



Evaluation of Ivy Gourd (*Coccinia grandis* L) Genotypes under Prayagraj Agro Climatic Conditions

**Pankaj Kumar Sutar^{a++*}, Devi Singh^{b#}, C. John Wesley^{c#}
and Bijay Laxmi Sahu^{d†}**

^a Department of Horticulture (Vegetable Science), Naini Agricultural Institute, SHUATS, Prayagraj, Uttar Pradesh, India.

^b Department of Horticulture, Naini Agricultural Institute, SHUATS, Prayagraj, Uttar Pradesh, India.

^c Centre for Geospatial Technologies, VIAET, SHUATS, Prayagraj, Uttar Pradesh, India.

^d Krishi Vigyan Kendra, Deogarh, Odisha, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The present investigation entitled "Evaluation of Ivy gourd (*Coccinia grandis* L) genotypes under Prayagraj agro climatic conditions" was carried out from October, 2022 to March 2023 at Horticultural Research Field, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology And Sciences, Prayagraj, U.P. The experiment was laid out in randomized block design with seven genotypes in three replications. The genotypes namely G₁-Arka Neelachal Khunki, G₂-Arka Neelachal Sabuja, G₃-Local Geda, G₄-Local Denga, G₅-Surekha, G₆- CHIV-7 and G₇-CHIV-8 were evaluated. It was concluded that all seven genotypes

⁺⁺ M.Sc. Research Scholar;

[#] Associate Professor;

[†] Scientist (Home Science);

*Corresponding author: E-mail: sutarpankaj7@gmail.com;

showed a significant performance on almost all the growth and yield characters as well as quality of Ivy gourd. The genotype G₂-Arka Neelachal Sabuja was found superior in terms of vine length (315.11 cm), petiole length (6.37 cm), internodal length (12.71cm),fruit diameter (2.87 cm), average fruit weight (21.08 g), No. of seeds per fruit (122), No. of fruits per plant (422), fruit yield per plant (8.82 kg) ,fruit yield per hectare (17.35 t/ha), TSS (4.33), Ascorbic acid (15.34 mg/100g) and minimum days taken for first female flower anthesis (35.17 days) whereas maximum fruit length was obtained from genotype G₁- Arka Neelachal Khunki (6.12 cm). Among the genotypes, highest gross return (Rs/ha) (3,47,000), net return (Rs/ha) (1,90,140), benefit cost ratio (2.21) was also obtained from genotype G₂ i.e Arka Neelachal Sabuja.

Keywords: Ivy gourd; genotypes; growth; yield.

1. INTRODUCTION

Ivy gourd (*Coccinia grandis* (L.) Volgi.) is a semi perennial, dioecious creeper widely cultivated in South East Asian countries and belongs to the family Cucurbitaceae with chromosome no. $2n = 24$. It is an underexploited creeper, commonly known as Kundru in Hindi. Ivy gourd is a minor cucurbit that originated and domesticated in Central Africa, India and Asia. In India, it is widely grown in Tamil Nadu, Karnataka, Kerala, Maharashtra, Gujarat, Andhra Pradesh, Bihar, Uttar Pradesh and Odisha. In fact, it is indigenous to India and its of their huts. This minor vegetable has unique medicinal value of controlling diabetes, bronchitis, skin disorders and it checks fever. It is also used as trauma aid by people in villages when there is an accident. The plant is used as a laxative. It is used internally in the treatment of gonorrhoea. In southern states, it is grown all-round year while in the east, west and north; it remains dormant during peak winter season.

Ivy gourd is a soft stemmed evergreen climber with simple or lobed leaves. It is a vegetatively propagated and plants are dioecious. Flowers are white in colour; fruits are cylindrical or elongated in shape with or without white stripes. Fruits are parthenocarpic and bright green at the edible stage when it is used as vegetable. It is rich source of vitamin A and C and also minerals like iron and calcium. Even though Ivy gourd is rich source of vitamins and minerals, the presence of polyphenol affects its palatability adversely.

Large numbers of unexploited local genotypes are available and genetic diversity has been considered as an important factor which is also essential for hybridization programme to obtain high yielding progenies and hybrids on a commercial scale and giving remunerative returns to farmers [1-8]. Availability of better

cultivars and knowledge of many other preparations and uses of these crops can propel its evolution from an underutilized species to an important horticulture crops in Indian agriculture. The occurrence of great diversity in many quantitative and qualitative characters of this crop has made a lot of scope for the crop improvement. Collecting all the available accessions and evaluating them based on the morphology, yield and yield contributing traits will help to identify desirable forms for direct use.

