On The Pathogenicity Of *Myrothecium roridum* - *Eichhornia crassipes* Isolate*

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The Indian Station of the Commonwealth Institute of Biological Control undertook a survey of natural enemies, especially plant pathogens, occurring on water weeds and witchweed and several plant pathogens hitherto unknown on these hosts were periodically reported by Nag Raj (15), (16) and (17); Nag Raj & Ponnappa (18), (19). (20) and (21); and by Rao (28). In 1968 a concerted effort was made to evolve plant pathogens capable of controlling one or more of these weeds. As a part of this programme the plant pathogens which appeared promising were cultured and these pathogens brought to pure forms, and their potentiality tried against water hyacinth, *Eichhornia crassipes* (Mart.) Solms. Of all the pathogens tested under laboratory conditions, only *Myrothecium roridum* Tode ex Fries and *Alternaria eichhorniae* Nag Raj and Ponnappa could bring about the death of the laminar region of certain plants either by spraying the spore suspension and incubating in moist chamber or by spotting the spore suspension on the collar region. An investigation was, therefore, initiated to determine the host specificity of *M. roridum*.

METHODS AND MATERIALS

Stock cultures of *M. roridum* stored at room temperature for more than 2 years were transferred to Potato-Dextrose-Agar (hereinafter PDA) and found to be infective on *E. crassipes*. *M. roridum* grew rapidly on PDA with dirty white mycelium and sporulated in 4 days, through the production of sporodochia. The spores of these fresh cultures were transferred to several PDA slants. The spores were spread on the entire surface of the slants to obtain fast growth and sporulation. These tubes were invariably used throughout the experiment.

The seeds of the test plants were sown in small 6 x 8 inches earthen pots and then inoculated with the pathogen when the plants had 10 leaves. The leaves were surface sterilized with 0.5% mercuric chloride and washed with sterile water. The spore suspension was prepared by pouring 10 ml. of sterile distilled water into test tubes, where the fungus had sporulated well and the test tubes shaken to produce a uniform suspension. The suspension was then atomized on the lower and upper surfaces of the leaves. The pots containing the inoculated plants were lowered into a glass cylindrical jar 12 x 9 inches containing some water and covered with a moist synthetic sponge to maintain maximum humidity. The inoculated plants were incubated for 18, 24 or 48 hours. Afterwards the plants were removed from the humid chamber and kept inside the laboratory room at a temperature of 18 - 30°C.

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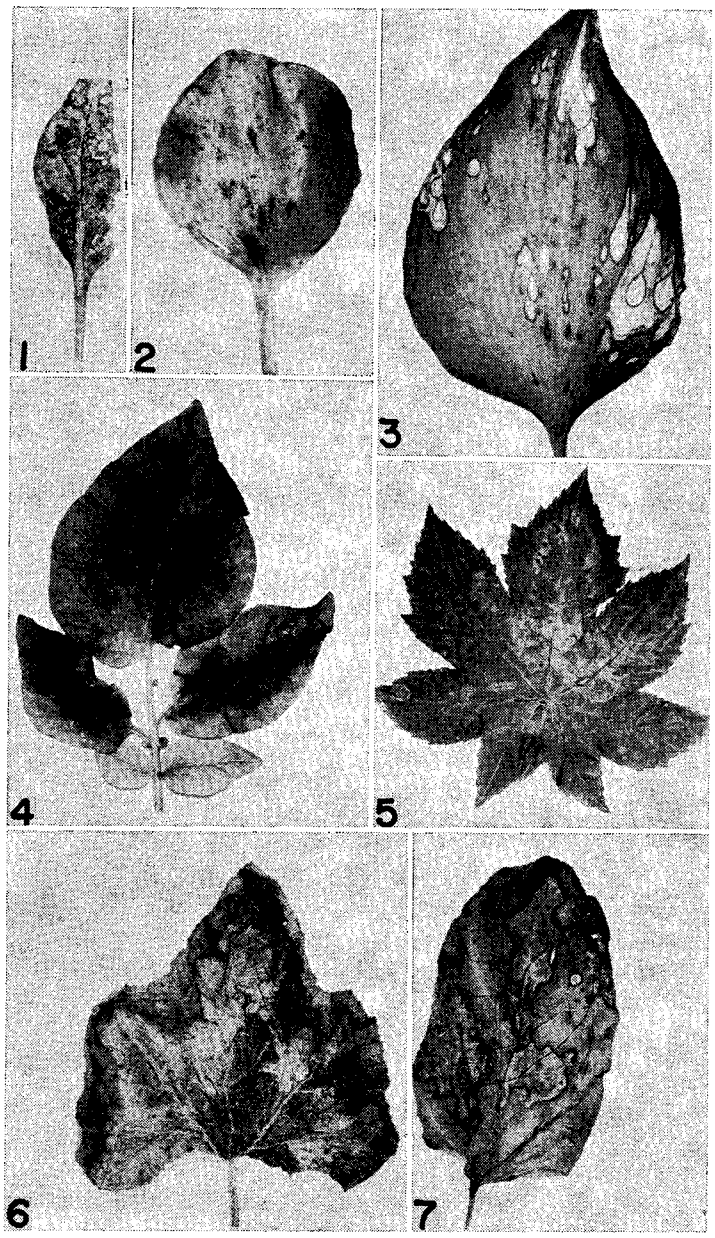

