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Evaluation of snakegourd genotypes for different seasons in the humid tropics

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ABSTRACT

Twenty diverse accessions of snake gourd (*Trichosanthes anguina* L.) collected from different parts of Kerala were evaluated during three seasons at College of Agriculture, Vellayani, Thiruvananthapuram. Remarkable variability for yield and yield attributes was noticed in all the seasons. The results of pooled analysis revealed that there is no significant difference between seasons for yield and fruit number while the genotypes differed significantly. But for fruit length and girth, there was no significant difference between genotypes, while difference over seasons was significant. The lowest pooled means for fruit length and girth was during summer. The average fruit weight and days to flowering showed significant variation among seasons and genotypes. TA 17 which recorded the highest yield and fruit number showed consistency in performance over seasons and can be recommended for commercial cultivation. Yield pattern for the harvest period of two months showed a gradual increase in yield per harvest from the first week which peaked in the fifth and sixth weeks and declined gradually thereafter.

Key words: *Trichosanthes anguina*, genotypes, season, yield pattern.

INTRODUCTION

Snake gourd, also known as serpent gourd, chichinda and *Padaval* native to India is a popular cucurbitaceous vegetable widely cultivated in south India. In Kerala, it is cultivated in an area of 1153 ha (F.I.B, 1). High productivity and relatively low incidence of pests and diseases makes it the farmers' choicest crop.

It is a moderate source of proteins 0.5 g, vitamin A 158 I.U., riboflavin 0.06 mg, thiamine 0.04 mg, niacin 0.3 mg, folate 15 µg, Fe 0.03 mg and Ca 26 mg per 100 g of edible portion (Holland *et al.* 2). The medicinal values of snake gourd are well documented.

The genus *Trichosanthes* consists of about 41 species of which *T. anguina* is distributed in warm humid areas with rich diversity in North Eastern region, West Bengal, Karnataka and Kerala (Srivastava, 3). The long history of cultivation in Kerala and selection imposed by the farmers over the years resulted in the development of natural variability in this crop. Documentation of this variability is essential to develop high yielding varieties and thereby increase productivity. Though snake gourd can be cultivated successfully throughout the year, the seasonal variations in temperature, day length and rainfall affects the fruit size and yield. Hence, the present study conducted under the hot humid tropical conditions of Kerala with a view to locate high yielding genotypes and to study the variation over the seasons.

MATERIALS AND METHODS

The experiments were conducted at the College of Agriculture, Vellayani, Thiruvananthapuram, Kerala during summer and rainy seasons. The site was located at 8° 5' N latitude and 77° 1' E longitude at an altitude of 29 m above mean sea level. Predominant soil type of the experimental site was red loam belonging to Vellayani series, texturally classified as sandy clay loam.

The experimental material consisted of 20 diverse accessions of snake gourd collected from different parts of the state (Table 1). The experiment was laid out in randomized block design with twenty treatments and two replications. The crop was sown at a spacing of 2 x 2 m. Four pits constituted a plot of size 16m^2. The crop received timely management practices as per package of practices recommendations of Kerala Agricultural University (KAU, 4).

Observations on biometrical characters like days to flowering, fruit length, fruit girth, number of fruits per plant average fruit weight and total yield per plot were recorded. The experiment was conducted for three seasons *viz*, summer 1995 (January – April), rainy season 1995 (June – September) and winter 1995 (October- January) to study the variation over the seasons.

As knowledge of the yield pattern helps in deciding

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Table 1. Details of snake gourd accessions used for the study.