Keeping the above points in view, the goal of this study was to evaluate Ivy gourd genotypes under prayagraj agro climatic conditions.

2. MATERIALS AND METHODS

A field experiment entitled "Evaluation trial of ivy gourd genotypes (*Coccinia grandis* L) under Prayagraj agro climatic conditions" was carried out in the department of horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, U.P during 2022-2023. The experiment was conducted in the site with latitude of $20^{\circ} 15'$ North and longitude of $60^{\circ} 3'$ East and at an altitude of 98 meters above the mean sea level. The experiment was laid out in a randomized block design with seven genotypes in three replications. The genotypes such as G₁-Arka Neelachal Khunki, G₂-Arka Neelachal Sabuja, G₃-Local Geda, G₄-Local Denga, G₅-Surekha, G₆- CHIV-7 and G₇-CHIV-8. All the package of practices was followed as per recommendations to raise a quality crop. Five plants were selected randomly from each genotypes and observations were recorded on vegetative growth parameters like days taken for first flowering, vine length, internodal length, petiole length, fruit length, fruit diameter, yield parameters such as average fruit weight, number of seeds per fruit, number of fruits per plant, fruit yield per plant, fruit yield per hectare and quality

parameters such as TSS and ascorbic acid of these plants. Data on various parameters was recorded and statistically analyzed by the method suggested by Fisher and Yates, 1963 by applying the technique of analysis of variance using randomized block design. The level of significance was kept at 5% ($p < 0.05$).

3. RESULTS AND DISCUSSION

Data in Table 1 indicates significant differences regarding the vegetative growth parameters like vine length, internodal length, petiole length and days to first flowering of seven ivy gourd genotypes.

The maximum vine length was observed with G2 – Arka Neelachal Sabuja (315.11 cm) followed by G1 – Arka Neelachal Khunki (310.56 cm) whereas the minimum was reported in G6 – CHIV- 7 (265.29 cm.) The variation in vine length might have been due to the genetic makeup of the genotypes, which in some way influenced this morphological expression through the activity of endogenous growth regulators [5,9,10]. Similar results for vine length had also recorded by Bharathi et al. [11], Nag et al. [12] in ivy gourd, in spine gourd and Ara et al. [13] in pointed gourd.

The maximum Internodal length was observed with G2 – Arka Neelachal Sabuja (12.71 cm) followed by G1 – Arka Neelachal Khunki (10.49 cm) whereas the minimum was reported in G7 – CHIV- 8 (8.05 cm). The variation in internodal length might have been due to vine length, genetic characteristics and morphological characters of the genotype. The Arka varieties finds better at adapting to the optimum environment and better nutrient uptake than the local varieties. Similar result for internodal length had been also recorded by Bharathi et al. [11],

Nag et al. [12] and Saikia J. and Phookan DB. [14].

The maximum petiole length was observed in G2 – Arka Neelachal Sabuja (6.37 cm) followed by G7 – CHIV-8 (5.90 cm) whereas minimum was reported in G3 – Local Geda- 7 (4.23 cm.) The variation in petiole length might have been due to internodal length, vine length, genetic architecture and morphological characters. Similar result for vine length had also recorded by Bharathi et al [11]. Nag et al. [12] and Saikia J. and Phookan D.B. [14].

The days taken for first flowering, the minimum days were recorded in G2 – Arka Neelachal Sabuja (35.17 days), followed by G5 – Surekha (37days) and the maximum days in G6 - CHIV-7 (52 days). The number of days from the planting to first female flowering is an important character, which indicates the earliness or lateness of the crop in general. The early and late female flower appearance help in the occurrence of early/late flush of the crop. The variation in days to the first female flower anthesis might be due to genetic character and morphological differentiation. Similar results for days to first female flower anthesis had also reported by Bharathi et al. [11], Nag et al. [12] and Saikia J. and Phookan DB [14].

Data in Table 2 indicates significant differences regarding the yield parameters like average fruit weight, number of seeds per fruit, number of fruits per plant, fruit yield per plant, fruit yield per hectare of seven ivy gourd genotypes.

