the individual plants. After emergence of seedling, staking the vines with 1.5 m bamboo pole was provided for support. Analysis of variance was carried out as per the procedure given by Panse and Sukhatme (1967).

All the recommended cultural practices were followed to raise the healthy crop.

Results and discussion

The mean values of 15-winged bean genotypes for growth and yield parameters are presented with the following headings (Table 1 & 2).

Table 1: Mean performance of winged bean genotypes for growth characters.

S. NO	T	GENOTYPE	VL (m)	LCC (SPAD)	LA (cm ²)	PS (m)
1	G ₁	IC-95230	1.73	24.51	105.30	0.31
2	G ₂	IC-95231	2.29	26.09	112.78	0.36
3	G ₃	EC-038824	2.20	28.25	121.37	0.34
4	G ₄	EC-130184	1.61	31.20	108.77	0.30
5	G ₅	EC-142600	2.07	29.74	121.61	0.38
6	G ₆	RWBGp-76	2.37	33.24	117.20	0.38
7	G ₇	RWBGp-78	2.58	43.97	142.12	0.46
8	G ₈	RWBGp-81	2.71	37.16	126.21	0.52
9	G ₉	RWBGp-85	2.97	40.48	137.67	0.59
10	G ₁₀	RWBGp-88	2.49	35.19	121.84	0.40
11	G ₁₁	Kerala local	3.69	51.04	163.80	0.67
12	G ₁₂	KWB-1	3.41	47.84	150.18	0.79
13	G ₁₃	KWB-2	2.82	42.26	143.35	0.56
14	G ₁₄	KWB-3	2.62	39.10	131.55	0.48
15	G ₁₅	IGKV-1	3.17	49.24	157.49	0.64
Mean			2.58	37.29	130.75	0.48
S.E.m. ±			0.05	0.44	1.10	0.02
C.D. @ 5%			0.15	1.35	3.32	0.06
T: TREATMENT						

Growth Parameters

Vine length (m)

The character vine length ranged from 1.61m to 3.69 m at final harvest with average mean of 2.58 m (Table 1). The genotype Kerala local had shown maximum vine length (3.69 m) and the genotype EC-130184 had shown minimum vine length (1.61m) compared to all other genotypes.

Leaf chlorophyll content (SPAD units)

It was noticed that chlorophyll content of leaf ranged from 24.51 SPAD units to 51.04 SPAD units at final

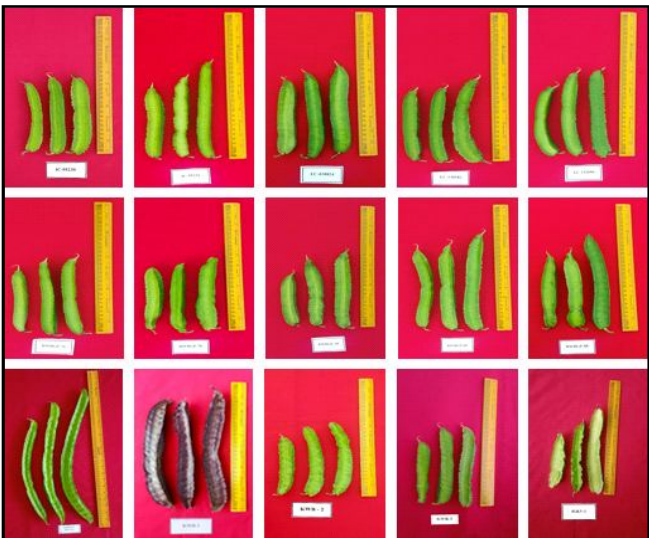


Fig. 1: Variation of pods among winged bean genotype.

Table 2: Mean performance of winged bean genotypes for yield characters.

S.no	T	Genotype	DFE	DFH	PL (cm)	PW (cm)	PWE (g)	NPPPL	NSPPO	PYPL(Kg)
1	G1	IC-95230	46.70	76.40	17.40	2.15	20.29	144.80	10.70	3.41
2	G2	IC-95231	47.70	77.40	21.20	2.13	19.58	165.70	11.90	4.79
3	G3	EC-038824	45.30	75.80	20.30	2.52	19.83	182.80	12.40	4.87
4	G4	EC-130184	47.30	77.00	18.32	2.34	21.83	138.60	10.90	3.17
5	G5	EC-142600	47.80	77.60	19.22	2.18	20.21	171.50	11.70	5.24
6	G6	RWBGP-76	48.10	77.90	19.24	2.30	21.43	176.20	12.10	5.08
7	G7	RWBGP-78	46.50	76.10	17.23	2.49	21.36	159.40	11.00	4.14
8	G8	RWBGP-81	48.60	79.40	18.53	2.42	21.61	189.20	11.50	5.76
9	G9	RWBGP-85	45.00	75.50	25.36	2.59	20.88	204.00	13.50	6.25
10	G10	RWBGP-88	44.70	73.20	23.32	2.36	22.40	197.80	13.10	5.99
11	G11	Kerala local	56.50	84.70	52.09	2.91	24.45	248.10	23.10	7.71
12	G12	KWB-1	42.05	71.90	30.62	2.72	23.49	262.30	14.50	8.48
13	G13	KWB-2	50.10	80.70	19.12	2.62	20.43	211.20	11.30	6.38
14	G14	KWB-3	48.40	78.20	19.36	2.57	20.25	200.20	12.00	6.04
15	G15	IGKV-1	46.90	76.80	24.35	2.66	22.73	223.80	13.40	7.67
Mean			47.44	77.24	23.04	2.46	21.38	191.71	12.87	5.66
S.E.m. ±			0.73	0.60	0.38	0.03	0.28	1.91	0.27	0.12
C.D. @5%			2.21	1.83	1.16	0.09	0.85	5.78	0.81	0.35
T: Treatment; DFE = Days to first flowering; DFH =Days to first harvesting; PL (cm) =Pod length (cm); PW (cm) = Pod width (cm); PWE(g) =Pod weight (g); NPPPL =Number of Pods per plant; NSPPO =Number of seeds per pod; PYPL (kg) = Pod yield per plant (kg).										

