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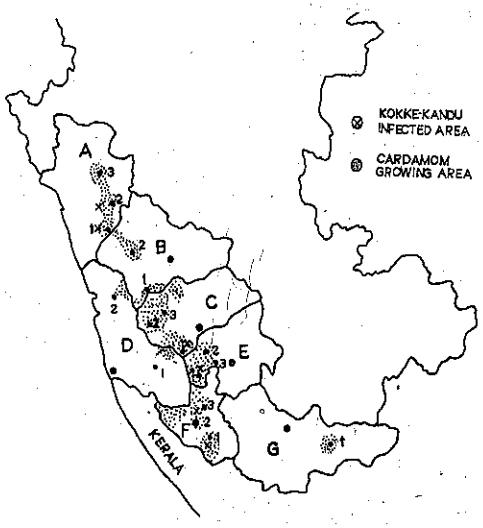
An Appraisal of 'Kokke-Kandu' - A New Viral Disease of Small Cardamom and 'Katte' (Mosaic) Disease in Karnataka

Small cardamom, *Elettaria cardamomum* (L.) Maton. is one of the major spice crops, cultivated in the Western Ghats of Kerala, Karnataka and Tamil Nadu states. Out of the total area of 81,113 ha. in India, Karnataka contributes 30,931 ha. distributed in the seven districts viz; Kodagu, Hassan, Chikmagalur, South Kanara, North Kanara, Shimoga and Mysore (Anonymous, 1991). The 'Katte' or mosaic is the most destructive disease affecting cardamom. It is characterised by the appearance of discontinuous light green stripes on younger leaves and leaf sheath. The affected plants ultimately show extreme stunting leading to yield loss (Mayne, 1951). Recently, a new virus disease locally known as 'Kokke-Kandu' meaning 'hooked tiller' is seen in some isolated areas in Karnataka. The disease is characterised by intraveinal clearing, rosetting of leaves, stunting, deformation of all aerial parts and clear mottling on pseudostem (Venugopal and Govindaraju, 1993). The information on the incidence of 'Katte' and 'Kokke-Kandu' is required to formulate strategies to contain these viral diseases of cardamom. Kokke-Kandu caused drastic decline of the clump compared to Katte. Results of a survey on the extent of incidence of these two viral diseases in different cardamom growing tracts of Karnataka are reported herein.

A survey was conducted during 1991-93 in five cardamom growing districts of Karnataka, viz; Kodagu, Hassan, Chikmagalur, Shimoga and North Kanara (Fig. 1). In each locality the plantations were selected randomly to represent different cardamom growing districts. In each selected plantation, the disease counts of 'Kokke- Kandu', 'Katte' and mixed infections were taken separately. For taking counts, a cluster of 100 plants was observed per spot. The number of clusters in each plantation was fixed on the basis of the effective area under cardamom as: 2 ha = 5 clusters; 2.1 to 5 ha = 10 clusters; 5.1 to 10 ha = 15 clusters and more than 10 ha = 20 clusters.

Disease incidence in each plantation was calculated after pooling the counts of all clusters. Care was taken to ensure even distribution of sampling units to represent different parts of the plantation. In nurseries,



A. NORTH KANARA
1. Siddapura
2. Sirsi
3. Yallapura

B. SHIMOGA
1. Thirthahally
2. Sagar

C. CHIKMAGALUR
1. Mudigere
2. Sringeri
3. Koppa

D. SOUTH KANARA
1. Belthangadi
2. Kundapura

E. HASSAN
1. Saklespur
2. Belur
3. Alur

F. KODAGU
1. Virajpet
2. Madikeri
3. Somwarpet

G. MYSORE
1. Kollegal

Fig. 1. Map showing cardamom growing tract in Karnataka

Table I. *Incidence of 'Katte' (K) and 'Kokke-Kandu' (KK) diseases in cardamom plantations of Karnataka*

