Original Research Article

EVALUATION ~~TRIAL~~ OF IVY GOURD (*Coccinia grandis* L.) GENOTYPES ~~(*Coccinia grandis* L.)~~ UNDER PRAYAGRAJ AGRO-CLIMATIC CONDITIONS

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ABSTRACT

The present investigation entitled **Evaluation trial of I~~i~~vy gourd genotypes (*Coccinia grandis* L) under Prayagraj agro-climatic conditions** was carried out ~~during~~ from October, 2022 to March 2023 at Horticultural Research Field, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology And Sciences. The experiment was laid out in a randomized block design with seven genotypes in three replications. The genotypes such as G_1-Arka Neelachal Khunki, G_2-Arka Neelachal Sabuja, G_3-Local Geda, G_4-Local Denga, G_5-Surekha, G_6- CHIV-7 and G_7-CHIV-8. It was concluded that the 7 genotypes showed a significant effect on almost all the growth and yield characters as well as quality of I~~i~~vy gourd. The genotype G_2-Arka Neelachal Sabuja found superior in terms of vine length (315.11 cm), petiole length (6.37 cm), internodal length (12.71 cm),fruit diameter (2.87 cm), average fruit weight (21.08 g), No. of seeds ~~for~~ 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 obtained from genotype G_1- Arka Neelachal Khunki (6.12 cm). Among the different genotypes the highest Gross return (Rs/ha) (3,47,000), Net return (Rs/ha) (1,90,140), benefit to cost ratio (2.21) was also obtained from genotype G2 i.e Arka Neelachal Sabuja.

Key words: *Ivy Gourd, Genotypes, growth, yield*

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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 semi-perennial creeper, commonly known as Kundru in Hindi and Kundul in Assamese. 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~~gonorrhea. Aqueous and ethanolic extracts of the plant have wild form and is also found in many parts of India **(Maurya, 2013).** In southern states, it is grown ~~all-round~~all round ~~the~~ year while in the east, west and north; it remains dormant during cool winter.

Ivy gourd is a perennial, ~~dioecious~~ dioecious climbing vine that may spread with the support of a tree, shrub, fence or any supports but is sensitive to shade and water logging conditions. Ivy gourd produces profuse branching with tuberous root; tendril is simple and sometime bifid, its leaves are arranged alternately along the stems, they vary from heart to pentagon shape and are up to 10 cm wide and long. The upper leaf surface is glabrous, whereas the lower surface is hairy. Flower is large and white in color star shape, solitary; peduncle is medium in size. Male flower: calyx companulate, glabrous, 5 lobed, obtuse; corolla white, companulae, glabrous 5 lobed, short and acute; stamens 5 (2+2+1) inserted at the base of calyx tube, filaments connate into a central column. Female flower; solitary peduncle cylinder, calyx and corolla similar to male flower. Stigma 3, subulate villous at base. Ovary is inferior. Fruits are ovoid, cylindrical ~~sometime~~ sometimes elliptic in shape, 10-12 cm long, 2.54.0 cm across, smooth light green with white strips and scarlet color when ripe. Seeds are tan-colored and 6–7 mm long. The fruit of species *Coccinia adenensis* are bitter in test due to ~~present~~ presence of cucurbitacin 'b' in the form of glycoside but lose their bitterness rapidly during ripening. The roots and stems are succulent and probably enable the plant to survive during prolonged drought **(Pier, 2003)**

2. MATERIALS AND METHODS

A field experiment entitled "Evaluation trial of I~~i~~vy gourd genotypes (*Coccinia grandis* L) under Prayagraj agro climatic conditions**"** was carried out in the ~~department~~ Department of H~~h~~orticulture, -Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences during 2022-2023. The experiment was laid out in a randomized block design with seven genotypes in three replications. The genotypes such as G_1-Arka Neelachal Khunki, G_2-Arka Neelachal Sabuja, G_3-Local Geda, G_4-Local Denga, G_5-Surekha, G_6- CHIV-7 and G_7-CHIV-8. All the package of practices was followed as per recommendations to raise a quality crop. Five plants are selected randomly from genotypes per application and observations were recorded on growth, yield, and quality parameters on these plants.

