Journal of Crop and Weed 7(2): 148- 151 (2011)

Studies on growth and yield of different betelvine cultivars under Terai zone of West Bengal

[1]P. S. MEDDA, [2]S. CHAKRABORTY, [3]P. M. BHATTACHARYA

[1]Department of Plantation Crops and Processing, Faculty of Horticulture,Uttar Banga Krishi Viswavidyalaya.
[2]Department of Crop Improvement, Horticulture and Agril. Botany, Palli Siksha Bhavana, Visva-Bharati.
[3]Department of Plant Pathology, Faculty of Agriculture, Uttar Banga Krishi Viswavidyalaya.

Received: 14.03.2011, Revised: 12.08.2011, Accepted : 15.09.2011

ABSTRACT

A field experiment was conducted to screen the suitable cultivars of betelvine for Terai zone of West Bengal. The experiment was laid out in randomized block design with twelve betelvine cultivars with three replications. Different cultivars exhibited significant variations with respect to their growth, yield and yield attributing characters. The sanchi cultivars recorded significantly higher monthly linear growth having larger inter-nodal length with relatively larger size leaves. The cultivar Utkal sudam produced moderately higher leaf yield (66.03 lakh ha^{-1}) with significantly larger size leaves (173.33 cm^2) having shortest inter-nodal length (3.98 cm) among all the bangla cultivars which led to give the highest benefit cost ratio (3.70). On economic point of view, the cv. Utkal sudam, Kotki can be considered as the suitable variety for cultivation in Terai zone of West Bengal.

Key words: Betelvine, cultivars, disease, growth, yield

Betelvine (*Piper betle* L.), a perennial, evergreen, dioecious, shade loving creeper, is an important small holders plantation crop of India, belongs to the family Piperaceae. It is well known for its economical, medicinal and social importance. The area under cultivation in India is more than 55,000 hectares with annual turnover of Rs. 900 crores every year providing livelihood to 25 million farm families of the country and at the same time it also provides an income of Rs 80-100 crores to the state of West Bengal (Guha, 2006). Darth of quality planting material hinders the way of successful promotion of crop cultivation as well as sustainable production of any crop in India, betelvine being no exception. Though several cultivars are tried by the growers in different pockets and by various research projects, no systematic exhaustive collection has been observed and the cultivars were not characterized properly which are essential prerequisite for any crop improvement programme. There is wide diversity in exomorphic characters of betelvine germplasm grown in India which is still unexplored due to absence of scientific breeding programme and low level of characterization Das *et al.* (1999). The systematic collections of the existing germplasm were started only after the inception of All India Co-ordinated Research Project on Betelvine. The collections so far made since 1981-2000 were listed with their local names and collection sources as provided by the participating centers and duplication of the cultivars with different names were very common. Sometimes the same variety is known by different names in different areas and very common in case of Bangla type. Identification of variation need to be analyzed to find out better germplasm and help in further selection process. Besides, the importance of genotypes x environment interaction (G x E) has been recognized from very beginning especially in the crops like betelvine where environmental fluctuation play a vital role in its seasonal production and productivity (Rahaman *et al.*, 1997). Keeping this constrains in mind the present investigation was undertaken to asses the varietal wealth of betelvine study with an objective to screen suitable cultivars for Terai region of West Bengal.

MATERIALS AND METHODS

The experiment was conducted for two consecutive years, 2008 and 2009 in a one year old betelvine plantation with 12 numbers of cultivars namely *Bagnan Sanchi, Simurali Chamurdali, Kotki, Simurali Deshi, Simurali Sanchi, Simurali Gole Bhabna, Halisahar Sanchi, Bagerhat, Simurali Bhabna, Utkal Sudam, Gayasur local* and *Kali Bangla* in Randomised Block Design with three replications. A uniform plot size of 2 x 1 m with paired rows consisting of 40 vines for each of the treatment was maintained. The recommended dose of FYM (10 tonnes. ha^{-1}), Phosphate (P_2O_5 @ 100 kg.ha^{-1}) and potassic (K_2O @ 100 kg.ha^{-1}) fertilizers were applied at the onset of monsoon of each year under study and the nitrogenous sources of nutrient (N @ 200 kg.ha^{-1}) was applied as urea and mustard oil-cakes in eight equal splits at a monthly interval starting from March to October Maiti (1989).

The observations on growth, yield, yield attributing parameters and disease incidence of the betelvine were recorded by tagging five randomly selected plants leaving the border rows from each treatment and their average values were worked out.

E-mail : partha_medda@indiatimes.com

Table 1: Vegetative growth parameters of different betelvine cultivars.