Maximum Fruit length was observed with plants G1 – Arka Neelachal Khunki (6.12 cm), followed by G2 – Arka Neelachal Sabuja (5.67 cm) whereas the minimum was reported in G3 – Local Geda (3.22 cm.) Fruit length is an

Table 1. Mean performance of seven genotypes of ivy guard for vine length, internodal length, Petiole length and days to first female flower initiation

Genotype	Vine length (cm)	Internode length (cm)	Petiole length (cm)	Days to first female flower initiation
G ₁ - Arka Neelachal Khunki	310.56	10.49	5.31	45.33
G ₂ - Arka Neelachal Sabuja	315.11	12.71	6.37	35.17
G ₃ - Local Geda	298.69	8.77	4.23	42.00
G ₄ - local denga	289.43	7.64	4.46	43.33
G ₅ - Surekha	307.91	9.59	5.41	37.00
G ₆ - Chiv -7	265.29	8.23	5.83	52.00
G ₇ - Chiv - 8	274.44	8.05	5.90	47.33
F-Test	S	S	S	S
S.Ed	3.66	0.59	0.41	0.75
CD @ 5%	7.97	1.28	0.89	1.62

important character contributing to yield. The variation in fruit length might have been due to fruit diameter, fruit volume and genetic and morphological differentiation. Variation in fruit length had been also found Bharathi et al [15], Bharathi et al. [11] in pointed gourd, Nag et al. [12] in ivy gourd.

Maximum fruit diameter was observed with plants G2 – Arka Neelachal Sabuja (2.87 cm), followed by G4 – Local Denga (2.84 cm) whereas the minimum was reported in G1 – Arka Neelachal Khunki (1.81 cm). Fruit diameter is an important character contributing to yield. The variation in fruit diameter might have been due to internodal length, fruit length, genetic makeup and morphological characters. Similar result for fruit diameter had also recorded by Bharathi et al [15], Bharathi et al. [11] in pointed gourd, Nag et al. [12] in ivy gourd.

Maximum average fruit weight was observed in genotype G2 – Arka Neelachal Sabuja (21.08 gm.), followed by G5 – Surekha (19.04 gm.) whereas the minimum was reported in G3 – Local Geda (16.28 gm.) The variation in fruit weight might have been due to fruit length, fruit volume, and specific gravity, genetic and morphological differentiation. A similar results for fruit diameter had also recorded by Bharathi et al [15], Bharathi et al. [11] in pointed gourd, Nag et al. [12] in ivy gourd.

Maximum number of seeds per fruit was observed with plants G2 – Arka Neelachal Sabuja (122), followed by G5 - Surekha (118); whereas minimum was reported in G6 – CHIV-7 (71). The variation in average fruit weight might have been due to fruit diameter, fruit length and morphological characters. Similar results for number of seeds per fruit had also recorded by Bharathi et al. [11] and Nag et al. [12].

Maximum number of fruits per plant was observed with plants G2 – Arka Neelachal Sabuja (422), followed by G5 - Surekha (384) whereas the minimum was reported in G6 – CHIV-7 (237) The variation in number of fruits per plant might have been due to internodal length, vine length and morphological characters. Similar result for number of fruits per plant had also recorded by Bharathi et al. [11] and Nag et al. [12].

Maximum fruit yield per plant was observed with plants G2 – Arka Neelachal Sabuja (8.82kg),

followed by G5 – Surekha (7.49kg) and the minimum at G6 - CHIV-7 (3.88kg). The yield per plant due to various genotypes was found significant. The variation of fruit yield per plant might have been due to internodal length, vine length, number of secondary branches, and number of fruits, average fruit weight, and fruit volume, and specific gravity, genetic and morphological differences. Similar result for fruit yield per plant had also recorded by Bharathi et al. [11] and Nag et al. [12].

Maximum fruit yield tonnes per hectare was observed with plants G2 – Arka Neelachal Sabuja (17.35t/ha), followed by G5 – Surekha (15.32t/ha) and the minimum at G4 – Local Denga (8.25t/ha). Yield is a complex character and is determined by many genes and is largely influenced by environmental conditions. In the present study data regarding yield per plant as well as per hectare showed significant differences among the genotypes. Yield in each genotype is a result of the cumulative effect of different characters which includes internodal length, vine length, number of secondary branches, number of fruits, average fruit weight, fruit yield per plant, fruit volume, specific gravity, also, genetic and morphological differences. Similar result for fruit yield per hectare had also recorded by Bharathi et al. [11] and Nag et al. [12] in ivy gourd.

The data regarding quality parameters like TSS, ascorbic acid and the economics of seven ivy gourd genotypes are shown in Table 3.