Sl. No	Acc. No.	Lot No.	Source
1	TA 1	SKM- I- 3	Sreekaryam, Thiruvananthapuram
2	TA 2	SKM- IV- 4	Sreekaryam, Thiruvananthapuram
3	TA 3	NED-2	Nedingil, Thiruvananthapuram
4	TA 4	M- 3	Malayattor, Ernakulam
5	TA 5	TVM -1	Muttakkad, Thiruvananthapuram
6	TA 6	TVM -2	Muttakkad, Thiruvananthapuram
7	TA 7	TVM -3	Palappor, Thiruvananthapuram
8	TA 8	TVM -4	Palappor, Thiruvananthapuram
9	TA 9	TVM -5	Kalliyur, Thiruvananthapuram
10	TA 10	TVM -6	Kalliyur, Thiruvananthapuram
11	TA 11	NDD -3	Nedumangad, Thiruvananthapuram
12	TA 12	NDD -7	Nedumangad, Thiruvananthapuram
13	TA 13	NDD -16	Plavod, Thiruvananthapuram
14	TA 15	NDD -32	Plavod, Thiruvananthapuram
15	TA 16	NDD -36	Karakulam, Thiruvananthapuram
16	TA 17	NDD -37	Karakulam, Thiruvananthapuram
17	TA 18	NDD -39	Anad, Thiruvananthapuram
18	TA 19	M- 4	Malayattor, Ernakulam
19	TA 20	TA19	KAU, Vellanikkara, Thrissur
20	TA 21	Kaumudi	KAU, Vellanikkara, Thrissur

the economic crop duration, the number of harvests and yield in each harvest over the seasons were pooled and worked out the yield pattern.

RESULTS AND DISCUSSION

Statistical analysis of the data revealed significant variation among the accessions for all the characters studied (Table 2). The range and mean values of different genotypes indicates that the indigenous materials have enough variability for the important traits which ensures effective selection for superior types. During the first season (summer) the fruit yield ranged from 20. 8 (TA 18) to 47. 45 kg plot $^{-1}$ (TA 17) whereas, the average fruit weight ranged from 690.36 to 1198.20 g. The accession TA 17 recorded maximum fruits per plot. The fruit length and girth also showed significant variation which ranged from 57.46 to 100.48 cm (TA 7) and 20.27 to 24.91 cm (TA 6) respectively. TA 3 was the earliest to flower. For the second season (rainy) the yield was higher compared to summer. The yield ranged from 21. 9 (TA 12) to 59.95 kg plot $^{-1}$ (TA 17). Fruit number also increased, the maximum value was recorded by TA 17. Maximum fruit weight of 1170.81 g was reported by TA 3. There was an increase in fruit girth, but the fruit length was reduced during rainy season. Days to flowering ranged from 41.5 to 49.00. During the third season (winter), the highest yield was reported by TA 13 (58. 05 kg plot $^{-1}$). The fruit length, girth and average fruit weight showed an increase over the previous seasons. The fruit length ranged from 75.00 to 122. 50 cm, girth from 24.00 to 30.25 and fruit weight from 853.9 to 1269.63 g. TA 9 recorded maximum fruit number and TA 12 was the earliest. These results conforms with the findings of Varghese and Rajan, (5), Rahman *et al.* (6) and Narayanakutty *et al.* (7) who reported high genetic variability and heritability among snake gourd genotypes.

Seasonal variation in fruit characters and yield were analysed using the datagenerated over seasons. The data over the three seasons were pooled and statistically analyzed and given in Table 3. The results revealed that there is no significant difference between seasons for yield, but the genotypes were differing significantly. The top yielder was TA 17 with an average yield of 33.41 t ha-1 followed by TA 13. Fruit number also showed the same trend where TA 17 recorded the highest value (60.83). On the contrary, fruit length and girth showed a reverse result. There was no significant difference between varieties, but difference over seasons was significant. The lowest pooled means for fruit length and girth was during summer and highest for the third season. High temperature coupled with low humidity during summer may be the reason for production of fruits with less fruit length and girth. The average fruit weight and fruit number showed significant variation among seasons and varieties. TA 13 was the earliest (40.50) while Kaumudi, the check variety was the latest. As regards

Table 2. Performance of 20 snake gourd accessions for yield and yield attributes over three seasons

