

# Association of Dipteran Maggots in Rhizome Rot of Ginger

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## ABSTRACT

A constant association of two dipteran maggots, *Eumerus* sp. and *Mimegralla* sp. was noticed with *Pythium* infected rhizomes and occasionally with the bacterial wilt (*Pseudomonas solanacearum*) affected rhizomes also. Positive *Pythium* isolations were obtained in 1.02% of maggots of *Mimegralla* sp. collected from the field. From infected rhizomes, 42% showed *Pythium* alone and 58% showed *Pythium* and maggots and never maggots alone. Both the species were capable of subterranean movement. A crude ginger extract had an attractant effect on the maggots.

Rhizome rot or soft rot of ginger caused by *Pythium* spp. is one of the major diseases of ginger in India. *Pythium aphanidermatum* (Edson) Fitz. has been identified as the causal agent of rhizome rot in Calicut and Cannanore districts of Kerala. Maggots of *Calobata* sp. (Micropezidae) and *Chalcidomyia atrocornis* Mall and *Formosina flavipes* Mall (Chloropidae) feeding on ginger rhizomes were reported by Nair (1978). In the present study, a constant association of maggots of *Mimegralla* sp. and *Eumerus* sp. was noted in *Pythium* affected rhizomes. This paper reports the results of preliminary investigation on the association of *Mimegralla* sp. with rhizome rot of ginger.

## Materials and methods

Maggots of *Mimegralla* sp. collected from the affected rhizomes were released at the rate of 100 per pot into 10 potted plants of ginger cultivar, Maran. Similarly 100 maggots were also released into 5 pots each of *Curcuma longa*, *C. aromatica* and *Kaemferia galanga*.

Water extract of ginger (10 gm/100 ml water) was tested for its attractant effect on *Mimegralla* maggots. Cotton wads dipped in the extract were kept at three different points to a distance of 20 cm from the point of release of maggots. Cotton wads dipped in water served as control. In another test potato pieces were used instead of cotton wads.

The ability of maggots of *Mimegralla* sp. for subterranean movement was tested as follows. Soil was filled up to 4 cm height in an aluminium tray and ginger sprouts raised in sterile soil were planted at 4 different points of 5, 10, 15 and 20 cm from the point of release of maggots. Twenty maggots were released in each tray. The observations were recorded after 48 hours.

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The association of *P. aphanidermatum* and maggots with diseased rhizomes was tested as follows: (1) Attempts were made to isolate *Pythium* from 98 maggots collected from diseased rhizomes and plated on potato-sucrose-rosebengal-chloramphenicol-agar medium. (2) Diseased rhizomes were collected from the field, washed thoroughly and later were incubated at room temperature (26–27°C) individually in sterile water contained in petri plates. *Pythium* grows out from rhizomes by 24–48 hr. and maggots also came out of tissues. The presence of *Pythium* and maggots were recorded after 72 hr.

*Mimegralla* maggots collected from the bacterial wilt affected rhizomes were released into five potted plants at the rate of 60 maggots per pot. The washings of the maggots were tested for the *Pseudomonas* isolation.

#### Results and discussion

*Mimegralla* maggots started feeding at the collar region, and later migrated into both pseudostems and rhizomes, feeding voraciously on the soft tissues. Foliar yellowing was severe when the maggots attacked the pseudostems as compared to rhizomes.

Soft rot symptoms were noticed in four out of 10 plants infested with maggots. Varying degrees of rhizomes feeding was noticed in the rest of the plants. Out of the four plants which showed soft rot symptoms, one gave a positive isolation of *Pythium* sp. and the other gave only *Fusarium* sp. Out of 98 maggots collected from the infected rhizomes, only one gave positive isolation, thereby indicating the poor ability of maggots in serving as carriers of *Pythium*. However further investigation to see whether *Pythium* exists in the tissues infested by the maggots is required. Incidentally the maggots were also capable of subterranean movement in the soil as indicated by their presence on the sprouts at all the four distances, i.e., 5, 10, 15 and 20 cm tested in a tray containing sterile soil.

The infected rhizomes incubated in water, showed the presence of *Pythium* alone in 42% of the samples and *Pythium* and maggots in 58%. Maggots alone were not observed in any sample. This indicates that *Pythium* alone can cause infection but the damage might be more in association with maggots. In some of the experimental plots, where poor percentage of germination was recorded, presence of abundant maggots in decaying rhizomes was noticed. This indicates association of maggots with rhizome rot observed before germination. The migration of maggots towards the cotton wads and potato discs dipped in aqueous extract of rhizomes showed that the extract is acting as an attractant. Harman and Eckenrode (1974) observed that the adults of seed corn maggots, *Hylema platura* Meigen were stimulated to oviposit near the sprouting seeds, possibly due to stimulating substances produced by microorganism growing on the seed exudate.

The maggots were observed to be voracious feeders on rhizomes of potted plants of *C. longa*, *C. aromatica*, *Kaempferia galanga* and the fresh potato disc.

Bacterial wilt of ginger caused by *Pseudomonas solanacearum* has been reported recently from Kerala (Sarma, Indrasenan and Iyer, 1978). Positive isolation of *Pseudomonas solanacearum* from the washings of the maggots collected from the bacterial wilt affected rhizomes, indicated the ability of the maggots as carriers of bacteria. When maggots from bacterial wilt affected rhizomes were released into five potted

plants, four of them took up infection and the bacterium was isolated from infected plants subsequently. The role of maggots as well as adult *Mimegralla* as carriers of the pathogen needs further investigation. The role of insects in spread of bacterial and fungal pathogen

has been reported in many plant diseases. (Carter, 1963).

The present studies were confined to *Mimegralla* alone and similar studies may be necessary to understand role of *Eumerus* sp. in the rhizome rot of ginger.

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