



Evaluation of Vegetable Cowpea (*Vigna unguiculata* L. Walp) Varieties For High Yield in Coastal Andhra Pradesh

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ABSTRACT

Nine vegetable cowpea varieties were evaluated during the year 2011 Kharif to identify suitable vegetable type cowpea varieties for commercial production in coastal Andhra Pradesh based on growth and yield characters. The study revealed that the variety Vellayani Local recorded highest values for all the growth components like plant height, primary branches, number of leaves and dry matter accumulation. Yield components like crop duration, pod length, pod girth, mean pod weight, seeds per pod, pod yield per plant and test weight were also recorded highest by the variety Vellayani Local showing its greater adaptability under these agro-climatic conditions.

Key words : Cowpea varieties, Coastal Andhra Pradesh, Pod yield, Yield components.

Cowpea is a widely grown legume in tropical and subtropical Africa. It is mostly cultivated by small scale farmers, usually intercropped with maize or sorghum. Cowpea seeds act as a major source of protein (22-24%), vitamins and minerals.

The short duration of the cowpea crop, the low investments and inputs and high income benefits, the adequacy of limited rainfall to mature a crop of cowpea, high cost of imported pulses and awareness among people regarding the importance of protein in the diet to avoid malnutrition, all these may contribute to evaluate a cowpea variety suitable to a particular region to get higher yields. In India, cowpea is cultivated on a limited scale and particularly in Andhra Pradesh where it is grown as a marginal crop with the local varieties. Yields of cowpea in general are low in Andhra Pradesh and there is considerable scope of improvement by introducing high yielding varieties and also by adoption of proper agronomic practices.

Cowpea varieties differ in their adaptability to different agro-climatic conditions. Since the research work on the evaluation of varieties to find out suitable varieties to the coastal Andhra Pradesh is meager, the present research was focused on the objective to identify best variety for coastal Andhra Pradesh.

MATERIAL AND METHODS

A field experiment entitled "Evaluation of vegetable cowpea (*Vigna unguiculata* L. Walp)

varieties for high yield in coastal Andhra Pradesh" was carried out during 2011 at Horticultural college and Research Institute, Dr.Y.S.R.Horticultural University, Venkataramannagudem, West Godavari District. The experiment was arranged in a randomized block design (RBD) with 3 replications. The nine varieties viz., Arka Garima (T1), Arka Suman (T2), Bhagya Lakshmi (T3), Vellayani Local (T4), Khashi Kanchan (T5), Baramasi (T6), Gomthi (T7), Pusa Komal (T8) and local check (T9) were assessed for different growth and yield attributing characters in the field.

Experimental site details

Venkataramannagudem comes under coastal belt and it is situated at an altitude of 34 meters (112 feet) above mean sea level. The geographical situation is 16.83 °N latitude and 81.50 °E longitude. The location falls under Agro-climatic zone-10 of humid, East Coast Plain and Hills (Krishna-Godavari zone) with an average rainfall of 900 mm. It experiences hot humid summers and mild winters. The soil is of red sandy loam with good drainage and moderate water holding capacity.

Cultivation details

The land was prepared into plots of size 3.0 m x 2.7 m and the seeds were directly dibbled 5 cm deep on ridges adopting a uniform spacing of 60 cm between the rows and 30 cm within the row. Before sowing, farm yard manure was applied to

the soil as a basal dose as per the recommendation. Nitrogen was applied in the form of urea (46% N) @ 25 kg ha⁻¹ in two equal splits *ie.*, as a basal dose and subsequent dose at flowering stage by placement method. Phosphorous was applied in the form of single superphosphate (16 % P₂O₅) and Potassium was in the form of Muriate of potash (MOP) (58-62%K₂O). Both phosphorus and potash were applied completely as a basal dressing @ 50 kg ha⁻¹. Irrigations were given at 5 days interval depending upon moisture condition of experimental plot, to maintain uniform soil moisture throughout the crop growth period. Hand weeding was done at 15 and 30 days after germination. The crop was duly protected from pests by fortnightly spraying of Carbaryl (3g l⁻¹) for controlling of sucking pests, Endosulphon (2 ml l⁻¹) and Malathion (2 ml l⁻¹) were used for the control of pod borers.

Five plants in each plot were tagged from the net plot of each treatment in each replication for recording the observations. The observations on plant height, number of primary branches, number of leaves, dry matter accumulation per plant, days to first flowering, days to 50 per cent flowering, crop duration, pod length, pod girth, seeds per pod, pods per plant, individual pod weight, test weight and pod yield per plant were recorded. The data was analyzed using computer software programmed by the method of variance outlined by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

The average performance of all nine varieties of vegetable cowpea with regard to different growth and yield components was given in Table-1 and Table-2 respectively.