Maximum TSS was recorded with plants G2 – Arka Neelachal Sabuja (4.33° Brix), followed by G5 – Surekha (3.95) and the minimum at G6 – CHIV-7 (2.53° Brix). The variation in total soluble solids might be due to better adaptability in the environmental conditions, higher nutrient uptake and genetically characteristics. Similar result for fruit yield per hectare had also recorded by Bharathi et al. [11] and Nag et al. [12].

Ascorbic Acid (mg/100g of fruit pulp), Maximum was recorded with plants G2 – Arka Neelachal Sabuja (15.34), followed by G1 – Arka Neelachal Khunki (14.33) and the minimum at G6 – CHIV-7 (11.18). The variation in ascorbic acid might be due to better adaptability in the environmental conditions, higher nutrient uptake and genetically characters. Similar results for fruit yield per hectare had also recorded by Bharathi et al. [11] and Nag et al. [12].

Table 2. Mean performance of seven genotypes of ivy guard for fruit length, fruit diameter, average fruit weight, number of fruits per plant, fruits yield per plant and fruit yield per hectare

Genotypes	Fruit length (cm)	Fruit diameter (cm)	Average Fruit weight (g)	No. of seeds per fruit	No. of fruits per plant	Fruit yield per plant(kg)	Fruit yield per ha(t/ha)
G ₁ . Arka Neelachal Khunki	6.12	1.81	18.09	107	321	6.68	14.24
G ₂ . Arka Neelachal Sabuja	5.67	2.87	21.08	122	422	8.82	17.35
G ₃ . Local GEDA	3.22	2.24	16.28	85	265	4.46	9.64
G ₄ . Local DENG	3.38	2.84	17.34	92	273	4.84	8.25
G ₅ . Surekha	4.11	2.77	19.04	118	384	7.49	15.32
G ₆ . CHIV -7	4.35	2.51	16.75	71	237	3.88	8.46
G ₇ . CHIV - 8	4.46	2.56	16.52	115	244	4.31	8.55
F-Test	S	S	S	S	S	S	S
S.Ed	0.22	0.15	0.23	0.84	2.75	0.19	0.19
CD @ 5%	0.49	0.32	0.57	1.82	5.99	0.42	0.41

Table 3. Evaluation of quality parameters and economics in ivy gourd genotypes

Treatments	Quality parameters		Economics		
	TSS (° Brix)	Ascorbic acid (mg/100g)	Gross Returns (Rs/ha)	Net Returns (Rs/ha)	Benefit Cost ratio
G ₁ . Arka Neelachal Khunki	3.82	14.33	2,84,800	1,27,940	1.81
G ₂ . Arka Neelachal Sabuja	4.33	15.34	3,47,000	1,90,140	2.21
G ₃ . Local GEDA	3.30	13.84	1,92,800	35,940	1.22
G ₄ . Local DENG	3.66	13.42	1,65,000	8,140	1.05
G ₅ . Surekha	3.95	12.32	3,06,400	1,49,540	1.95
G ₆ . CHIV -7	2.53	11.18	1,69,200	12,340	1.07
G ₇ . CHIV - 8	2.83	12.85	1,71,000	14,140	1.09
F-Test	S	S			
S.Ed	0.19	1.34			
CD @ 5%	0.41	2.79			

Among the different genotypes the highest Gross return were obtained from genotype G₂ – Arka Neelachal Sabuja (Rs/ha) (3,47,000) followed by genotype G₅ – Surekha (Rs/ha) (3,06,400) with net return of (Rs/ha) 1,90,140 and (Rs/ha) 1,49,540 respectively. These genotypes exhibited maximum Benefit:Cost ratio of 2.21 and 1.95 respectively.

4. CONCLUSION

From the present study, it is concluded that the genotype G₂-Arka Neelachal Sabuja found superior in terms of vine length (315.11 cm), petiole length (6.37 cm), internodal length (12.71cm), fruit diameter (2.87 cm), average fruit weight (21.08 g), no. of seeds per fruit (122), no. of fruits per plant (422), fruit yield per plant (8.82 kg), fruit yield per hectare (17.35 t/ha), TSS (4.33 °Brix), Ascorbic acid (15.34 mg/100g) and minimum days taken for first female flowering (35.17 days). However, maximum fruit length obtained from genotype G₁. Arka Neelachal Khunki (6.12 cm). Among the tested genotypes, highest gross

return (Rs/ha) (3,47,000), net return (Rs/ha) (1,90,140), benefit cost ratio (2.21) was also obtained from genotype G₂ i.e. Arka Neelachal Sabuja.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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