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Detection of Myrothecium Leaf Spot, A New Disease of Watermelon

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Leaf spots were first observed on watermelon (*Citrullus vulgaris* Schrad) under polyethylene film-covered greenhouse in November 2002. Symptoms appeared as dark-brown circles or large irregular spots on the leaves of watermelon. Occasionally, zonal growth of the lesions was observed. Under humid conditions, small black sclerotium-like bodies (sporodochia) were produced on the surface of the lesions. The sporodochia on leaf lesions were sessile, polymorphic, variable in size, 35-850 μm in diameter, and 30-470 μm in depth. Conidia in sporodochium were black in mass, one-celled, rod-shaped, with rounded ends, hyaline, guttulate, and measured 6-8 × 1.6-2.2 μm in size. The pathogen was identified as *Myrothecium roridum* Tode ex Fr. This is the first report of Myrothecium leaf spot on watermelon naturally occurring in commercial greenhouses.

Keywords **:** Cucurbits, leaf spot, *Myrothecium roridum*, watermelon.

Myrothecium species are common soil inhabitants in temperate and tropical regions. Stevenson and McColloch (1947) found a narrow-spored *Myrothecium roridum* Tode ex Fr. associated with tomato fruit rot in Texas, USA. They reviewed research results of previous workers and suggested that an oval-spored *M. verrucaria* might also have caused tomato fruit rot in Wisconsin. Cunfer et al. (1969) reported *Myrothecium roridum* and *M. verrucaria* as foliar pathogens of red clover (*Trifolium pratense*), with the former being much more pathogenic and virulent. *M. roridum* was isolated from the seed of yellow marsh cress, *Rorippa islandica*, in Alberta, Canada (Tewari and Skoropad, 1977) and from soybean in Illinois (Schiller et al., 1978). Serious losses caused by the pathogen have also been reported in cotton in India (Dake, 1980), and in coffee in South America (Fitton and Holliday, 1970).

The pathogen was also recorded in mulberry and Madagascar periwinkle (Kishi et al., 1998). In Korea, disease caused by *Myrothecium verrucaria* in peanut (Shim et al., 1996) and by *M. roridum* in soybean (Yum and Park, 1990) was reported previously. Related works were also reported on hosts including cucurbitaceae, tomato in India (Gaur and Pathak, 1977), rapeseed, mustard (Tewari and Skoropad, 1977), and muskmelon (Fernando et al., 1986; Kuti et al., 1987, 1989). In cucurbits, muskmelon was recorded as host showing typical crater rot symptom on fruits. This disease has not been previously reported on watermelon.

Appearance and development of typical symptom were noticed to occur on watermelon (*Citrullus vulgaris* Schrad) leaves on November 11, 2002 in the greenhouse in Jinju, Korea. Symptoms were dark black-brownish round, zonal, or irregular lesions appearing on the leaves of watermelon and producing microsclerotia-like bodies on the surface of the lesion, which were confirmed as sporodochia. Black mass of conidia on lesion was rarely observed. After diluting the conidial suspension in water agar for 24 hours, the germtube tips of germinated single spore were transferred to PDA. Colonies of isolated fungus on PDA were white with flat mycelium producing black sporodochia. Symptoms were reproduced by artificial inoculation of healthy seedlings of watermelon. Conidial suspensions (2×10^4/ml) of isolate No. WM-01 were sprayed and kept in humidity chamber at 25°C overnight, thereafter in growth chamber. In five days, small black spots appeared on cotyledons and leaves, which became large round or irregular lesions (Fig. 1A-E).

As shown in Fig. 1F-G, the culture produced hyaline, one-celled conidia at one end of the phialides. The sporodochia on leaf lesions were sessile, polymorphic, variable in size, 35-850 μm in diameter, and 30-470 μm in depth, while the phialides were 10.3 × 2.2 μm in size. Conidia in sporodochium were black in mass, one-celled, rod-shaped, with rounded ends, hyaline, guttulate, and measured 6-8 × 1.6-2.2 mm in size. The characteristics of the pathogen were consistent with that of *Myrothecium roridum* (Ellis, 1971; Fitton and Holliday, 1970). Thus, the pathogen was identified as *Myrothecium roridum* Tode ex Fr., and the disease was named as Myrothecium leaf spot of watermelon.