Acc.No.	Days to flowering			Fruit length (cm)			Fruit girth(cm)			Fruits/plot			Fruit weight (g)			Yield/plot (kg)		
	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III
TA 1	46.75	46.50	40.40	95.33	66.80	106.25	22.57	29.00	25.00	34.5	35.0	32.0	1087.01	1043.0	1215.37	36.60	36.60	27.35
TA 2	48.00	42.00	41.00	88.54	72.0	78.50	23.89	28.20	30.25	36.5	37.5	36.0	963.41	769.90	1028.75	35.15	30.75	27.33
TA 3	43.50	43.50	41.37	89.67	81.90	122.50	22.50	25.00	27.95	29.5	40.0	52.0	1144.25	1170.8	1138.50	33.75	40.80	41.10
TA 4	46.50	41.00	37.87	65.00	86.50	81.75	22.25	25.25	26.25	42.5	46.5	43.5	875.65	816.25	1082.25	36.65	39.70	40.90
TA 5	46.25	45.50	41.37	88.09	81.00	103.50	22.82	30.05	28.50	51.5	44.0	38.0	862.43	887.91	1254.50	44.25	37.75	36.50
TA 6	48.50	44.50	45.80	94.94	76.00	107.75	24.91	30.50	27.38	51.5	51.5	29.5	858.37	1031.9	1222.50	43.90	41.15	26.80
TA 7	44.00	46.00	44.12	100.48	89.45	93.75	23.79	25.45	26.38	43.0	38.0	39.5	1051.16	999.52	1110.18	45.20	42.25	36.65
TA 8	45.75	46.50	38.75	91.98	80.25	88.50	23.48	24.25	25.00	33.0	32.5	57.0	832.49	761.59	980.38	27.55	29.00	38.05
TA 9	47.00	42.50	39.40	105.52	83.50	77.75	22.24	29.25	27.75	40.0	40.0	59.5	954.17	955.94	1050.75	38.25	44.75	47.85
TA 10	44.00	43.00	42.00	94.05	70.25	77.75	24.86	26.80	27.00	32.5	41.5	56.0	1198.20	890.67	1197.50	38.9	38.80	46.10
TA 11	44.00	42.50	41.60	57.46	42.15	97.50	24.23	21.75	26.50	43.0	48.0	46.5	754.49	679.81	1083.17	32.48	30.95	37.65
TA 12	45.00	47.00	42.50	70.13	73.70	79.75	23.38	24.80	25.00	42.5	35.0	40.0	877.87	655.84	803.75	37.25	21.90	26.00
TA 13	44.00	42.00	35.50	69.29	88.65	102.50	23.96	27.50	27.75	41.5	60.5	49.0	861.72	963.17	1269.63	35.70	50.90	58.05
TA 15	44.50	41.50	39.60	89.97	81.50	101.25	20.27	25.00	27.00	42.0	52.0	54.5	754.73	952.64	1071.25	31.18	49.05	44.44
TA 16	45.25	44.50	42.35	100.32	89.7	98.00	22.65	25.75	25.40	53.5	42.5	53.0	797.38	950.74	1097.59	42.20	4.050	33.65
TA 17	46.5	42.50	38.45	77.86	71.75	81.25	22.66	24.30	25.50	62.0	64.0	56.5	767.55	835.28	942.13	47.45	59.95	53.40
TA 18	43.00	45.50	45.50	71.38	62.50	75.00	21.88	28.50	24.00	26.0	34.0	18.5	800.08	857.00	853.97	20.80	30.40	14.70
TA 19	46.50	45.00	37.87	90.04	79.50	78.00	22.86	26.50	26.75	35.5	36.0	42.0	987.87	795.14	1025.50	34.25	31.90	32.88
TA 20	45.50	42.00	37.40	78.88	65.00	71.25	23.59	25.90	24.75	53.0	62.0	47.5	690.36	755.86	863.13	36.50	40.75	35.20
TA 21	49.85	49.00	45.25	77.82	81.50	110.25	24.83	26.85	27.25	37.5	53.5	42.5	1131.95	891.92	1137.08	42.35	41.75	36.55
CD	3.188	2.735	8.82	17.38	9.133	11.262	3.014	3.328	2.814	9.67	9.30	7.99	202.34	112.20	126.968	3.85	10.203	11.87

fruit weight, TA 3 (1151.67 g), TA 1 (1115.67 g) and TA 10 (1095.43 g) were the superior ones. These results contradicts the findings of Saglam and Yazgan, (8) who reported that yield and fruit number per plat were significantly affected by years and sowing dates whereas fruit length did not differ significantly. A perusal of the data on yield and yield attributes over seasons for different genotypes revealed that the top yielder TA 17 is a promising line as it showed consistency in performance and can be recommended for commercial cultivation.