GROWTH COMPONENTS

Plant height

At final harvest maximum plant height was observed in the variety Vellayani Local (161.59 cm) followed by Gomthi (25.43 cm), Local check (125.36 cm) and Arka Garima (100.16cm) whereas minimum height was observed in Bhagya Lakshmi (28.40 cm). Such variations in plant height were also reported by Ram *et al.* (1994) in cowpea. The variation might be due to differences in genetic characters or due to environmental fluctuations.

Number of primary branches per plant

During final harvest Vellayani Local recorded the highest number of primary branches (9.55), followed by Gomthi (8.48) and Arka Garima (7.12) and the minimum number was recorded by Bhagya Lakshmi (4.63). This type of variation in number of primary branches among different varieties was observed by Kohli *et al.* (1971) in cowpea.

Number of leaves per plant

Leaves are the functional units for photosynthesis, which greatly influence the growth and yield of any crop. By the time of final harvest maximum number of leaves retained by Vellayani Local (173.66), followed by Gomthi (141.66). The minimum was recorded by Bhagya Lakshmi (25.00). Similar differences in leaf number were reported by Sarvamangala (2004) and Futuless *et al.* (2010) in cowpea cultivars.

Total dry matter accumulation (g)

At the time of final harvest maximum dry matter accumulation was recorded by Vellayani Local (90.33 g), followed by Gomthi (72.38 g) and Arka Garima (51.45 g). Minimum dry matter accumulation was recorded by Bhagya Lakshmi (26.07 g). The high dry weight accumulation in the varieties was due to indirect effect of plant height, primary branches and number of leaves. This high variation in dry matter was in accordance with the reports of Relwani *et al.* (1970), Kohli *et al.* (1971) in cowpea

YIELD COMPONENTS

Days to first flowering

Earliness plays an important role in fetching higher market price and more income. Vellayani Local (34.35 days) took the lowest number of days to first flowering, followed by Baramasi (35.12 days). The maximum number of days to first flowering was taken by Bhagya Lakshmi (43.00 days).

Days to 50 per cent flowering

Vellayani Local (39.9 days) took the lowest number of days to 50 per cent flowering followed by Gomthi (45.4 days) and Bhagya Lakshmi (45.6

Table 1. Plant height, primary branches, leaves and dry matter of different cowpea varieties.

Treatments	Plant height(cm)			Number of primary branches			Number of leaves per plant			Dry matter accumulation per plant		
	30 DAS	60 DAS	At final harvest	30 DAS	60 DAS	At final harvest	30 DAS	60 DAS	At final harvest	30 DAS	60 DAS	At final harvest
	T1	24.66	60.23	100.16	2.26	5.6	7.12	45.53	65.16	71.66	4.86	22.68
T2	21.00	35.53	55.56	2.13	4.85	6.53	35.42	71.83	68.33	6.58	33.02	41.50
T3	10.90	17.63	28.40	0.70	3.25	4.63	21.74	27.66	25.00	2.66	12.98	26.07
T4	61.70	138.10	161.59	3.23	7.19	9.55	132.26	166.66	173.66	15.68	72.40	90.33
T5	18.23	25.98	36.56	1.16	5.62	6.48	30.70	41.66	51.66	5.18	14.78	30.85
T6	17.56	24.30	30.25	1.76	3.82	6.10	50.72	74.00	75.00	3.62	17.96	33.00
T7	25.43	98.86	145.50	2.51	6.63	8.48	110.57	130.00	141.66	7.36	34.73	72.38
T8	17.86	34.23	52.78	0.50	4.66	5.47	25.76	43.33	51.00	5.41	22.01	50.00
T9	21.53	75.63	125.36	1.66	4.50	6.25	93.10	111.66	125.00	3.90	15.50	34.33
CD	4.39	10.93	11.99	0.46	1.39	1.50	9.98	18.72	15.32	1.28	5.64	9.91
SE(m)	1.45	3.61	3.96	0.15	0.46	0.49	3.03	6.19	5.06	0.42	1.86	3.28
CV	10.35	11.03	8.39	14.88	15.60	12.78	9.43	13.18	10.08	12.00	11.82	11.89

days). Arka Garima (51.6 days) took maximum number of days to 50 per cent flowering. Similar findings were reported in cowpea by Egbe *et al.* (2010).

Crop duration (Days to final picking)

The crop duration ranged from 82.4 days to 95.54 days. Maximum crop duration of 95.54 days was recorded by Vellayani Local followed by Gomthi (92.68) and Arka Garima (90.80). The minimum crop duration of 82.40 days was recorded by the variety Bhagya Lakshmi. The major objective of this parameter was to study the harvesting period and frequency of harvest of the varieties, which play an important role on higher production, productivity and income (Yama *et al.*, 2006).

Pod length (cm)

Maximum pod length (plate 2) was recorded by Vellayani Local (46.70 cm) followed by Khashi Kanchan (32.83 cm) and Gomthi (29.53 cm). The minimum pod length of 17.46 cm was recorded by Bhagya Lakshmi. Such variations for pod length were reported in cowpea by Yama *et al.* (2006) and Arkbar Khan *et al.* (2010). To select a better variety for its higher pod yield, Pod length should be one of the major criteria for preferable pod size. It is obvious that the longer pods produce more yield than short pods (Yama *et al.*, 2006).

