

Studies on selection of elite lines of CI-37 seedling progenies of cardamom (*Elettaria cardamomum* Maton)

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Abstract

Studies were carried out at Chettalli (Karnataka, India) to select high yielding accessions (lines) of cardamom (*Elettaria cardamomum*) from seedling progenies of CI-37 in a cardamom plantation and also to identify plants for earliness (yielding) coupled with high yield potential. Among the 275 high yielding accessions selected, 49 entries (17.8% of total entries) were classified as high yielders with a mean yield of 6537.01 g wet capsules/clump. High variability for total yield and Bartlett Index of earliness for yield was observed. The yield per clump varied from 325 to 7555 g wet capsules/clump. Entry No. 186 was identified to be a high yielding early type having the highest Bartlett Index of 0.7084950 with a total yield of 5156 g wet capsules/clump.

Key words: Bartlett Index, cardamom, *Elettaria cardamomum*, selection, yield.

One of the important reasons for the low productivity of cardamom (*Elettaria cardamomum* Maton) in India is the use of unselected planting material. Large scale propagation of cardamom is done through seeds and the heterogenous progeny is genetically not uniform due to natural cross pollination. The high degree of variability in yield in the seedling population of cardamom necessitates selection and use of high yielding clones to increase yield.

Since the selections/clones are highly

specific in their agro-ecological requirements, higher yields can be realized only when cultivated under optimum conditions. Hence selection and clonal multiplication of elite clones identified in farmers' fields is important. This paper reports the results of investigations carried out to select high yielding clones of cardamom from the seedling population of CI-37 (Malabar type) in a farmers field.

Seedling populations raised from CI-37 were planted at a spacing of 2 m x 2 m

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(2500 plants/ha) during 1991 in an area of 2 ha at Chettalli (Karnataka) which receives an average rainfall of 1500-1650 mm. The soils at the experimental site are kandic paleustalf, rich in organic material, poor in available phosphorus and medium to high available potassium. The high production technology suggested by Korikanthimath & Venugopal (1989) was adopted for raising the plants. Among the 5000 plants planted, 275 plants were identified for further studies based on visual observations. The yield obtained in individual pickings were recorded and Bartlet Index for earliness was computed for each entry over 14 pickings as follows:

$$BI = \frac{n_{14}y_1 + n_{13}y_2 + \dots + n_2y_{13} + n_1y_{14}}{14 \times \Sigma y_i} \text{ where,}$$

$n_1, n_2, \dots, n_{14}$ are picking numbers, $y_1, y_2, \dots, y_{14}$ are picking yields and $\Sigma y = y_1 + y_2 + \dots + y_{14}$

The cumulative yield in the 275 clones selected for the study ranged from 325 g wet capsules/clump (Entry No. 273) to 7555 g wet capsules/clump (Entry No. 225). Based on the cumulative yield, all the 275 entries were classified into four groups namely, very low, low, medium and high yielders. The high yielding group comprised of 49 entries (17.8%)

with a mean yield of 6537.01 g wet capsules/clump (Table 1).

The Bartlet Index of earliness and total yield/clump of each line is presented in Table 2. Based on the index, all the lines were classified into five types (Table 3) and a majority of them fall under the group of medium type (51.3%) of earliness for yield. This group included 141 entries in which the Bartlet Index of earliness ranged from 0.5000-0.5999. Among the 275 entries, 81 entries namely, Nos. 186, 271, 272, 273, 274 and 275 were classified as very early types which had Bartlet Index of more than 0.70000. However these early types were poor yielders except Entry No. 186 (5156 g wet capsules/clump and Barlet Index of 0.7084950).

The 49 high yielding plants were planted in the clonal nursery by adopting the 'rapid clonal multiplication' technique for generation of elite planting material. The study indicated that farmers can select high yielding cardamom plants on their own plantations and use such plants for further clonal propagation to generate superior clonal planting material.

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Table 1. Classification of cardamom clones based on yield

Type	No. of entries	Mean yield (g/clump)	SD	SEM
Very low	5 (1.8)	633.00	182.78	81.74
Low	46 (16.7)	4339.22	214.71	31.66
Medium	175 (63.6)	5313.15	391.97	29.63
High	49 (17.8)	6537.01	342.87	48.98