District/ Taluk	Villages surveyed	Area surveyed (ha.)	Katte infected area (ha.)	Kokke-Kandu Infected area (ha.)	Area with mixed infection (ha.)	Estates surveyed	No. of diseased estates			Per cent disease intensity range		
							K	KK	Mixed infection	K	KK	Mixed infection
KODAGU												
Virajpet	2	97.2	5.0(5.1)	80.0(82.3)	-	4	3	1	0	0.1-45.0	0.1-45.0	-
Madikeri	8	105.7	101.0(95.5)	-	-	9	9	0	0	0.1-43.0	-	-
Somwarpet	7	98.9	80.5(81.4)	28.1(28.4)	2.0(2.0)	23	22	7	1	0.6-99.9	0.1-04.0	0.6
HASSAN												
Saklespur	29	381.1	362.1(95.0)	91.0(23.9)	175.9(46.1)	133	132	85	36	0.2-94.0	0.1-43.0	0.1-10.0
Belur	1	5.6	5.6(100.0)	-	-	2	2	0	0	2.0-02.8	-	-
CHIKMAGALUR												
Mudigere	8	33.7	33.7(100.0)	12.0(35.6)	-	9	6	2	0	0.0-09.0	14.8-15.5	-
Chikmagalur	1	0.5	0.5(100.0)	-	-	1	1	0	0	0.5	-	-
SHIMOGA												
Sagar	1	20.0	20.0(100.0)	-	-	35	35	0	0	0.1-25.0	-	-
NORTH KANARA												
Siddapura	4	67.0	67.0(100.0)	40.0(59.7)	40.0(59.7)	73	73	40	1	8.5-34.0	0.1-40.0	0.1-10.0
Sirsi	9	88.8	88.8(100.0)	72.2(81.3)	71.4(80.4)	87	87	60	1	0.05-20.0	0.2-82.0	1.0-10.4
Yallapura	4	6.4	6.4(100.0)			5	5	0	0	0.08.89.0		
Grand Total	74	904.9	770.6	323.3	289.3	381	375	195	39			

The values in the parentheses indicate the percentage area infected.

all the seedlings were examined individually to record the incidence.

A total oof 381 plantations covering 5 districts, 11 taluks and 74 villages of Karnataka were surveyed (Table I). Out of 381 plantations, wide spread incidence of 'Katte' was seen in 375 plantations with incidence ranging from 0.1 to 99.99 per cent. The incidence of 'Kokke-Kandu' was recorded in 195 plantations with incidence ranging from 0.1 to 82 per cent. This new viral disease is well established in contiguous heavy rainfall area of Hongadahalla (Hassan district). In Kodagu district, only adjoining areas bordering the Saklespur taluk (Hassan district) have shown low incidence of 'Kokke-Kandu'. The disease in these areas is confined to plantations raised in the vicinity of infected pockets and is gradually spreading. In Birunani which is an isolated cardamom pocket in Kodagu district, a moderate form of 'Kokke-Kandu' was seen in 39 plantations only. Many isolated areas in Hongadahalla area, Sirsi and Siddapur taluks have become uneconomical due to severe incidence of both 'Kokke-Kandu' and 'Katte' diseases.

A survey of 39 nurseries having 7-9 month old seedlings also revealed the incidence of 'Kokke-Kandu' disease in seven nurseries raised very close to infected plantations. The seedling infection was as high as 73.3 per cent (Table II). This suggests that nursery sites are to be located away from the infected area to avoid introduction of new viral disease to the other area through planting material. The 'Katte' infection has been reported in seedling stage itself in the nurseries raised adjascent to infected plantations. It has been observed that the seedlings of all ages are prone to natural infection of 'Katte' disease.

To ensure availability of disease free seedlings and prevent the spread of Kokke-Kandu, the cardamom nursery sites should be selected away from infected plantations. The present study revealed that Hongadahalla area in Saklespur taluk and many pockets in Sirsi and Siddapur taluks are the hot spots of both 'Katte' and 'Kokke-Kandu' diseases. Though this new viral disease is of serious nature, still a large portion of cardamom growing area in Karnataka is free from 'Kokke-Kandu' disease. The cardamom growers need to be appraised of the seriousness of the disease and the steps to be taken to eradicate the affected plants from the gardens. Similar studies are needed in other cardamom growing areas of Kerala and Tamil Nadu to check for the presence of 'Kokke-Kandu' disease.

Table II. *Incidence of 'Kokke-Kandu' disease in cardamom nurseries located in the vicinity of affected plantations*

Name of the village	No. of nurseries serveyed	No. of beds surveyed	No. of infected beds	% disease intensity range	Approximate distance from inoculum source (m)
Hosahally	2	52	13	18.42-42.85	10-100
Maranahally	4	175	65	29.16-73.33	10-100
Hettur	5	159	0	-	5000
Vanagur	9	273	0	-	3000
Maddikeri	2	51	0	-	5000
Handally	1	20	0	-	5000
Koodu raste	1	69	0	-	3000
Hiradanahally	6	145	0	-	10000
Ucchangi	1	12	0	-	5000
Hulaguthur	3	35	0	-	5000
Herur	2	28	0	-	3000
Karagur	1	10	0	-	5000
Yeslur	1	236	0	-	10000
Birunani	1	13	13	01.70-08.30	200
Total	39	1278	91		

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