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Evaluation of high-yielding cardamom (*Elettaria cardamomum*) selections in Karnataka for yield and quality*

D PRASATH[1], M N VENUGOPAL[2] and R SENTHIL KUMAR[3]

Cardamom Research Centre, Indian Institute of Spices Research, Kodagu, Karnataka 571 201

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Cardamom (*Elettaria cardamomum* Maton), the 'Queen of Spices' is one of the important spice crops in India and is native to evergreen forests of Western Ghats of South India (Purseglove *et al*. 1981). It covers an area of 69600 ha (2006–07), of which 56% area exist in Kerala, Karnataka (37%) and Tamil Nadu (7%). (DASD 2008). The productivity in India is low compared to Guatemala, a leading producer and exporter of cardamom in the world. There is an urgent need to increase the productivity of cardamom in India, thereby production cost can be reduced so as to compete in the international market to regain the lost glory of Indian cardamom. To achieve this goal, a holistic approach towards manipulation of different factors is essential (Backiyarani *et al*. 2002). Cardamom being cross-pollinated crop offers tremendous scope for selection of high yielding genotypes to increase the productivity (Venugopal 1999). Hence, identification of an appropriate variety suitable for specific region is an important factor in cardamom. Recently, few farmers' selections have become very popular among the cardamom growers of Idukki, Kerala due to their high yield potential under intensive management conditions, and reasonably attracted the interests of both growers and scientists of other states. Therefore, the present study was conducted to assess the suitability of high-yielding popular farmers' varieties of Kerala and promising germplasm collections to the high ranges of Karnataka.

The first experiment was conducted during 2003 – 07 at the Cardamom Research Centre, Indian Institute of Spices Research, Appangala, Karnataka. The experiment location lies in 1000 m above mean sea level with annual rainfall range of 1 750–2 500 mm. The experimental materials consisted of farmers' selections ('Green Gold', 'Wonder Cardamom' and 'Palakuzhi Selection'), 10 promising germplasm accessions and a released variety 'IISR Suvasini'

Table 1 Performance of farmers' selections and germplasm accessions at Appangala during 2006

Entries	Plant height (cm)	Tillers/ plant	Panicles/ plant	Capsules/ plant	Yield (wet) g/plant
'APG 416' (VA 1)	290.00	39.00	60.33	3 099.33	3 099.33
'APG 241' (VA 8)	293.33	39.33	91.67	3 014.67	2 384.60
'APG 373' (NHY 10)	296.67	48.33	88.00	3 050.00	2 702.30
'APG 387' (NHY 24)	261.67	30.33	42.67	1 733.00	1 187.11
'APG 438' (CP 3)	286.67	42.67	41.33	2 810.33	2 059.97
'APG 445' (CP 10)	230.00	33.33	49.67	3 851.00	2 633.24
'APG 446' (CP 11)	296.67	25.33	42.00	2 925.33	2 053.58
'APG 261' (CP 12)	300.00	35.67	43.33	3 373.33	1 686.67
'APG 250' (AMB 2)	300.00	38.00	57.00	4 500.00	3 541.50
'APG 439' (CP 4)	293.33	45.33	44.00	3 098.33	2 305.16
'IISR Suvasini'	303.33	40.00	53.67	3 457.00	2 412.99
'Green Gold'	261.67	31.00	44.33	2 774.00	2 391.35
'Wonder Cardamom'	305.00	33.00	39.00	2 851.00	2 354.93
'Palakuzhi Selection'	308.33	48.00	73.33	4 661.33	3 001.90
Mean	282.38	37.62	54.76	3 016.98	2 315.42
SEd	18.45	4.35	7.28	1 195.18	868.51
CV(%)	8.00	14.15	16.27	48.52	45.94
CD (P = 0.005)	37.92	8.93	14.27	2 456.74	1 785.25