LEGENDS TO FIGURES

Figures 1-7: *Myrothecium roridum* Tode ex Fries .130-day old culture of the fungus grown on PDA and inoculated on the leaves of 1. *Capsicum frutescens*, 2. *Eichhornia crassipes*, 4. *Solanum tuberosum*, 5. *Ricinus communis*, 6. *Cucurbita moschata*, 7. Cotyledon leaf of *R. communis*, 3. Naturally infected leaf of *E. crassipes*.

RESULTS

The general pathological behaviour of different plants to *M. roridum* isolated from *E. crassipes* is presented in Table I. Symptoms were observed after spraying the spore on either the upper or lower surface of the leaf. The first noticeable symptom was a general water-soaked area which had developed within 24 hours. Necrotic areas had developed on the leaves by the second day, with the necrosis gradually extending to the buds and stems. On the third day the leaves appeared shrivelled and dried up. In some cases the tender leaves showed a degree of resistance for a day or two and this type of reaction is considered as the heavy or highly susceptible type of infection. In several other plants the infection developed in the form of spots and on keeping inside the laboratory the leaves became necrotic. Such necrotic spots coalesce to form blight, but do not kill the plants outright; this is considered as medium intensity type or moderately susceptible type of infection.

The results given below indicate the capacity of *M. roridum* to infect different economically important cultivated plants, with some exceptions.

DISCUSSION

M. roridum has been reported on *Viola tricolor* L., Snapdragon (*Antirrhinum majus* L.) and tomato (*L. esculentum*) from England and *A. esculentus, D. labab, Trichosanthes* sp. and *Asclepias* sp. from Sierra Leone, West Africa by Preston (27); on *G. hirsutum, G. herbaceum* L., *G. indicum* Lam., *Lagenaria sinceraria, C. vulgaris, C. moschata, M. charantia, T. anguina, A. esculentus, Vigna sinensis* (L.) Endl. & Haask, *Phaseolus aureus* Roxb. and *C. tetragonoloba* by Munjal (14) from India; on *A. esculentus, Luffa acutangula* Roxb., *T. anguina,* jute (*Corchorus olitorius* L.), *Viola* sp. and cocao (*Theobroma cocao* L.) seedlings by Deighton (8), (9) & (10) from Sierra Leone; on *C. gigantea* by Agarwal and Hasija (4) from India; on *C. arabica* by Schieber and Echandi (29) from Guatemala and by Urhan (36) from Colombia; on *E. crassipes* by Nag Raj and Ponnappa (18) from India; on *L. esculentum* by Stevens and McColloch (32) from Mexico, Tandon and Srivastava (34), Srivastava and Tandon (31) from India and Anonymous (3) from Italy; on *S. melongena* (eggplant) by Nath *et al* (22) from India; on *V. rosea* by Singh et al (30) from India; on Cowpea (*Vigna unguiculata* (L.) Walp.) by Padmanabhan (23) from India; on Cowpea (*Vigna* sp.) and Soyabean (*Glycine* sp.) by Miller and Wood (12) from U.S.A.; on potato (*S. tuberosum*) tomato and lupin (*Lupinus* sp.) by Moore (13) from England; on *Viola odorata* by Anonymous (2) from England; on *Viola* and pansy (*Viola* sp.) by Chesters and Hickman (6) from England; on *A. majus* by Taubenhaus (35) from Texas; Anonymous (1) from U.S.A. and by Wilhelm (38) from Colorado; on *Gardenia* by Berrett and Hardman (5) from California; on cotton by Steyaert (33) from Belgian Cango and Cognée and Bird (7) from Texas; on *Peristrophe bicalyculata* Nees by Ponnappa (24); on *Sida cordifolia* L. by Ponnappa (25) from India and even on cotton textiles by White *et al* (37) from Texas, U.S.A. A species of *Myrothecium* has also been reported on cowpea, soy-bean, *Psophocarpus tetragonolobous,* castor oil (*Ricinus communis* L.), eggplant and *Luffa* sp. from Malaya by McIntosh (11).