Values in parantheses are percentages of total entries

Table 2. Bartlett Index for earliness and yield of cardamom clones

Entry	Total yield (g/clump)	Bartlett Index	Entry	Total yield (g/clump)	Bartlett Index	Entry	Total yield (g/clump)	Bartlett Index	Entry	Total yield (g/clump)	Bartlett Index	Entry	Total yield (g/clump)	Bartlett Index
1	6935	0.5023174	56	4658	0.5422008	111	4696	0.6336092	166	4312	0.6107209	221	6640	0.5520654
2	4928	0.3872623	57	4923	0.4768724	112	5485	0.6372575	167	4697	0.6293683	222	6375	0.5445378
3	5555	0.4212036	58	4633	0.5057044	113	4663	0.6274777	168	5881	0.6294240	223	7373	0.5401271
4	4935	0.4305254	59	6136	0.5414183	114	4983	0.6300421	169	4313	0.6553112	224	7555	0.5708613
5	5056	0.4851661	60	5276	0.5220134	115	5671	0.6075396	170	4807	0.6406580	225	6275	0.5593625
6	5206	0.4479035	61	4628	0.5192925	116	4902	0.6264936	171	4631	0.6353920	226	6205	0.5897318
7	3961	0.4001876	62	3997	0.5256621	117	4958	0.6192589	172	6134	0.6393405	227	6915	0.6029336
8	4646	0.4196544	63	3784	0.4841060	118	4901	0.6402920	173	4139	0.6514168	228	7036	0.6115488
9	5192	0.4428241	64	4210	0.5244316	119	6183	0.6248931	174	5454	0.6426738	229	5960	0.5592042
10	4435	0.4215655	65	5552	0.5785431	120	6048	0.6435185	175	5147	0.6725971	230	6545	0.6467314
11	6206	0.4404493	66	5180	0.5773579	121	4853	0.6548085	176	5694	0.6204275	231	6705	0.5983807
12	4648	0.4351641	67	5426	0.5640566	122	4774	0.6402538	177	5911	0.6800517	232	6048	0.5950845
13	5464	0.4668479	68	5395	0.5863233	123	4675	0.6677616	178	5748	0.6100507	233	6660	0.5886958
14	5114	0.4438237	69	5135	0.4923494	124	5708	0.6260011	179	5605	0.6303173	234	6340	0.4912122
15	4938	0.4523086	70	4613	0.4967638	125	4426	0.6296882	180	5880	0.6362974	235	5995	0.5128083
16	4182	0.4420475	71	5768	0.5152442	126	5169	0.6552248	181	4517	0.6690281	236	5395	0.5003310
17	5153	0.4646808	72	4948	0.5486777	127	4683	0.5687441	182	4916	0.6633151	237	5395	0.6010618
18	6365	0.4462462	73	5190	0.5266997	128	4993	0.5856056	183	5178	0.6515202	238	6590	0.6800780
19	4560	0.4516761	74	5871	0.5262306	129	4948	0.5702737	184	4890	0.6733567	239	5254	0.6294796
20	4708	0.4252488	75	4060	0.5086207	130	5816	0.6174961	185	5309	0.6463283	240	6291	0.6330245
21	5269	0.4402028	76	4569	0.4796923	131	5514	0.6037619	186	5156	0.7084950	241	5730	0.5782847
22	4821	0.5098527	77	4400	0.4585227	132	6326	0.5897092	187	5280	0.6402327	242	5454	0.5409398
23	4928	0.4621405	78	5744	0.5162903	133	5726	0.5964523	188	5960	0.6540269	243	6609	0.5734388
24	4828	0.4400965	79	4931	0.4731871	134	4402	0.5953301	189	6966	0.6199089	244	7386	0.5797261
25	4364	0.4671992	80	5044	0.4929761	135	4401	0.6103970	190	5232	0.6490552	245	6035	0.5507752
26	5867	0.4782561	81	5193	0.4881296	136	5073	0.5743573	191	5678	0.6514241	246	5625	0.5446349
27	4393	0.4925368	82	5059	0.5075537	137	5916	0.5659350	192	5426	0.6841925	247	6410	0.5897593
28	4969	0.5079493	83	5989	0.4777926	138	4738	0.5547247	193	5542	0.6523947	248	6601	0.6119311
29	5559	0.5118213	84	5632	0.5572240	139	4840	0.5984356	194	5125	0.6498258	249	6452	0.5689709
30	4275	0.5108104	85	6595	0.5373118	140	5570	0.5989997	195	5452	0.6516874	250	5659	0.5649913

(Table 2 continued on p.60)

Table 2 (continued from p. 59)