*Short note

[1]Scientist (Horticulture), Indian Institute of Spices Research, PB. No. 1701, Marikunnu (PO), Calicut, Kerala 673 012 (E-mail: prasath@spices.res.in); [2]Principal Scientist (Plant pathology) (E-mail: venugopal@spices.res.in); [3]Senior Scientist (Horticulture), (E-mail: senthil@spices.res.in)

Table 2 Capsule and quality characters of farmers' selections (2006)

Entries	Dry recovery (%)	Capsule (dry) length/ breadth (cm)	Essential oil (%)	Seed weight (%)
'IISR Suvasini'	21.1	1.38/0.56	5.5	73.15
'Green Gold'	22.1	1.65/0.59	6.2	66.25
'Wonder Cardamom'	22.7	1.68/0.62	6.5	62.95
'Palakuzhi Slection'	21.9	1.66/0.61	5.5	67.30

as a check. Twelve clones/genotype/replication were planted during 2003 in a randomized block design with 3 replications at spacing of 2.0 m × 2.0 m. Recommended package of practices were followed and observations were recorded during 2005, 2006 and 2007 crop seasons on various yield and yield contributing characters, viz plant height, tillers/ plant, panicles/plant, capsules/plant, wet yield/plant and dry yield/ha. The capsule and quality parameters such as dry recovery, dry capsule length and breadth were also recorded. The data were subjected to statistical analysis (Panse and Sukhatme 1978). Dried cardamom capsules (20 g/genotype/ replication) were crushed and the seeds were separated and weighed. The decorticated seeds were subjected to hydrodistillation in a Clevenger-type apparatus for 3 hr and volatile oil yield was recorded.

The plant height ranged from 308.33 to 230.00 cm and the variation was significant among genotypes (Table 1). Maximum tillers/plant was observed in 'APG 373' (48.33) which was at par with 8 genotypes ('APG 416, 241, 438, 261, 250, 439', 'IISR Suvasini' and 'Palakuzhi selection'). 'APG 242' recorded the maximum panicles/plant (91.67), followed by 'APG 373' (88.00) and 'Palakuzhi selection' (73.33). The other 2 farmers' selections and a released variety were at par for this character. The 'Palakuzhi selection' recorded the maximum capsules/plant (4661.33) that was at par with 'APG 250' (4500.00) and significantly superior over the other genotypes. All the 3 farmers' selections were at par for this character. 'APG 250' gave the highest wet yield (wet) of 3541.50 g/plant, which was at par with 'APG 416' (3099.33 g/plant) and 'Palakuzhi selection' (3001.90 g/plant). For the character yield (wet)/plant, all the 3 land races and local variety were at par.

Among 3 farmers' selections and 'IISR Suvasini', the per cent dry recovery varied from 21.1 to 22.7 and the maximum was recorded in 'Wonder Cardamom' (Table 2). The bold capsules in terms of length and breadth was recorded in 'Wonder cardamom' (1.68 cm and 0.62 cm) and the capsules of the check were smallest (1.38 cm and 0.56 cm). The highest essential oil (%) and lowest seed weight (%) were also recorded in the high-yielding selection 'Wonder Cardamom' (6.5 and 62.95). Radhakrishnan *et al*. (2006) also reported similar variability for quality attributes among the genotypes.

Table 3 Yield performance of cardamom selections (2005–07)