Data on various parameters was recorded and statically analyzed by applying the technique of analysis of variance using randomized block design. The level of significance was kept at 5% ($p<0.05$).

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3. RESULTS AND DISCUSSION

~~All the parameters are shown in tabular form in Table no 1, Table no 2 and Table no 3~~All the recorded observation were shown in Table 1, Table 2 and Table 3

1. The Days taken for first flowering~~,~~, the minimum days was recorded in G2 – Arka Neelachal Sabuja (35.17 days)~~,~~, followed by G5 – Surekha (37days) and the maximum days at G6 - CHIV-7 (52 days). The number of days from the planting to ~~of~~ 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 have been due to internodal length, petiole length and vine length. Similar ~~result~~ results for days to first female flower anthesis had also reported by **Bharathi *et al* (2011), Nag *et al.*, (2012)** and **Saikia J. and Phookan D.B. (2018)**
2. The maximum vine length ~~(cm)~~ 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. Similar ~~result~~ results for vine length had also recorded by **Bharathi *et al* (2011)., Nag *et al.*, (2012)** in ivy gourd**, Basmati *et al.*, (2014)** in spine gourd, **Ara *et al.*, (2012)** in pointed gourd.
3. The maximum Internodal length ~~(cm)~~ 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 ~~characters~~ characteristics and morphological characters. The Arka varieties ~~find~~finds better at adapting to the optimum environment and better nutrient uptake than the local varieties. Similar results for vine length had been also recorded by **Bharathi *et al* (2011)., Nag *et al.*, (2012)** and **Saikia J. and Phookan D.B. (2018).**
4. The maximum Petiole length ~~(cm)~~ was observed with 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 ~~characters~~ architecture and morphological characters. The Arka varieties finds better at adapting environment and better nutrient uptake than the local varieties. Similar result for vine length had also recorded by **Bharathi *et al* (2011)., Nag *et al.*, (2012)** and **Saikia J. and Phookan D.B. (2018).**
5. Maximum Fruit length ~~(cm)~~ 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 important character contributing ~~to~~towards 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 by **Hazara *et al.* (1998), Krishana Prasad *et al.* (1999), Dora *et al.* (2002), Khan et al. (2009), Bharathi et al. (2011)** in pointed gourd**, Bharathi *et al.* (2006)** in spine gourd, **Bharathi *et al.* (2008)**, **Nag *et al.* (2012)** in ivy gourd.
6. Maximum f~~F~~ruit d~~D~~iameter ~~(cm)~~ 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 ~~towards~~ to yield. The variation in fruit diameter might have

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been due to internodal length, fruit length, genetic makeup ~~characters~~ and morphological characters. Similar result for fruit diameter had also recorded by **Dora *et al*. (2002 a), Bharathi *et al* (2008), Khan *et al.* (2009). Bharathi *et al*. (2011), Nair *et al.* (2012)** in pointed gourd**, Celine *et al.* (2010)** in snake gourd**, Basumaty *et al*. (2014)** in spine gourd**, Nag *et al.* (2012)** in ivy gourd**.**