Entry	Total yield (g/clump)	Bartlett Index	Entry	Total yield (g/clump)	Bartlett Index	Entry	Total yield (g/clump)	Bartlett Index	Entry	Total yield (g/clump)	Bartlett Index	Entry	Total yield (g/clump)	Bartlett Index
31	4904	0.4727919	86	5265	0.5343373	141	4922	0.5282115	196	4722	0.6440673	251	5723	0.6038666
32	4568	0.4829560	87	5770	0.5038995	142	5334	0.5811506	197	5095	0.6568905	252	6125	0.5035569
33	6870	0.4746309	88	5017	0.5238617	143	4480	0.5706952	198	5924	0.6476560	253	5480	0.5920230
34	5880	0.4495870	89	5955	0.5453401	144	5386	0.5625431	199	4850	0.5652430	254	6455	0.6726790
35	5218	0.4320484	90	4690	0.4709108	145	4369	0.5192427	200	5360	0.5695629	255	6314	0.6506290
36	5172	0.5224146	91	4451	0.5571461	146	5962	0.5290411	201	5753	0.5791388	256	6490	0.6657495
37	5417	0.5990137	92	6053	0.5702249	147	5788	0.5225590	202	5110	0.5693598	257	6492	0.6507680
38	5092	0.5699276	93	4803	0.5211624	148	5521	0.5737574	203	5006	0.5697877	258	5455	0.6230850
39	5296	0.5867231	94	5572	0.5560199	149	4942	0.5152628	204	5843	0.5500110	259	5547	0.6612326
40	6485	0.5784668	95	4596	0.5482562	150	6020	0.5752254	205	5914	0.5516329	260	4783	0.6133628
41	5622	0.5996595	96	5594	0.5225241	151	4921	0.5561733	206	6752	0.5147258	261	6720	0.6152211
42	4711	0.5487158	97	4754	0.5194423	152	4740	0.5524412	207	6668	0.5905176	262	6260	0.6104519
43	4101	0.5681890	98	5226	0.5110027	153	5127	0.5494441	208	5711	0.5628862	263	4932	0.5997422
44	4086	0.5508356	99	5040	0.4973214	154	4582	0.5715065	209	5412	0.5468007	264	5393	0.6712405
45	5397	0.5738241	100	6131	0.4603304	155	6268	0.5907216	210	6243	0.5726986	265	6165	0.6653574
46	4685	0.5619759	101	5122	0.5032493	156	5048	0.5440061	211	6205	0.5759526	266	5541	0.6234692
47	4432	0.5531846	102	5005	0.4928357	157	4532	0.5101500	212	5360	0.5755330	267	5531	0.6104166
48	4904	0.5783908	103	5515	0.5061262	158	5969	0.5611253	213	4566	0.5412834	268	5053	0.6023296
49	4112	0.5548047	104	4767	0.4922533	159	5510	0.5608504	214	4916	0.5780542	269	6551	0.6412543
50	4650	0.5628264	105	4348	0.5000000	160	4476	0.5561407	215	5907	0.5844519	270	5570	0.5795076
51	5220	0.5842912	106	4401	0.4924206	161	5400	0.5251587	216	6404	0.5878469	271	795	0.9532794
52	4909	0.5724180	107	6345	0.5352921	162	7000	0.5487755	217	5350	0.5130841	272	640	0.9285714
53	5521	0.5807178	108	4922	0.5028734	163	4955	0.6249964	218	5640	0.5233029	273	325	0.9285714
54	6231	0.6273013	109	5784	0.6421903	164	4894	0.6422150	219	5780	0.5222442	274	740	0.9285714
55	5240	0.5222192	110	4468	0.5911881	165	4754	0.6262696	220	6660	0.5328186	275	665	0.9285714

Table 3. Classification of cardamom clones based on Bartlett Index of earliness for yield

Type	Bartlett Index (Range)	No. of entries	Entries (1 to 275)
Very late	<0.4000	1 (0.3%)	2
Late	0.4000 - 0.4999	46 (16.7%)	3 to 21, 23 to 27, 31 to 35, 57, 63, 69, 70, 76, 77, 79 to 81, 83, 90, 99, 100, 102, 104, 106, 234.
Medium	0.5000 - 0.5999	141 (51.5%)	75, 78, 82, 84 to 89, 91 to 98, 101, 103, 105, 107, 108, 110, 127 to 129, 132 to 134, 136 to 162, 199 to 226, 229, 231 to 233, 235, 236, 241 to 247, 249, 250, 253, 263, 270.
Early	0.6000 - 0.6999	81 (29.7%)	54, 109, 111 to 126, 130, 131, 135, 163 to 185, 187 to 199, 227, 228, 230, 237 to 240, 248, 251, 272, 254 to 262, 264 to 269.
Very early	≥ 0.7000	6 (2.2%)	186, 271 to 275.

Values in parantheses are percentages of total entries

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