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Preliminary evaluation of elite clones of cardamom (*Elettaria cardamomum* Maton) for yield and yield parameters in clonal nursery

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Abstract

Twelve elite clones of cardamom (*Elettaria cardamomum*) were assessed for yield and yield parameters at Appangala (Karnataka, India) in the clonal nursery in two batches of planting. Among them, Sel. 9, Sel. 7 and Sel. 4 were significantly superior for yield and yield parameters, with higher number of panicles and capsules per plant, wet weight of capsules per plant and dry capsule yield per hectare. Early planting of clones was ideal for better establishment, suckering and yield under irrigated conditions.

Key words: cardamom clones, *Elettaria cardamomum*, yield parameters.

Introduction

Lack of high yielding clones suited for different agroclimatic situations has resulted in low produtivity in cardamom (*Elettaria cardamomum* Maton). Use of high yielding, elite planting material and replacing conventional inferior clones is essential for increasing productivity (Korikanthimath 1992; Madhusoodhanan 1992). Since cardamom is a cross pollinated crop, rapid clonal multiplication of the identified clone is essential to replace inferior conventional clones (Korikanthimath 1992). The results of studies on yield and yield parameters of elite selections of cardamom clones in the clonal nursery undertaken at Appangala (Kodagu District, Karnataka, India) are reported here.

Materials and methods

The experiments were conducted at Cardamom Research Centre, Indian Institute of Spices Research, Appangala. Twelve elite clones and a local check were evaluated in a clonal nursery in a Randomised Block Design with four replications planted in two batches during 17 March 1989 (I batch) and 17 April 1989 (II batch), respectively. In each plot there were 12 plants with a spacing of 1.8 m x 0.6 m. Observations on number of panciles per plant were

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recorded on 360, 390, 420, 450, 480 and 510 days after planting (DAP) in the first batch. The number of capsules per plant, wet weight of capsules per plant and dry capsule yield per hectare was recorded in both the batches during second year (total of six pickings) of planting.

Results and discussion

Number of panicles

Number of panicles is a major yield contributing parameter in cardamom (Gopal *et al.* 1993; Sudharshan *et al.* 1989). Number of panicles per plant differed significantly on all days of observations except on 390 DAP (Table 1). Sel. 9 had maximum number of panicles per plant followed by Sel. 7 on all the days of observations.

Number of capsules

An important character which also directly contributes to yield is number of capsules per plant (Sudharshan *et al.* 1989). The clones differed significantly among themselves for number of capsules per plant. Sel. 9 had the highest number of capsules per plant (697.5) followed by Sel. 7 (653.0) and Sel. 4 (604.0) and were significantly superior to local check which had the lowest number of capsules per plant (232.3). The date of planting also had a significant effect on number of capsules per

Table 1. Number of panicles per plant on different days after planting in clonal nursery of cardamom

Clone	Number of panicles on different days after planting					
	360	390	420	450	480	510
Sel.1	5.38	8.25	10.50	14.90	16.25	17.75
Sel.2	5.25	9.70	12.00	16.75	20.50	23.50
Sel.3	5.25	6.90	8.25	13.00	14.25	16.25
Sel.4	5.68	10.18	13.00	17.75	21.75	24.50
Sel.5	5.00	9.00	10.50	16.75	18.00	21.25
Sel.6	5.00	9.00	10.50	13.75	15.50	17.00
Sel.7	6.68	10.80	13.75	20.75	23.50	26.30
Sel.8	5.68	9.85	11.50	17.50	20.50	23.50
Sel.9	8.33	11.95	15.75	26.25	28.50	30.75
Sel.10	6.00	10.75	12.25	18.75	20.50	22.25
Sel.11	6.00	7.65	10.25	14.00	16.75	20.00
Sel.12	5.68	9.20	11.25	15.50	22.00	24.00
Local check	3.68	8.65	10.00	13.50	16.50	19.00
SEm±	0.35	1.03	1.25	1.79	2.10	2.12
F test	**	NS	*	**	**	**
CD (P=0.05)	0.62	-	2.20	3.13	3.69	3.72

** Significant at P=0.01; * Significant at P=0.05; NS=Not significant

plant. The first batch of planting had more number of capsules per plant compared to second batch, probably because early planting resulted in better establishment of clones prior to the onset of monsoon due to assured irrigation. The interaction between batches of planting and clones was also significant. All the clones except Sel. 10, Sel. 12 and local check had significantly higher number of capsules per plant in the first batch than in the second batch of planting. The number of capsules per plant was maximum in Sel. 9 (860.0) followed by Sel. 7 (781.9) and Sel. 8 (752.0) in the first batch of planting (Table 2).