Pod girth (cm)

The maximum pod girth was recorded by Vellayani Local (3.51 cm), followed by Khashi Kanchan and Arka Garima (3.30 cm), whereas the minimum pod girth was recorded by Bhagya Lakshmi (2.46 cm). Similar variations in pod girth were also reported by Mohan *et al.* (2009) in dolichos bean.

Number of pods per plant

Regarding the pod number Gomthi (25.00) recorded the highest number of pods per plant and found significantly superior to all the other varieties tested. It was followed by Vellayani Local (19.46). The lowest number of pods per plant was recorded in Bhagya Lakshmi (9.10). The study on

Table 2. Yield components of different cowpea varieties.

Treatments	Days to 1 st flowering	Days to 50% flowering	Days to first picking	Crop duration (cm)	Pod length (cm)	Pod Girth in(cm) plant	Number of pods/ plant	Single pod wt (g)	No. of Seeds/ pod	1000 seed wt (g)	Pod yield/ plant(g)
T1 Arka Garima	39.24	51.16	45.73	90.80	23.00	3.30	14.70	26.23	17.00	124.46	349.03
T2 Arka Suman	37.91	46.62	47.97	84.25	20.00	3.15	14.60	15.31	13.33	115.96	237.24
T3 Bhagya Lakshmi	43.00	45.63	56.06	82.40	17.46	2.46	9.10	8.18	12.33	129.20	76.60
T4 Vellayani Local	34.35	39.94	42.91	95.54	46.70	3.51	19.46	28.77	21.00	169.46	556.04
T5 Khashi Kanchan	36.03	41.82	46.48	82.85	32.83	3.30	9.50	28.25	17.33	148.80	252.45
T6 Baramasi	35.12	48.46	47.28	87.84	28.50	2.75	15.36	12.30	14.66	110.66	179.74
T7 Gomthi	38.13	45.44	46.29	92.68	29.53	2.78	25.00	16.35	16.66	126.33	400.56
T8 Pusa Komal	41.38	50.95	50.02	87.68	20.33	2.66	10.49	6.69	12.33	113.23	70.05
T9 Local variety (check)	37.74	46.72	46.08	87.53	28.16	2.70	16.13	16.63	16.00	115.26	268.04
CD	1.04	1.86	4.98	4.17	0.56	0.16	3.14	0.40	1.39	0.88	41.16
SE(m)	0.34	0.61	1.64	1.38	0.18	0.05	1.13	0.13	0.46	0.29	13.61
CV	1.56	2.30	5.99	2.71	1.17	3.15	13.10	1.32	5.09	0.39	8.87

number of pods per plant help to evaluate the varieties for pod setting and its effect on pod size and yield (Yama *et al.*, 2006). Highly significant variations for number of pods per plant were reported by Obadoni (2009) in cowpea.

Mean pod weight (g)

The highest mean pod weight was recorded by Vellayani Local (28.77 g), followed by Khashi Kanchan (28.25 g) and Arka Garima (26.23 g).

Number of seeds per pod

Maximum number of seeds recorded in Vellayani Local (21.00), followed by Khashi Kanchan (17.33) and Arka Garima (17.00) against the local check (16.00). Minimum number of seeds per pod was recorded in Bhagya Lakshmi and Pusa Komal (12.33). This variation might be due to differential genetic makeup, specific to a variety or due to environmental influence (Akbar Khan *et al.*, 2010). Similar results were reported by Chattopadhyaya *et al.* (1996) and Vidya (2000) in cowpea.

Test weight (g)

Maximum seed weight was recorded by Vellayani Local (169.46 g) followed by Khashi Kanchan (148.80 g) and Bhagya Lakshmi (129.20 g). Minimum test weight was recorded by Baramasi (110.66 g). These differences in seed weight might be due to the time factor for the accumulation of assimilates in the seeds and differences in the genetic makeup of different genotypes. Acclimatization factor might also be responsible for higher seed weight. Akbar Khan *et al.* (2010), Futiless *et al.* (2010) reported similar variation for seed weight in cowpea.

Pod yield per plant (g)

The average pod yield per plant ranged from 70.05 g to 556.04 g. Maximum pod yield was recorded in Vellayani Local (556.04 g), which was

significantly superior to all the other varieties. It was followed by Gomthi (400.56 g) and Arka Garima (349.03 g). The minimum pod yield of 70.05 g was recorded by Bhagya Lakshmi. The results obtained in the study are in conformity with the reports of Hazra *et al.* (1996) and Sobha and Vahab (1998) in cowpea.

From the results obtained in the present study, Vellayani Local was considered as best high yielding variety for coastal Andhra Pradesh followed by Gomthi and Arka Garima.

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