Cultivars	Increment in vine length(cm)/month	Girth of vine (mm)	Inter-nodal length (cm)	Petiole length (cm)	Leaf area (cm^2)	Leaf thickness (mm)
Bagnan Sanchi	60.44	4.15	10.37	5.65	153.00	0.42
Simurali Chamurdali	46.63	3.24	6.08	8.35	162.85	0.42
Kotki	45.56	4.13	5.84	8.07	179.50	0.35
Simurali Deshi	41.63	3.58	6.26	5.76	95.56	0.35
Simurali Sanchi	61.13	4.22	8.62	7.10	184.44	0.34
Simurali Gole Bhabna	51.11	3.64	5.89	8.73	139.87	0.32
Halisahar Sanchi	61.65	4.08	8.39	6.65	181.64	0.40
Bagerhat	45.04	2.95	5.61	6.99	116.08	0.37
Simurali Bhabna	49.55	3.98	6.27	8.89	103.53	0.36
Utkal Sudam	32.15	4.16	3.98	10.17	173.33	0.37
Gayasur	48.37	3.44	6.67	8.64	162.71	0.40
Kali Bangla	49.98	3.59	6.47	8.12	157.33	0.30
SEm (±)	**0.29**	**0.05**	**0.09**	**0.17**	**1.91**	**0.01**
LSD(0.05)	**0.90**	**0.16**	**0.28**	**0.53**	**5.94**	**0.03**

Table 2: Yield and yield attributing characters of different betelvine cultivars.

Cultivars	Fresh wt. of 100 leaves (g)	Dry wt. of 100 leaves (g)	Leaf Area Index	Cumulative Growth Rate ($g\ m^{-2}\ day^{-1}$)	No. of leaves produced/month	Projected Leaf yield/ha. (Lakh)
Bagnan Sanchi	457.70	55.80	3.436	2.199	5.91	48.23
Simurali Chamurdali	501.66	62.46	5.455	3.197	7.68	62.66
Kotki	571.14	70.81	6.186	3.685	7.80	63.65
Simurali Deshi	321.29	38.74	2.953	1.718	6.66	54.31
Simurali Sanchi	594.33	66.57	4.973	3.152	7.10	57.94
Simurali Gole Bhabna	502.08	61.64	5.038	3.559	8.67	70.75
Halisahar Sanchi	535.25	73.56	5.061	3.624	7.37	60.10
Bagerhat	451.63	51.08	4.144	2.735	8.03	65.52
Simurali Bhabna	470.62	60.19	3.454	3.172	7.90	64.45
Utkal Sudam	506.80	65.58	7.598	3.527	8.10	66.03
Gayasur	461.02	59.68	5.055	2.893	7.27	59.28
Kali Bangla	437.14	57.32	5.114	2.961	6.50	63.19
SEm(±)	**5.80**	**1.13**	**0.08**	**0.07**	**0.11**	**0.91**
LSD(0.05)	**18.05**	**3.52**	**0.25**	**0.22**	**0.34**	**2.83**

RESULTS AND DISCUSSION

Analyzed pooled data of two consecutive years showed significant variations of the morphological parameters. *Halisahar Sanchi* showed maximum vine increment (61.65 cm) per month and was statistically at par with *Simurali sanchi* followed by *Bagnan sanchi* and *Utkal sudam* lowest vine increment (32.15 cm) inter-nodal length (3.98 cm). Simurali sanchi showed maximum vine girth (4.22 mm) and statistically *at par* with *Utkal sudam, Bagnan sanchi, Kotki* and *Halisahar sanchi. Bagerhat Local* showed lowest vine girth (2.95 mm) (Table 1), similar finding was also observed by Imam (2008).

Bagnan sanchi recorded highest inter-nodal length (10.37 cm) and statistically significant over all the varieties. *Utkal sudam* recorded longest petiole (10.17 cm) with lowest inter-nodal length (3.98 cm). *Simurali Gole Bhabna* produced maximum number of leaves (8.67) per month, statistically significant over all the varieties. *Bagnan sanchi* produced lowest number of leaves (5.91) per month (Table-1).

Table 3: Incidence of major diseases of different betelvine cultivars.

Cultivars	Incidence of Bacterial leaf spot			*Phytopthora* Leaf Blight	Sclerotium Foot Rot
	June	September	December		
Bagnan Sanchi	15.59	11.76	10.69	6.41	19.47
Simurali Chamurdali	16.18	10.45	0.91	0.91	14.52
Kotki	22.80	19.80	6.71	4.03	0.91
Simurali Deshi	16.51	14.83	7.90	0.91	18.09
Simurali Sanchi	13.39	21.80	0.91	2.61	10.19
Simurali Gole Bhabna	23.41	23.03	7.27	5.07	0.91
Halisahar Sanchi	13.81	24.77	0.91	0.91	10.19
Bagerhat	14.73	8.75	9.51	4.48	19.47
Simurali Bhabna	17.35	7.68	5.16	0.91	0.91
Utkal Sudam	17.43	22.55	11.09	1.97	10.19
Gayasur	19.26	17.61	7.51	0.91	0.91
Kali Bangla	13.62	3.91	3.71	0.91	10.19
SEm ±	**2.47**	**1.63**	**0.41**	**0.67**	**0.45**
LSD(0.05)	**7.67**	**5.09**	**1.27**	**2.07**	**1.40**

Table4: Benefit cost ratio (Estimated) of cultivating different betelvine cultivars.

