

Comparative study of different turmeric cultivars in areca-based cropping system and open field under Sub-Himalayan Terai Region of West Bengal

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Abstract

A total of eleven turmeric cultivars/lines were evaluated for their performance in the partial shade of arecanut canopy and open condition under Sub-Himalayan Terai region of West Bengal. The cultivar 'Suguna' gave the highest yield (29.04t/ha) followed by CLS-2A (27.41 t/ha) and Kasturi (26.22t/ha) under areca shade and the cultivar 'Sudarsana' produced maximum fresh rhizomes (44.53 t/ha) followed by 'Suguna' (38.53t/ha) and 'Kasturi' (38.05 t/ha) in open condition. 'Sudarsana' and 'Kasturi' also performed well in areca shade but the yield was lower than in the open condition; the mean internodal distance and yield per plant were responsible for the higher yield. This is supported by moderately higher numbers of secondary fingers and mother rhizome weight. The cultivar 'Suguna' is also found to be tolerant to *Cercospora* leaf spot under the partial shade of areca canopy.

Key words: Arecanut, Mangala, secondary selection, *inter se*

Introduction

Turmeric (*Curcuma longa* L) is an important spice crop grown in India. It is used for ritual purpose, preparation of different dishes to add colour and taste and for medicinal and cosmetic use. It is also used as a substitute to synthetic colours. It can be grown well in a wide range of climatic conditions, both in open field and under shade. Singh *et al* (1986) reported that turmeric could be grown as an intercrop in areca garden in North Bengal. About 43% sunlight penetrates through areca canopy when areca palm is planted at a spacing of 2.7 m x 2.7 m (Abdul Khader *et. al.* 1993). Growing of different intercrops by utilizing the sunlight and unused soil maximizes the profit from areca garden and minimizes the risk for growing areca as a mono crop. Sannamarappa and Shivashankar (1988) and Chenchaiyah *et al* (2002) have also reported the successful cultivation of turmeric under arecanut canopy. An average of Rs.82074 net return per ha could be obtained from intercropping in areca garden, whereas, only Rs.36265.00 from areca monocrop (Chenchaiyah *et al*, 2002). The findings of Latha *et al*

(1994) indicated that turmeric could be taken as the best intercrop in coconut garden also. However, no recommendation of any specific variety/cultivar suited to grow under areca canopy as well as in open condition for this area is available. Hence, the present study was conducted to find out a suitable turmeric variety/cultivar under areca canopy and open conditions for Sub Himalayan Terai region of West Bengal.

Materials and Methods

Eleven turmeric cultivars/lines namely, Sudarsana (V₁), Prova (V₂), Prothiva (V₃), Suvarna (V₄), Alleppey (V₅), Kasturi (V₆), CL-24 (V₇), CLS-2A (V₈), CLS-3D (V₉), Suguna (V₁₀) and Local (V₁₁) were planted in 1m x 9 m beds in the interspaces of 35 years old areca palms as well as in open field. The soil of the garden was predominantly sandy loam with a pH of 5.9. The area receives an average annual rainfall of 3000mm. The experiment was laid out in a randomized block design with three replications. Rhizomes were planted at a spacing of 20 cm plant to plant and 20 cm row to row. Recommended agronomic practices were followed

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(Nambiar, 2001). Ten plants in each replication were selected randomly and tagged to record all the observations like, days required for first shoot emergence, and for 90 per cent shoot emergence, plant height, number of leaves per plant, number of primary and secondary fingers, internodal distance, mother rhizome weight per plant, yield per plant and per hectare, and per cent leaves affected by *Cercospora* leaf spot (under shade conditions). The experiment was repeated for two years (1999-2000 and 2000-2001) and the mean data is included in this paper.