harvest with overall mean of 37.29 SPAD units (Table 1). The more leaf chlorophyll content had exhibited by Kerala local (51.04 SPAD units) and the lowest leaf chlorophyll content had observed in IC-95230 which was 24.51 SPAD units.

Leaf area (cm²)

Significant variation was observed with respect to leaf area and it ranged from 105.30 cm² to 163.80 cm² with average mean of 130.75 cm² (Table 1). The highest leaf area was seen in Kerala local (163.80 cm²) and the genotype IC-95230 (105.30 cm²) had lowest leaf area among all winged bean genotypes.

Plant spread (m)

It was found that, plant spread had shown significant variation among the winged bean genotypes having range from 0.30 m to 0.79 m with mean of 0.48 m. The genotype KWB-1 was found with maximum plant spread (0.79 m). The minimum plant spread (0.30 m) was found in genotype EC-130184.

Wide variation was observed among the winged bean genotypes for growth traits. As per observations recorded Kerala local exhibited maximum vine length, leaf chlorophyll content and leaf area. Maximum plant spread was observed in KWB-1.

Similar results are obtained with Thapa *et al.*, (2024), Hansda *et al.*, (2023), Kashyap and Yadav (2022), Kant and Nandan (2018), Prasanth *et al.*, (2015) and Pan *et*

al., (2005) in Winged bean.

Yield Parameters

Days to first flowering

There was significant variation among the genotypes for days to first flowering having a range from 42.05 to 56.50 days with an overall mean of 47.44 days (Table 2). The genotype KWB-1 showed early flowering *i.e.*, a less number of days taken for first flowering with 42.05 days and the more number of days for first flowering (56.50) was observed in genotype Kerala local.

Days to first harvesting

Days to first harvesting ranged from 71.90 days (KWB-1) to 84.70 days (Kerala local) with a general mean of 77.24 days (Table 2). Less number of days to first harvesting (71.90 days) was observed in KWB-1 and the more number of days to first harvesting (84.70 days) was observed in Kerala local.

Pod length (cm)

It was found that mature pod length ranged from 17.23 cm to 52.09 cm with a general mean of 23.04 cm (Table 2). Among the genotypes, the highest mature pod length (52.09 cm) was noticed in genotype Kerala local and the lowest mature pod length (17.23 cm) was found in genotype RWBGP-78.

Pod width (cm)

The mature pod width ranged from 2.13 cm to 2.91

cm with an average mean of 2.46 cm (Table 2). The maximum mature pod width (2.91 cm) was identified in genotype Kerala local and the genotype IC- 95231 had minimum mature pod width (2.13 cm).

Pod weight (g)

Significant variation was noticed among the genotypes with respect to the mature pod weight ranged from 19.58g to 24.45g with a general mean of 21.38g (Table 2). Maximum mature pod weight (24.45g) was identified in Kerala local. However, minimum mature pod weight (19.58g) was found with in the genotype IC- 95231.

Number of Pods per plant

Number of pods per plant varied significantly among the genotypes ranged from 138.60 to 262.30 with an average mean of 191.71 (Table 2). The number of pods per plant were more (262.30) in genotype KWB-1 and the number of pods per plant are low (138.60) in genotype EC-130184.

Number of seeds per pod

It was found that number of seeds per pod ranged from 10.70 to 23.10 with overall mean 12.87 (Table 2). The more number of seeds per pod (23.10) was observed in the genotype Kerala local and the genotype IC-95230 was found with lesser number of seeds per pod (10.70) among the genotypes.

Pod yield per plant (kg)

The pod yield per plant that ranged from 3.17 kg to 8.48 kg with an overall mean of 5.66 kg (Table 2). The genotype KWB-1 recorded the maximum pod yield per plant (8.48 kg) and the minimum pod yield per plant (3.17 kg) was recorded in EC-130184 compared to all other genotypes.

As per observations recorded more variation in mean performance of winged bean genotypes was noticed for yield characters. KWB-1 showed early flowering, early harvesting and also maximum values for traits like number of pods per plant, pod yield per plant. Whereas, the genotype Kerala local exhibited maximum values for traits like pod length, pod width, pod weight and number of seeds per pod.

Similar results were observed by Thapa *et al.*, (2024), Hansda *et al.*, (2023), Kashyap and Yadav (2022), Lawal *et al.*, (2019), Kant and Nandan (2018), Prasanth *et al.*, (2015) and Mohamadali and Madalageri (2007) in Winged bean.

Conclusion

From the present study, it is concluded that the winged bean genotypes had shown significant variation in growth

and yield attributes. Out of fifteen-winged bean genotypes Kerala local and KWB-1 were found to be superior among all other winged bean genotypes. The present study results revealed that these fifteen-winged bean genotypes are suitable to cultivate under coastal humid climate of Andhra Pradesh.

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