Cultivars	Leaf yield Bigha^{-1}	Selling price lakh^{-1} leaves (Rs.)	Gross return (Rs.)	Cost of cultivation (Rs.)	Net Profit (Rs.)	Benefit: cost ratio
Bagnan Sanchi	5.9	10000	59960	53000	6960	0.13
Simurali Chamurdali	7.9	22500	178470	53000	125470	2.37
Kotki	7.6	30000	229080	53000	176080	3.32
Simurali Deshi	6.6	12000	79712	53000	26712	0.50
Simurali Sanchi	7.1	10000	71026.	53000	18026	0.34
Simurali Gole Bhabna	8.3	25000	207933	53000	154933	2.92
Halisahar Sanchi	7.3	10000	73360	53000	20360	0.38
Bagerhat	8.3	20000	165866	53000	112866	2.13
Simurali Bhabna	8.2	25000	205233	53000	152233	2.87
Utkal Sudam	7.8	30000	235160	50000	185160	3.70
Gayasur	7.3	20000	145893	53000	92893	1.75
Kali Bangla	6.8	25000	170233	53000	117233	2.21

Largest leaf area was produced by Simurali Sanchi (184.44 sq.cm) and statistically at par with *Halisahar sanchi* and *Kotki* followed by *Utkal Sudam. Simurali Deshi* recorded significantly smaller leaf size (95.56 sq.cm.) (Table 1). Das *et al.* (1995) reported that the cv. *Utkal Sudam* exhibited the minimum shoot growth with shortest inter-node, longest petiole and largest leaf size under Bhubaneswar condition. Cultivars having slow growth rate with shorter internodes is most desirable when the economics of cultivation is considered.

Utkal sudam exhibited the significantly higher LAI (7.598) followed by *Kotki* (6.186). However, *Kotki* showed highest cumulative growth rate (3.685) followed by *Halisahar sanchi* (3.624) (Table 2).

Simurali sanchi recorded significantly higher fresh wt. (594.33 g) followed by *Kotki* (571.14 g). *Simurali Deshi* recorded lowest fresh wt. (321.29 g). *Halisahar sanchi* recorded highest dry wt. (73.56 g), statistically *at par* with *Kotki. Simurali Gole Bhabna* (62.38 lakh), *Bagerhat* (62.38 lakh) and *Simurali Bhabna* (61.57 lakh) produced significantly higher number of leaves ha^{-1} compared to the other varieties (Table 2).

Different cultivars have showed their varied level of tolerance to different diseases. *Kali Bangla, Simurali Chamurdali,* and *Simurali Bhabna* showed tolerance to bacterial leaf spot. However, *Simurali Bhabna and Gayasur Local* were fairly tolerant to *Phytopthora* leaf rot and foot rot diseases (Table -3).

In the Terai region of West Bengal the cultivars Simurali *Gole Bhabna, Utkal Sudam, Bagerhat local* and *Simurali Bhabna* showed higher productivity. The Benefit cost ratio was worked out considering the net profit and cost of cultivationand it was revealed that the cv. *Utkal Sudam* production is associated with highest benefit cost ratio (3.70) followed by *Kotki* (3.32) (Tab.-4). This was due to slowest growing rate with shortest internodes having higher number of moderately larger size leaves production of the cv. *Utkal Sudam* leading to involvement of less cost of lowering. On economic point of view *Utkal Sudam* & *Kotki* are the most desirable variety for their moderately higher number of larger size leaves with shorter inter-nodal length and the present findings were in conformity with the earlier findings of Das *et al.* (1995).

REFERENCES

Das, J.N., Dash, S.C., C.R. and Nayak, B.B. 1995. Relative performance of some Bangla varieties of betelvine (*Piper betel* L.) at Bhubaneswar. *Orissa Journal of Horticulture*, **23**: 104-07.

Das, R. C., Das, J. N., C.R. and Mishra, P. K. 1999. Variation and characrter association of leaf yield and its component characters in betelvine (*Piper betel* L.). *Orissa Journal of Horticulture*, **27**: 66-71.

Guha, P. 2006. Betel leaf: The Neglected Green Gold of India. *J. Hum. Ecol.*, **19**: 87-93.

Imam M. N. 2008. Integrated production and post harvest management of betel leaves (*Piper betel* L.). *Ph.D.- Thesis*, Submitted to Bidhan Chandra Krishi Viswa Vidyalaya.

Maity, S. 1989. The betelvine extension bulletin. Published by Director, IIHR, Bangalore-560080.

Rahaman, M., Das, N.D. and Jana, S.C.1997. Phenotypic stability for yield and Yield attributes in betelvine (*Piper betel* L.). *Journal of Plantation Crops*, **25**: 57-61.