Results and Discussion

Tables 1 & 2 indicate the results of vegetative characters yield and yield attributes of different cultivars/lines of turmeric studied under the partial shade of areca canopy and under open field in Sub Himalayan Terai region of West Bengal. All the cultivars/lines varied significantly for all the characters under study except

number of leaves per plant Poojari *et.al* (1987) reported similar results in their study on evaluation of turmeric. Under areca canopy, the variety 'Prova' took minimum time (59.50 days) for first emergence of shoot after planting of rhizomes followed by Sudarsana (59.67 days), whereas maximum time was required for the variety Suguna (79.67 days) for first emergence of shoot whereas the line CL 24 took minimum time (58 days) for first shoot emergence in open condition. The cultivar 'suguna' took maximum time for first shoot emergence in both the conditions (79.67 and 78.5 days, respectively). Similar trend was also observed for 90 per cent shoot emergence among the cultivars/lines under areca shades as well as open conditions. The plant height for all the cultivars/lines were more in shaded condition. The plant height differed significantly and ranged from 126.17 cm (Suguna) to 184.50 cm (Sudarsana) in areca shade and from 114.0 cm (Suguna) to 162.8 cm (Sudarsana) in open condition. The mean number of leaves produced

Table 1. Growth, yield and yield attributes of different turmeric cultivars/lines under areca canopy

Cultivars/ lines	Days to first emergence of shoot	Days to 90% shoot emergence	Plant height (cm)	No. leaf	No. leaf	No. secondary fingers	Internode distance cm	Rhizome weight (g)	Yield per plant (g)	Yield (t/ha)	Disease incidence
Sudarsana (V ₁)	59.67	88.50	184.50	12.00	6.67	18.33	10.33	79.00	323.83	26.09	22.03 (27.22)
Prova (V ₂)	59.50	87.00	151.83	12.00	8.50	19.33	7.33	61.50	276.50	21.40	7.47 (14.24)
Prothiva (V ₃)	63.33	88.00	160.17	11.17	7.00	10.33	7.17	87.00	224.67	25.84	8.62 (16.44)
Suvarna (V ₄)	60.17	88.17	171.00	11.33	7.00	17.00	8.83	62.67	213.33	22.28	6.15 (13.55)
Aleppey (V ₅)	61.83	87.00	175.67	11.50	6.17	11.33	7.67	87.33	231.77	22.77	4.15 (11.54)
Kasturi (V ₆)	62.50	87.67	154.83	11.83	7.33	15.00	10.67	113.00	308.50	26.22	3.57 (10.68)
CL-24 (V ₇)	60.50	91.00	162.17	11.83	6.00	12.17	7.17	84.67	272.67	26.09	5.23 (12.88)
CLS-2A (V ₈)	65.17	91.33	163.83	12.33	7.83	17.17	8.83	93.33	332.33	27.41	11.17 (19.11)
CLS-3D (V ₉)	62.67	87.00	154.33	11.67	5.83	11.33	8.83	94.67	278.33	25.95	0.03 (14.98)
Suguna (V ₁₀)	79.67	97.33	126.17	11.50	5.50	14.33	10.67	83.33	24.50	29.40	3.48 (10.61)
Local (V ₁₁)	61.67	89.67	149.83	11.50	6.50	13.33	7.00	81.67	241.33	23.32	3.37 (10.50)
CD Value	1.841	2.087	12.676	NS	1.221	3.492	1.427	22.027	89.438	4.558	6.697

Table 2. Growth, yield and yield attributes of different turmeric cultivars/lines under open condition

Cultivars/ lines	Days to first emergence of shoot	Days to 90% shoot emergence	Plant height (cm)	No. leaf	No. primary fingers	No. secondary fingers	Internode distance (mm)	Mother rhizome weight (g)	Yield per plant (g)	Yield (t/ha)
Sudarsana (V ₁)	61.00	84.25	162.8	12.3	7.98	19.08	11.23	87.90	432.08	44.53
Prova (V ₂)	60.50	87.00	117.3	11.3	7.55	18.63	8.90	62.93	239.13	24.25
Prothiva (V ₃)	59.00	86.75	125.8	10.5	6.78	9.50	7.75	92.53	255.4	30.15
Suvarna (V ₄)	59.50	86.00	121.8	11.00	7.18	23.00	8.33	57.10	229.60	26.50
Aleppey (V ₅)	61.00	88.00	138.3	11.8	6.25	15.33	7.63	86.68	293.75	34.43
Kasturi (V ₆)	60.50	86.25	134.5	12.3	6.68	11.68	8.45	117.08	312.00	38.05
CL-24 (V ₇)	58.00	87.25	129.3	12.3	7.00	12.25	8.30	112.93	310.83	35.10
CLS-2A (V ₈)	62.00	88.00	138.8	11.8	6.83	11.43	8.75	124.68	293.33	33.03
CLS-3D (V ₉)	59.00	86.75	126.8	11.5	6.43	11.33	8.25	110.85	302.50	28.90
Suguna (V ₁₀)	78.50	92.00	114.0	11.0	5.25	13.50	12.30	141.63	382.90	38.53
Local (V ₁₁)	59.00	86.25	134.3	12.0	6.58	14.78	8.03	135.00	312.50	33.45
CD Value	3.037	2.02	13.41	NS	1.279	5.529	1.837	34.983	90.744	5.967