TABLE 1. REACTION OF VARIOUS PLANTS TO *M. roridum*.

Family and name of test plant	Incubation period in hours	Infection of young stem & bud	Reaction
APOCYNACEAE			
Vinca rosea L.	18	Nil	–
ASCLEPIADACEAE			
Calotropis gigantea R. Br.	24	Nil	–
CUCURBITACEAE			
Citrullus vulgaris Schard.	18	Yes	+++
Cucurbita moschata Duch. ex Poir. (Fig. 6)	18	Yes	+++
Cyamopsis tetragonoloba (L.) Taub.	24	Yes	+++
Lagenaria leucantha (Dutch) Rusby	18	Yes	+++
Momordica charantia L.	24	Yes	++
Trichosanthes anguina L.	24	Yes	+++
CRUCIFERAE			
Brassica oleracea L. var. *caulorapa* DC.	48	Nil	–
EUPHORBIACEAE			
Ricinus communis L. (Figs. 5 & 7).	18	Yes	+++
GRAMINEAE			
Oryza sativa L.	24	Yes	+++
LEGUMINOSAE			
Dolichos lablab L.	24	Yes	+++
Vigna sp.	18	Yes	++
MALVACEAE			
Abelmoschus esculentus Moench.	18	Yes	+++
Gossypium hirsutum L.	18	Yes	++
PONTEDERIACEAE			
Eichhornia crassipes (Control) (Figs. 2 & 3)	18	Yes	+++
RUBIACEAE			
Coffea arabica L.	48	Nil	–
SOLANACEAE			
Capsicum frutescens L. (Fig. 1).	18	Yes	+++
Lycopersicon esculentum Mill.	24	Yes	+++
Solanum melongena L.	24	Yes	+++
S. tuberosum L. (Fig. 4).	18	Yes	+++

+++ = Highly susceptible, ++ = Moderatelly susceptible, – = Resistant.

In addition to the above hosts the present isolate would infect chilli (*C. frutescens*), *S. tuberosum,* paddy (*O. sativa*) and castor plant (*R. communis*) under laboratory conditions even though this fungus has not been reported on these hosts from India *M. roridum* has been reported on *C. arabica* from Guatemala and *V. rosea* from India, but the *E. crassipes* isolate did not infect these hosts, even in repeated trials.

Preston (26) working with *M. roridum* on tomato and *A. majus* concluded that *M. roridum* is a weak parasite. The present studies show that the *E. crassipes* isolate is highly pathogenic to tomato and more aggressive, producing symptoms within 18 to 48 hours, from leaf-spot to leaf-blight, and in highly humid conditions could bring about total death of the hosts. Based on these pathological characters it is felt necessary to seggregate this fungus from *M. roridum* at a new varietal level as *Myrothecium roridum* Tode ex Fries var. *eichhorniae* Ponnappa var. nov.

SUMMARY

The fungus grown on PDA and stored at room temperature can remain viable for more than 2 years. Plants representing 19 genera, economic or otherwise, belonging to 10 families were tested against *M. roridum,* an isolate from *E. crassipes.* All the plants were found to be susceptible except *V. rosea, C. gigantea* and *B. oleracea* var. *caulorapa.* Though this fungus has been reported on *C.*

arabica and *V. rosea* the isolate from *E. crassipes* failed to infect these hosts. *C. frutescens, S. tuberosum, O. sativa* and *R. communis* are new host records for the fungus. On the basis of host range and pathological reactions this fungus has been seggregated from *M. roridum* to a new varietal level as *Myrothecium roridum* Tode ex Fries var. *eichhorniae* Ponnappa var. nov. It attacks vegetables, pulses, cotton, coffee, cocao and even decomposes cellulose from cotton textile. Hence its usefulness as an agent of biological control can not be exploited.

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