Entries	Dry yield/ha (kg)			
	2005	2006	2007	Mean
'APG 416' (VA 1)	1 487.68	872.20	941.10	1 100.33
'APG 241' (VA 8)	1 013.46	769.64	484.60	755.90
'APG 373' (NHY 10)	1 283.59	525.78	744.48	851.28
'APG 387' (NHY 24)	652.91	388.81	531.34	524.35
'APG 438' (CP 3)	1 029.99	535.58	366.50	644.02
'APG 445' (CP 10)	1 250.79	472.37	491.74	738.30
'APG 446' (CP 11)	1 206.48	357.44	480.61	681.51
'APG 261' (CP 12)	948.75	441.00	566.70	652.15
'APG 250' (AMB 2)	1 770.75	823.94	826.94	1 140.54
'APG 439' (CP 4)	1 152.58	603.14	583.82	779.85
'IISR Suvasini'	1 085.84	610.62	767.37	821.28
'Green Gold'	1 076.11	649.62	826.47	850.73
'Wonder Cardamom'	1 165.69	492.13	530.17	729.33
'Palakuzhi Selection'	1 500.95	671.05	525.50	899.17
Mean	1 187.54	586.67	619.10	
SEd	438.54	89.50	63.31	
CV (%)	46.71	21.14	18.05	
CD (*P*=0.05)	901.44	149.54	130.14	

Cardamom being semi perennial rhizomatous commercial crop, the yield level was recorded over 3 years (Table 3). Analysis of variance showed that 14 genotypes differed significantly for yield/ha in all the 3 years. The estimated yield (dry) over 3 years varied from 524.35 kg/ha (APG 387) to 1140.54 kg/ha (APG 250) and among the farmers' selections, highest yield (dry) of 899.17 kg/ha was recorded in 'Palakuzhi Selection' followed by 'Green Gold' (850.73 kg/ha). Among the genotypes, 'APG 250' and 'APG 416' performed consistently with higher yield in all the 3 years. The 3 farmers' varieties were statistically at par during 2005–06, whereas in 2007, the yield of 'Green Gold' was statistically significant over the other 2 selections. The results are in agreement with Bhat and Sudharshan (2006).

Under average management conditions, the farmers' selections performed at par with the released variety 'IISR Suvasini' in Karnataka. The yield of 'APG 250' and 'APG 416' were significantly higher compared to other genotypes, large-scale cultivation of theses 2 lines would substantially enhance the production and productivity of cardamom in Karnataka.

SUMMARY

Fourteen genotypes of cardamom (*Elettaria cardamomum* Maton) including 3 popular farmers' selections were evaluated during 2003–07 at high altitudes to assess the yield as well as to identify the suitable genotypes under Karnataka conditions. Results indicated that in terms of yield, the farmers' selections performed at par with the released variety 'IISR Suvasini'. The estimated yield (dry) over 3 years varied from 524.35 kg/ha ('APG 387') to 1140.54 kg/ha ('APG

250'). Among the genotypes, 'APG 250' and 'APG 416' performed consistently with higher yield in all the 3 years.

REFERENCES

Backiyarani S, Kurian S P, Josephrajkumar A and Murugan M. 2002. Evaluation of high yielding accessions of small cardamom (*Elettaria cardamomum* Maton) for suitability in the high ranges of Idukki district. *Journal of Spices and Aromatic Crops* **11**(2): 93–6.

Bhat S and Sudharshan M R. 2006. Evaluation of cardamom genotypes in Karnataka for yield and quality. *Journal of Plantation Crops* **34**(3): 212–5.

DASD. 2008. *Area and Production Statistics of Arecanut and Spices*. Directorate of Arecanut and Spices Development, Ministry of Agriculture, Government of India, Calicut, Kerala

Panse V G and Sukhatme P V. 1978. *Statistical Methods for Agricultural Workers*, pp 108, Indian Council of Agricultural Research, New Delhi.

Purseglove J W, Brown E G, Green C L and Robbins S R J. 1981. *Spices,* Vol 2. Longman Inc., New York, USA.

Radhakrishnan V V, Mohanan K V and Menon P P. 2006. Genetic variability in cardamom (*Elettaria cardamoum* Maton). *Journal of Plantation Crops* **34**(2): 87–9.

Venugopal M N. 1999. Natural disease escapes as source of resistance against cardamom mosaic virus causing *katte* disease of cardamom (*Elettaria cardamomum* Maton). *Journal of Spices and Aromatic Crops* **8**: 145–51.