DISTRIBUTION AND FACTORS INFLUENCING CHENTHAL DISEASE OF CARDAMOM

MATHEW GEORGE AND N.P. JAYASANKAR

Central Plantation Crops Research Institute, Regional Research Station, Kayangulam, Krishnapuram 690 533, Kerala, India.

ABSTRACT

'Chenthal' is a newly reported disease of cardamom caused by *Corynebacterium* sp. The symptoms of the disease are delineated. Water-soaked lesions appeared on the abaxial surface of the young leaves turn brown to dark in colour and the leaves wither. As withering of the leaves progresses the plants wilt. Affected gardens present a burnt appearance. Report on a comprehensive survey of Chenthal disease reveals that the entire cardamom belt of Kerala is affected and the disease has extended to patches of Tamil Nadu and Karnataka States too. It is noteworthy that pockets of healthy plantation exist within the foci of severe infestation. Occurrence of healthy plantation cut away from the main belt of cardamom growing areas is also observed. Analysis of the survey data reveals a highly significant correlation between manuring and incidence of the disease. Significant correlation is found between shade and intensity of the disease also. Based on these points, the probable chances of arresting the disease by ecological manipulation and suitable management practices is discused. An explanation to the severity of Chenthal disease in red gum tree shade is also attempted.

INTRODUCTION

Cardamom (*Elettaria cardamomum* (L.) Maton) is an indigenous zingiberaceae plant grown in the ever-green forests of Western ghats. Fully developed plants are 2—4 metres in height with tall pseudostems, formed of encircling leaf sheath. The underground stem is a rhizome with shallow root stems. Leaves are simple, lanceolate and distichous with short petioles and measure about 30—50 cm in leangth and 10—15 cm in width. Flowers emerge on panicles from the stem during April to August and fruits mature in about 3—4 months after flowering. The true cardəmom of commerce is the dried capsule and is known as queen of spices.

Chenthal disease of cardamom is first observed at Vandanmettu in the High Ranges of Kerala. The initial symptom of the disease is the appearance of elongated water-soaked lesions of varying sizes on the abaxial surface of young leaves. The lesions generally appear on the second leaf, while the youngest leaf is free of any spots. In healthy plant the youngest leaf is tender and silky to touch, but in the diseased it is leathery. The water-soaked lesion later turn brown to dark in colour with a pale yellow halo. Generally they develop near the leaf margin and progress towards the midrib. As the withering of the leaves progresses, the pseudostems wilt. New shoots emerging after the incidence of the disease are reduced in size. They contract the infection around three or four leaf stage. Flowers produced after the incidence fail to develop capsules. The panicles dry up from the tip downwards. Affected gardens present a burnt appearance.

The disease is caused by a gram positive rod shaped bacterium classified as *Corynebacterium* sp. Potted cardamom plants developed lesions in less than 12 hrs, on spraying with an aqueous suspension of the bacterial culture. A period of 3—6 days was required for the development of other typical lesions and the leaves withered within a fortnight. The pathogen was reisolated from initial as well as old lesions on the leaves (Mathew George, *et al*, 1976). Six antibacterial compounds were screened against the bacterium and Penicillin was found most effective. Kanamycin, Sulphadiazine, Erythromycin and Tetracycline inhibited growth partially, while Streptomycin was ineffective. Field trials conducted at Vandanmettu also revealed the efficacy of Penicillin in controlling the disease (Mathew George *et al*, 1977)

A comprehensive survey made in the cardamom tract spreading to Kerala, Tamil Nadu and Karnataka states revealed the factors favouring Chenthal disease. The disease made its appearance between the years 1975 and 1977. Now it is found at varying intensities in the entire cardamom belt of Kerala. It is also noteworthy that there are healthy pockets inside the disease tract. To cite an example the estate of Mr. Jose J. Ottaplackal at Pathumury area near Kumily in Idukki district is appropriate. The plot is at an elevation of 1050 metres and provides uniform and thick shade. No chemical fertilizers are used in the area.