by each plant was more or less similar for all the cultivars in both the conditions. More number of primary fingers (8.50) and secondary fingers (19.33) were recorded in 'Prova' while only 5.5 number of primary fingers and 10.33 number of secondary fingers were observed in 'Suguna' and 'Prothiva' respectively in shade conditions. Internodal distance of fingers recorded maximum (10.67 cm) in Suguna and Kasturi followed by Sudarsana (10.33 cm), while minimum was observed in Local cultivar (7.00 cm). Significant results were also observed for this character in open field condition. Maximum internodal distance was recorded in Suguna (12.3 mm) followed by Sudarsana (11.23mm). The internodal distance of Suguna and Sudarsana in both conditions was observed more than the other varieties/lines. The weight of mother rhizome/plant was recorded maximum in open condition for almost all the varieties/lines than shade condition. Maximum mother rhizome weight was recorded 113.00 g in cultivar Kasturi and it was followed by CLS-3D and CLS-2A in shade condition and 141.63 g in Suguna in open condition. The fresh yield of turmeric per plant was recorded more in open condition for all the varieties/lines. This is due to more numbers of primary and secondary fingers and mother rhizome weight. The highest fresh yield per plant was recorded in Suguna (424.50 g) followed by CLS-2A (332.33 g) in shade condition. On the other hand, the cultivar Sudarsana produced the maximum yield (432.08 g) per plant in open condition. The yield per hectare was calculated from the mean plot yield, which also showed significant differences among all the cultivars under study in both the conditions. The cultivar, Suguna gave the highest fresh yield of 29.04 t of rhizome per ha while Prova produced only 21.40-t/ha in shade conditions. However, only 21-26t/ha fresh rhizome yields for PCT-13 (Suguna) were reported by Hore *et al*, (2001) in coconut garden. Sannamarappa and Shivashankar (1988) reported a maximum fresh rhizome yield of 5228 kg/ha of turmeric at 60% intercrop intensity under areca garden. In case of open field maximum fresh rhizome was recorded from the cultivars Sudarsana (44.53 t/ha) followed by Suguna (38.53 t/ha). The above results indicate that maximum internodal distance, and mean yield per plant contributed to higher yield in Suguna in shade conditions. The lesser mother rhizome weight, which also contributes to yield is masked by more number of secondary fingers. This cultivar also produced less number of primary fingers but wider internodal length added weightage to the yield (Peter and Kandianan, 1999) reported 28.8 t/ha and 23.3 t/ha yield of Sudarsana and Suguna respectively. They also reported the yield of cultivar Prova i.e 37.47 t/ha. The yield variation of same varieties at different place may

be due to climatic conditions where its are grown. In open field, the plant height, primary finger, finger length, internodal distance and yield per plant contributed the highest yield for the cultivar Sudarsana. Though the cultivar Suvarna produced the maximum number of secondary fingers but due to less number of primary finger and the mother rhizome weight per plant, yield was comparatively low for this cultivar. The cultivar Suguna was the shortest plant height but number of secondary fingers per plant and finger width of mother rhizome contributed to more yield. An observation was made on per cent plants affected with *Cercospora* leaf spot disease. All the cultivars differed significantly to the attack of the disease. About 10.5% plants were affected with leaf spot disease in Suguna while it was 22.30% in cultivar Sudarsana. This also indicates the superiority of the cultivar Suguna under areca canopy for higher yield and tolerance to *Cercospora* leaf spot.

Among all the eleven turmeric varieties studied, Suguna, CLS-2A and Kasturi performed well in partial shade of areca plantation and Sudarsana, Suguna and Kasturi gave better rhizome yield under open conditions. Hence, these varieties can be recommended for growing in areca gardens as well as open conditions of Sub-Himalayan, tarai region of West Bengal conditions.

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