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# INFLUENCE OF 'KATTE' MOSAIC VIRUS OF CARDAMOM ON THE POPULATION OF *MELOIDOGYNE INCOGNITA*

by
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**Summary.** Cardamom (*Elettaria cardamomum* Maton) plants infected with 'Katte' mosaic virus supported five to ten times more *Meloidogyne incognita* (Kofoid *et* White) Chitw. than healthy plants. The highest rate of nematode reproduction occurred in plants pre-infected with virus and subsequently inoculated with nematode.

A virus disease of cardamom (*Elettaria cardamomum* Maton) locally known as 'Katte' mosaic (KMV) and transmitted by the aphid *Pentalonia nigronervosa* causes low yields and decline wherever the crop is grown in south India (Mayne, 1951; Venugopal and Naidu, 1981). During a survey of plant parasitic nematodes associated with cardamom, it was noted that the root-knot nematode, *Meloidogyne incognita* (Kofoid *et* White) Chitw. was often present on plants infected with the virus. Hence a survey was undertaken to ascertain the incidence of root-knot nematodes in 'Katte' infected cardamom plantations in Coorg district, Karnataka State, where the intensity of the disease has been reported to be higher than in other states (Venugopal and Naidu, 1981). Investigations were also made on the influence of KMV on the population dynamics of *M. incognita*. These were undertaken in order to develop a better strategy for the management of both the virus and the nematode in plantations, based on a better understanding of their interactions.

## Materials and methods

Root samples were collected at random from KMV-infected plants and apparently disease free plants in each of the 30 plantations investigated in the Coorg district. The roots were fixed in 4% formalin; 5 g of roots were cut into small pieces, stained in acid fuchsin, lactophenol for 5 minutes and blended in 150 ml water for 30 second. Three aliquots of 5 ml each were examined for eggs, juveniles and adults of the root-knot nematode, *M. incognita*.

In a pot experiment, single cardamom seedlings were raised in 20 cm diam. plastic pots containing 3 kg of steam sterilised soil. At the 9-10 leaf stage the pots were inoculated with 100 freshly hatched second stage *M. incognita* juveniles and 10 viruliferous aphids (*P. nigronervosa*) were placed on the leaves, for a combination of both as indicated in Table II and each replicated nine times. Except for simultaneous inoculations, inoculation of one organism was followed by another after three months. In KMV disease of cardamom, the disease incubation period in the host varied from 32 to 91 days and therefore nematode inoculation was made three months after virus inoculation. The pots were arranged in a complete randomised design on benches in an insect proof cage house. Seven months after inoculation the seedlings were uprooted with an intact root system for nematode isolation. Root samples were processed as described earlier, while soil populations of the nematode were extracted from each pot by Cobb's sieving and decanting method. The reproduction factor (R) of the nematode was calculated by dividing the final population (Pf) by the initial population (Pi). The significance of differences between healthy and diseased plants with respect to nematode populations was examined by using the 't' test.

## Results and discussion

All the samples collected during the survey yielded *M. incognita* but KMV infected plants supported five to ten times more nematodes than healthy plants (Table I). In the pot experiment a highest reproduction rate of *M. incognita* was recorder in plants pre-infected with virus and subsequently inoculated with nematodes (Table II). The effect

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of virus infection on root-knot nematodes multiplication was also evident in the survey of cardamom plantations (Table I).

Swarup and Goswami (1969), Khurana *et al.* (1970), Naqvi *et al.* (1977) and Jabri *et al.* (1985) reported significant increases of nematode populations in simultaneous infection with root-knot nematodes when tomato, maize, sugarbeet and *Zinnia elegans* were infected with virus. In contrast, in the present study the highest multiplication rates occurred when virus infection preceded nematode infection compared with simultaneous infection. A direct correlation between increase in the nematode population and the time of virus infection was reported by Naqvi *et al.* (1975) and a similar trend was observed in the present study.

'Katte' disease of cardamom can be economically managed through sanitation and replanting. The apparent stimulation of the nematode in virus infected plants suggests e need to study a possible synergistic interaction between virus and nematode in relation to yield reduction. This should then give an insight into the need for preventing infection by both pathogens.

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TABLE I - *Incidence of* Meloidogyne incognita *on Katte mosaic virus affected and healthy cardamom plants.*

| Region | No. of samples | Mean nematode density per g of root | |
|---|---|---|---|
| | | Katte affected plants | Katte free plants |
| Madikeri | 2 | 359 | 62 |
| Somwarpet | 8 | 337 | 35 |
| Virajpet | 20 | 554 | 95 |
| Total | 30 | 1250 | 192 |

SE = 17.49; t = (Observed value) = 23.22; t = (Table value at P = 0.01) = 2.75.

TABLE II - *Effect of Katte mosaic virus infection on multiplication of* M. incognita *in cardamom seedlings.*

| Treatment | No. of nematodes | | | |
|---|---|---|---|---|
| | Root per g | Soil per 250 g | Root + Soil | Reproduction factor (R) |
| Nematode alone (control) | 516 | 47 | 563 | 5.6 |
| Nematode + virus simultaneously | 1053 | 380 | 1433 | 14.3 |
| Nematode followed by virus | 671 | 371 | 1042 | 10.4 |
| Virus followed by nematode | 1397 | 570 | 1967 | 19.6 |
| C.V. (%) | 44.8 | 25.6 | 37.7 | – |
| C.D. (P = 0.05) | 392.1 | 85.4 | 459.5 | – |

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