The plants are manured with bonemeal and neemcake. Liming is done once in an year. Another healthy plantation is the Pasuparai estate of High land produce Company. That, this plantation remains cut off from the main cardamom belt is a point of favour in this connection.

The disease is also observed in Shencottah, Salem, Pollachi and Kodai hills of Tamil Nadu. Gudalur area of Nilgiris; Saithur, Sivagiri tract of Rajapalayam; Virajpet, Madikeri belt of Coorg are free of this disease. But Shettalli, Thackely and Abinattabachally villages of Somwarpet in North Coorg reports mild occurrence of chenthal disease.

Statistical analysis of the survey data revealed that there is a highly significant correlation between manuring and incidence of the disease (Table 1).

Table I. Percent Distribution

Intensity	Manure			
	Organic	Inorganic	Both	No manure
Healthy	59	19	20	nil
Mild	34	39	47	50
Moderate	7	39	27	50
Severe	—	3	6	—

Significant correlation between shade and intensity of the disease is also observed (Table 2).

Table 2

Disease	Shade		
	Thick shade	Moderate shade	Thin shade
Mild disease	nil	70	40
Moderate	nil	30	47
Severe	nil	nil	13

Fiftynine per cent of the organic manured plots remained healthy, whereas it is only ninteen per cent in inorganic fertilized plots and there is no incidence of disease in thickly shaded areas.

In tea estates Red gum trees were planted as a wind break. Of late in the shade of these plants cardamom is cultivated. The Red gum trees shed leaves during summer season and the shade-loving cardamom plants are exposed to the bright summer rays. This predisposes the clumps to severe chenthal infection. Caradygoody estate of A. V. Thomas & Co. displays this phenomenon.

Cardamom cultivation is a unique feature of forest farming and the favourable conditions required are exacting. The ecological aberration caused due to the indiscriminate felling of forest trees and also the unwise management practices adopted, are contributing to the maladies of cardamom. Regulation of shade once in a year is advocated in cardamom plantation. Thining out of shade render the pods more acceptable, giving it the desirable green colour. It is an age old practice in cardamom plantation to remove senescent leaves and pseudostem. This will facilitate easy growth of fresh shoots and to an extent control thrips. Cardamom clumps are usually mulched with these materials. But in Chenthal affected areas these practices may be discontinued. Mulching with diseased materials will enhance the inoculum potential

Pathogenic plant disease is considered to have three dimensions namely, the pathogen, the host and the environment. Traditionally the popular means of combating pathogenic diseases have been, (1) application of agricultural chemicals to foliage, seeds, and soil and (2) adoption of resistant crop varieties. The one aims almost entirely at the pathogen; the other concerns itself as exclusively with the host. Thus chemical control and disease resistance tend to become essentially one-dimensional problems; whereas cultural control often becomes three-dimensional. Small wonder that the issues are less clearly drawn and that, as a general rule, it enjoys less popular understanding and support. However because environment is demonstrably the most powerful controlling factor in pathogenic disease, alteration of the environment is

equally the most potent weapon available to man in his efforts to obtain for himself the maximum productivity from his crops. His problem is to identify the environmental factors which most profoundly affect the disease in question and to develop techniques which can be employed to ameliorate these factors. That, this is not easy, does not lessen the cogency of the argument (Horsfall and Dimond, 1960). Hence an attempt is made here to streamline the possible environmental and cultural factors which affect the chenthal disease of cardamom.

ACKNOWLEDGEMENT

The authors thank field officers of cardamom board for their co-operation in the survey.

REFERENCES

HORSFALL, J.G., AND DIMOND, A.E. 1960. *Plant Pathology*. Vol.-III. Academic Press, New York and London.

MATHEW GEORGE, THOMAS JOSEPH, POTTY, V.P., AND JAYASANKAR, N.P. 1976. A bacterial blight disease of cardamom. *J. Plant. Crops* **4** (1) : 23—34.

MATHEW GEORGE, AND JAYASANKAR, N.P. 1977. Control of chenthal disease of cardamom with penicillin. *Curr. Sci.* **46**(7) : 327.