The yield pattern of snake gourd was studied using the data collected for three seasons. In general, snake gourd starts flowering in 40 to 45 days after sowing. In the present study, days to flowering from sowing ranged from 40.5 to 48.3 with an overall mean of 43.61 days. Days to first harvest recorded an overall mean of 61. 3. Thereafter weekly harvests were done. Total number of nine harvests was done over a period of two months. The data on nine harvests for the 20 genotypes were totaled to find out the yield pattern during the entire harvest period of two months for the three seasons and given in Table 4. The mean values showed a gradual increase in yield per harvest from the first harvest which peaked in the fifth and sixth weeks and declined gradually until last harvest. From the results it can be concluded that snake gourd has a pre bearing period of approximately 45 days and bearing period of 75 days, the total economic crop duration being 120 to 125 days. These results help the farmer to schedule the cultivation operations and effective marketing of the produce avoiding market glut.

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Table 3. Pooled means for yield and yield attributes of snakegourd accessions over seasons.

Accession No.	Days to flowering	Fruit length (cm)	Fruit girth (cm)	Fruits/plot	Fruit weight (g)	Yield/ha (t)
TA 1	44.88	89.46	25.52	33.67	1115.67	20.94
TA 2	43.67	79.68	27.44	36.67	920.66	19.41
TA 3	42.79	98.02	25.15	40.50	1151.67	23.09
TA 4	41.79	77.75	24.58	44.17	924.70	24.42
TA 5	44.37	90.86	27.12	44.50	1001.60	24.62
TA 6	46.27	92.89	27.59	44.17	1037.60	23.30
TA 7	44.70	94.56	25.20	40.17	1053.60	25.85
TA 8	43.67	86.91	24.24	40.83	858.17	19.70
TA 9	42.96	88.90	269.41	46.50	969.30	24.92
TA 10	43.00	80.68	26.22	43.30	1095.46	25.79
TA 11	42.70	65.70	24.16	45.83	839.16	21.05
TA 12	44.83	74.52	24.39	39.70	779.13	17.72
TA 13	40.50	86.81	26.40	50.33	1030.50	30.13
TA 15	41.86	90.90	24.09	45.5	926.17	26.06
TA 16	42.48	96.00	24.60	49.67	948.56	24.23
TA 17	44.03	74.36	24.50	60.83	848.30	33.41
TA 18	44.66	69.62	24.79	26.16	837.00	13.72
TA 19	43.12	82.52	25.37	37.83	936.17	20.57
TA 20	41.63	71.71	24.74	54.16	769.80	23.42
Kaumudi	48.03	89.85	26.31	44.33	1053.67	25.13
CDP=0.05	3.183*	NS*	NS	12.96*	160.14*	NS

Table 4. Weekly harvest details of snake gourd for three seasons from plot of size 640 m^2.

Harvests	I season (Jan- April)		II season (June-Sept)		III season (Oct- Jan)	
	Yield (kg/plot)	Percentage over total	Yield (kg/plot)	Percentage over total	Yield (kg/plot)	Percentage over total
1st week	55.3	3.03	37.7	2.42	42.4	2.68
2nd week	164.2	9.01	141.8	9.13	134.9	8.58
3rd week	203.1	11.41	123.5	7.95	288.2	18.34
4th week	295.8	16.23	248.4	16.00	151.8	9.66
5th week	248.5	13.63	301.4	19.42	236.9	15.07
6th week	340.7	18.69	261.0	16.31	194.1	12.35
7th week	254.8	13.97	197.1	12.64	213.1	13.55
8th week	171.9	9.63	156.3	10.06	208.2	13.25
9th week	88.7	4.86	85.1	5.48	103.8	6.60
Total	1823.0	100.00	1552.3	100.00	1571.2	100.00

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