7. Maximum a~~A~~verage f~~F~~ruit w~~W~~eight ~~(gm.)~~ was observed with plants 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. ~~Simila~~A similar results for fruit diameter had also recorded by **Dora *et al*. (2002 a), Bharathi *et al* (2008), Khan *et al.* (2009). Bharathi *et al*. (2011), Nair *et al.* (2012)** in pointed gourd**, Celine *et al.* (2010)** in snake gourd**, Basumaty *et al*. (2014)** in spine gourd**, Nag *et al.* (2012)** in ivy gourd**.**
8. Maximum Number of seed 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* (2011)** and **Nag *et al*., (2012)**
9. Maximum n~~N~~umber 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 results for number of fruits per plant had also recorded by **Bharathi *et al* (2011)** and **Nag *et al*., (2012).**
10. Maximum f~~F~~ruit yield per plant ~~(kg)~~ was observed with plants G2 – Arka Neelachal Sabuja (8.82 kg), followed by G5 – Surekha (7.49 kg) and the minimum at G6 - CHIV-7 (3.88 kg). The yield per plant due to various genotypes was found significant. T~~T~~he variation of fruit yield per plant ~~(kg)~~ 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 ~~difference~~differences. Similar results for fruit yield per plant had also recorded by **Bharathi *et al* (2011)** and **Nag *et al*., (2012)**
11. Maximum f~~F~~ruit yield tonnes per hectare ~~(ton)~~ 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 results for fruit yield per hectare had also recorded by **Bharathi *et al* (2011)** and **Nag *et al*., (2012)** in ivy gourd
12. ~~TSS (°Brix) ,~~ Maximum TSS was recorded with plants G2 – Arka Neelachal Sabuja (4.33)~~–~~, followed by G5 –Surekha (3.95) and the minimum at G6 – CHIV-7 (2.53). The variation in total soluble solids might be due to better ~~adoptability~~ adaptability in the environmental conditions, higher nutrient uptake and genetically ~~characters~~characteristics. Similar results for fruit yield per hectare had also recorded by **Bharathi *et al* (2011)** and **Nag *et al*., (2012)**

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13. 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 ~~adoptability~~adaptability in the environmental conditions, higher nutrient uptake and genetically characters. Similar ~~result -~~results for fruit yield per hectare had also recorded by **Bharathi *et al* (2011)** and **Nag *et al.*, (2012)**
14. 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 genotype~~These genotypes exhibited maximum Benefit: Cost ratio of 2.21 and 1.95 respectively. ()

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Table 1: ~~Evaluation of growth parameter in ivy gourd genotypes~~Mean performance of seven genotypes of ivy guard for vine length, internodal length, Petiole length and days to first female flower initiation.

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Treatment	Genotype	Vine length (cm)	~~internodal~~Internodal length (cm)	Petiole length (cm)	Days to first female flower initiation
G1	~~G1~~-ARKA NEELACHAL KHUNKI	310.56	10.49	5.31	45.33
G2	~~G2~~-ARKA NEELACHAL SABUJA	315.11	12.71	6.37	35.17
G3	~~G3~~-LOCAL GEDA	298.69	8.77	4.23	42.00
G4	~~G4~~-LOCAL DENGA	289.43	7.64	4.46	43.33
G5	~~G5~~ SUREKHA	307.91	9.59	5.41	37.00
G6	~~G6~~ CHIV -7	265.29	8.23	5.83	52.00
G7	~~G7~~ CHIV - 8	274.44	8.05	5.90	47.33
	F-Test	S	S	S	
	S.Ed	3.66	0.59	0.41	0.75
	CD @ 5%	7.97	1.28	0.89	1.62

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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.

~~Table 2: Evaluation of yield parameters in ivy gourd genotypes.~~

Treatment	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)	yield per ha(t/ha)
G1	~~G_1~~-ARKA NEELACHAL KHUNKI	6.12	1.81	18.09	107	321	6.68	14.24
G2	~~G_2~~-ARKA NEELACHAL SABUJA	5.67	2.87	21.08	122	422	8.82	17.35
G3	~~G_3~~-LOCAL GEDA	3.22	2.24	16.28	85	265	4	
G4	~~G_4~~-LOCAL DENGA	3.38	2.84	17.34	92	273	4.84	8.25
G5	~~G_5~~ SUREKHA	4.11	2.77	19.04	118	384	7.49	15.32
G6	~~G_6~~ CHIV -7	4.35	2.51	16.75	71	237	3.88	8.46
G7	~~G_7~~ CHIV - 8	4.46	2.56	16.52	115	244	4.31	8.55
	F-Test	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

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

	Quality parameters		Economics		
Treatments	**TSS**	**Ascorbic acid**	**Gross Returns (Rs/ha)**	**Net Returns (Rs/ha)**	**Benefit Cos 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 DENGA	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			

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4. CONCLUSION

From the present investigation, it is concluded that the genotype G_{2}-Arka Neelachal ~~Sabuja~~ 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 ~~for~~ 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 obtained from genotype G_{1}- Arka Neelachal Khunki (6.12 cm).

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Among the different genotypes the 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.

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