Table 2. Number of capsules per plant in relation to planting dates in clonal nursery of cardamom

Clone	No. of capsules/plant		
	Batch I	Batch II	Mean
Sel.1	459.5	298.9	379.2
Sel.2	665.3	408.0	536.6
Sel.3	352.3	255.1	303.7
Sel.4	695.9	512.2	604.0
Sel.5	632.4	348.6	490.5
Sel.6	686.7	352.3	519.5
Sel.7	781.9	524.0	653.0
Sel.8	752.0	393.1	572.5
Sel.9	860.0	534.9	697.5
Sel.10	546.0	485.0	515.5
Sel.11	462.2	278.3	370.2
Sel.12	431.8	279.0	355.4
Local check	213.0	251.5	232.3
Mean	580.0	378.5	-
	F test	SEm±	CD (P=0.05)
Clone	**	38.8	113.2
Batch	**	15.2	44.4
Interaction	*	54.9	160.0

**/* Significant at P=0.01/P=0.05
Batch I planted on 17.3.1989
Batch II planted on 17.4.1989

Wet weight of capsules

The clones differed significantly for wet weight of capsules per plant (Table 3). Among the clones Sel. 9 recorded maximum wet weight of capsules (880.5 g) per plant followed by Sel. 7 (785.5 g), Sel. 4 (747.4 g), Sel. 8 (720.5 g) and Sel. 2 (792.5 g) and were significantly superior to local check which had lowest wet weight of capsules (262.5 g) per plant. Wet weight of capsules was significantly higher in first batch compared to second batch of planting. This indicates the advantage of early planting to obtain higher establishment of clones by enhanced tillering due to higher tempera-

Table 3. Wet weight of capsules per plant in relation to planting dates in clonal nursery of cardamom

Clone	Wet weight of capsules (g)/plant		
	Batch I	Batch II	Mean
Sel.1	669.8	471.2	570.5
Sel.2	947.0	458.0	702.5
Sel.3	495.4	315.5	405.5
Sel.4	958.8	536.0	747.4
Sel.5	806.7	458.6	632.6
Sel.6	881.8	477.1	679.4
Sel.7	1010.1	560.9	785.5
Sel.8	928.7	512.3	720.5
Sel.9	1065.0	696.0	880.5
Sel.10	683.5	514.3	598.9
Sel.11	594.2	367.8	481.0
Sel.12	623.0	285.0	454.0
Local check	325.0	200.0	262.5
Mean	768.4	450.2	-
	F test	SEm±	CD (P=0.05)
Clone	**	49.9	154.5
Batch	**	19.6	57.1
Interaction	NS	70.6	-

** Significant at P=0.01; NS=Not significant
Batch I planted on 17.3.1989
Batch II planted on 17.4.1989

tures coupled with adequate irrigation before the onset of the monsoon. The interaction between clones and batches of planting was not significant. Maximum wet weight of capsules per plant was observed in Sel. 9 (1065.0 g) followed by Sel. 7 (1010.1 g) in first batch and was minimum in local check (200.09) in second batch of planting.

Dry weight of capsules

The clones differed significantly among themselves for dry capsule yield (Table 4). Sel. 9 had maximum dry capsule yield (2038.0 kg/ha) followed by Sel. 7 (1818.3 kg), Sel. 4 (1730.0 kg), Sel. 8 (1668.0 kg) and Sel. 2 (1626.5 kg) and were significantly superior to local check which had lowest dry capsule yield (607. 8 kg). Dry capsule yield was significantly higher in first batch of planting (1778.7 kg/ha) compared to second batch (1042.3 kg). Interaction effects of batches of planting and clones were not significant. Dry capsule yield was maximum in Sel. 9 (2465 kg/ha) followed by Sel. 7 (2338.0 kg) in first batch of planting and was lowest in local check (463.0 kg) in second batch of planting.

Table 4. Dry capsule yield in relation to planting dates in clonal nursery of cardamom

Clone	Dry capsule yield (kg/ha)		
	Batch I	Batch II	Mean
Sel.1	1550.5	1090.5	1320.5
Sel.2	2192.5	1060.5	1626.6
Sel.3	1146.5	731.5	939.0
Sel.4	2219.5	1240.5	1730.0
Sel.5	1867.5	1062.0	1464.8
Sel.6	2041.5	1104.0	1572.8
Sel.7	2338.0	1298.5	1818.3
Sel.8	2150.0	1186.0	1668.0
Sel.9	2465.0	1611.0	2038.0
Sel.10	1582.0	1991.0	1386.5
Sel.11	1375.0	851.5	1113.3
Sel.12	1442.0	660.0	1051.0
Local check	752.5	463.0	607.8
Mean	1778.7	1042.3	-
	F test	SEm±	CD (P=0.05)
Clone	**	115.6	336.7
Batch	**	45.3	132.1
Interaction	NS	163.4	-

** Significant at P=0.01; NS=Not significant
Batch I planted on 17.3.1989
Batch II planted on 17.4.1989

Variability in yield parameters is important for developing high yielding clones and such variability has been observed in cardamom (George *et al.*, 1981). In the present investigation, significant variability was observed for yield parameters resulting in the selection of superior clones. Among the clones Sel. 9, Sel. 7 and Sel. 4 were superior for yield and yield parameters. These clones had higher number of panicles and capsules per plant, wet weight of capsules per plant and dry capsule yield per hectare. The superiority of these clones for yield and yield parameters was attributed to better growth with repect to plant height, number of leaves and number of tillers per plant and higher harvest index observed in earlier studies in these clones (Korikanthimath 1996). Parameters like number of panicles and capsules per plant and fresh weight of capsules with high heritability and positive correlation with yield (Gopal *et al.* 1993) have greatly contributed for the high dry capsule yields in these superior clones. Early planting of clones for better establishment prior to the onset of monsoon has also contributed to higher yields since late planting

coinciding with heavy monsoons may lead to water stagnation, rotting of rhizomes and poor establishment and late recovery of plants. The sustainability of yield of elite clones observed in the clonal nursery was further confirmed by their performance in the main field which is being reported separately.

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