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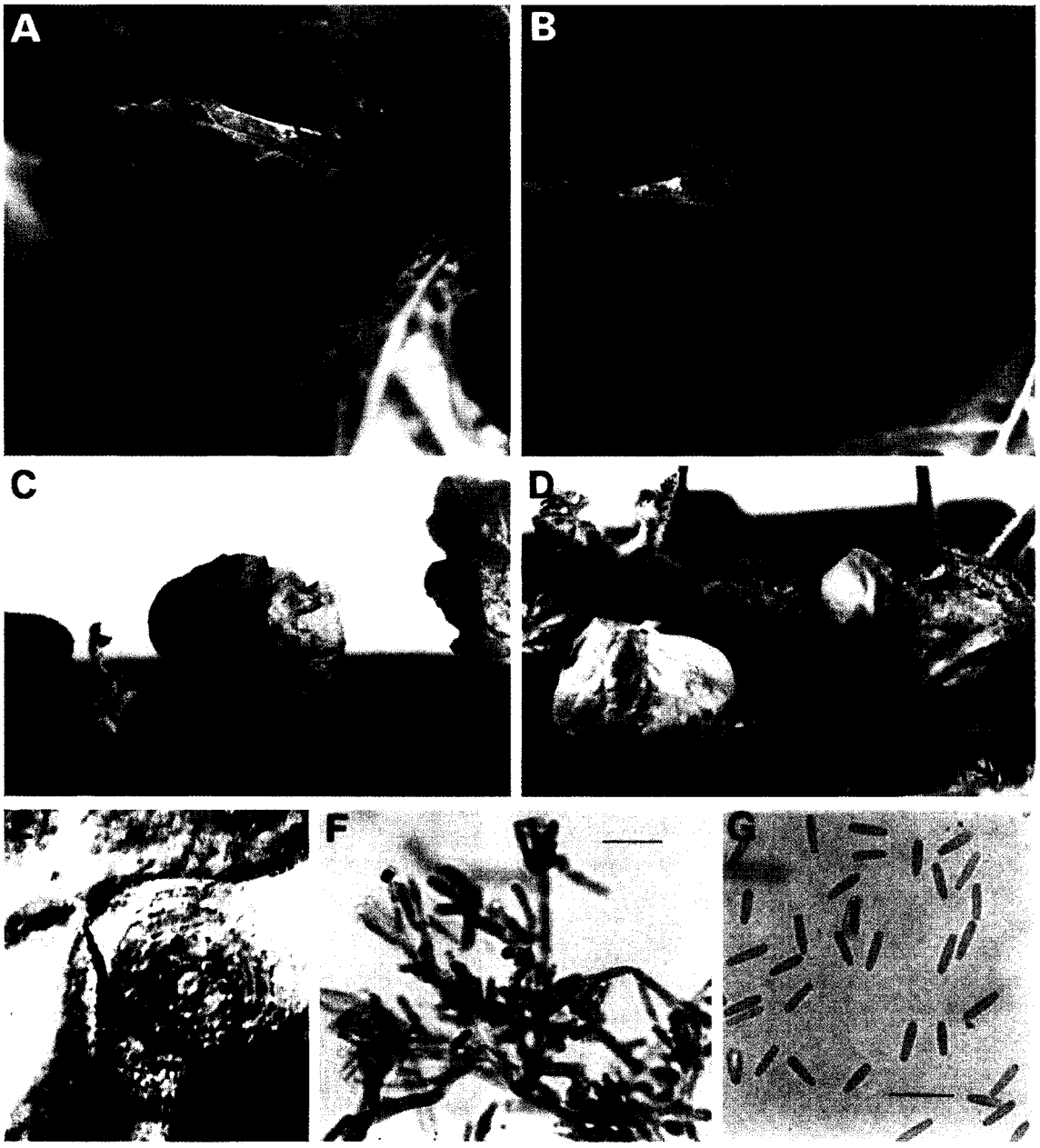

Fig. 1. Symptoms of Myrothecium leaf spot of watermelon and features of its causal agents. (**A-B**) Symptoms of natural infection under greenhouse watermelon, (**C-D**) Inoculated lesions of watermelon seedlings, (**E**) Close-up lesion (the black dots on the lesion are spore mass-produced on sporodochium), (**F**) Phialides of *Myrothecium roridum* (scale bar indicates 10 μm), and (**G**) Greenish spores of *M. roridum* (scale bar indicates 10 μm).

In addition to the major symptoms on cucurbits, Dake (1980) suggested that seed-soaked inoculation could reduce seed germination and result in delayed emergence, as well as stunted seedlings of cotton. Myrothecium disease is sporadic, however, developments are presumed to be favored in hot, prolonged humid weather (Cunfer et al., 1969) on many host plants. Infection has been more serious under greenhouse condition (Fitton and Holliday, 1970). Epidemiological studies are needed for better understanding of disease occurrence.

The disease might have already occurred as one of the major diseases of watermelon for sometime. The infected leaf area ranged from 10 to 22%. In greenhouses not facilitated with artificial heating system during the winter season, most farmers might have misdiagnose this symptom for anthracnose or gummy blight. However, watermelon disease by natural infection of *M. roridum* has not been officially described in scientific journals, but only

briefly mentioned in the compendium of cucurbit diseases, which reads "*M. roridum* causes a rind rot (under laboratory conditions) of gourds and watermelon" (Zitter et al., 1998). Therefore, this is the first report of Myrothecium leaf spot of watermelon in natural infection under greenhouse condition.

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