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Phytophthora hibernalis – a new pathogen on roses

***Phytophthora hibernalis* – ein neuer Schaderreger an Rosen**

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Phytophthora hibernalis

At the end of March 2007 an unusual twig blight was observed on imported containerized grafted *Rosa* cv. Chevy Chase. The roses had been overwintered outdoor under a plastic sheet to prevent frost damage. When the sheet was removed in spring, most of the roses looked dead and the rest had dark violet to black lesions at the base of the stems close to the soil surface (Fig. 1) and also on the twigs up to 30 cm in height. The rootstock of these plants looked healthy. The discoloured regions of the twigs were clearly distinct from the apparently healthy sections of the twigs. Removal of the discoloured bark exposed brown lesions in the wood beneath. Above the discoloured regions the twigs had died. Soon after sampling all the diseased roses were removed from the container area and destroyed.

From the necrotic lesions of less diseased roses, two homothallic isolates of a *Phytophthora* species were isolated. Based on morphological and on molecular studies the isolates were identified as *Phytophthora hibernalis*. The morphological data conformed closely to the description of *P. hibernalis* presented by Erwin and Ribeiro (1996). The minimum, optimum and maximum temperature for vegetative growth on carrot piece agar was 2, 15 and 25°C and the maximum growth rate was 3.0 mm/24 h at 15°C. Both isolates showed a rosette pattern on carrot piece agar (Fig. 2). The semi-papillate sporangia were caducous with characteristic long pedicles (Fig. 2) and ranged from 28-44 µm (average 37.6 µm, n=50) in length and from 12-22 µm in width (average of 17.4 µm, n=50). The average length:width ratio was 2.2:1. Both isolates were homothallic. Oogonia diameter varied from 26-38 µm with an average of 31.6 µm (n=50) and oospores had a diameter between 24-34 µm with an average of 28.4 µm (n=50) (Fig. 2). The two isolates had amphigynous but also paragynous antheridia (Fig. 2). Oospores were thin walled. The identification on the basis of morphology was confirmed by sequencing the *r*DNA ITS1 and 2 regions of both isolates according to Cooke et al. (2000). The ITS sequence of both isolates matched 100% the sequence of several isolates of *P. hibernalis* submitted to GenBank (Genbank Accession No. requested).

Koch's postulates were fullfilled in infection studies with *Rosa* cv. Red Corvette and cv. Friso. Twigs of containerized roses overwintering in a glasshouse at 10-15°C were infected via wounding. A mycelium disc from an actively growing colony of each of the *Phytophthora* isolates growing on carrot piece agar was placed onto the fresh wound. Each twig part was subsequently wrapped in wet tissue and protected by a piece of plastic film. Three days after incubation, the plastic film and the tissue were removed. The roses were incubated at 10-15°C in the glasshouse with a natural day length between 10-12 hours. Around the inoculation points a small necrotic lesion developed within one week after inoculation. The tissue turned dark brown to black forming a necrotic lesion with a clearly distinct margin to the healthy looking tissue. The necrosis started to girdle the inoculated twig but there was very little longitudinal spread of the necrosis. The development of the necrosis varied with the isolate. Over the following weeks the development of the necrosis stopped or turned extremely slow. Eleven weeks after inoculation, tissue samples were taken from the edge of the necrosis and placed on carrot

Figure 1. Disease Symptoms of *Phytophthora hibernalis* on *Rosa* cv. Chevy Chase.

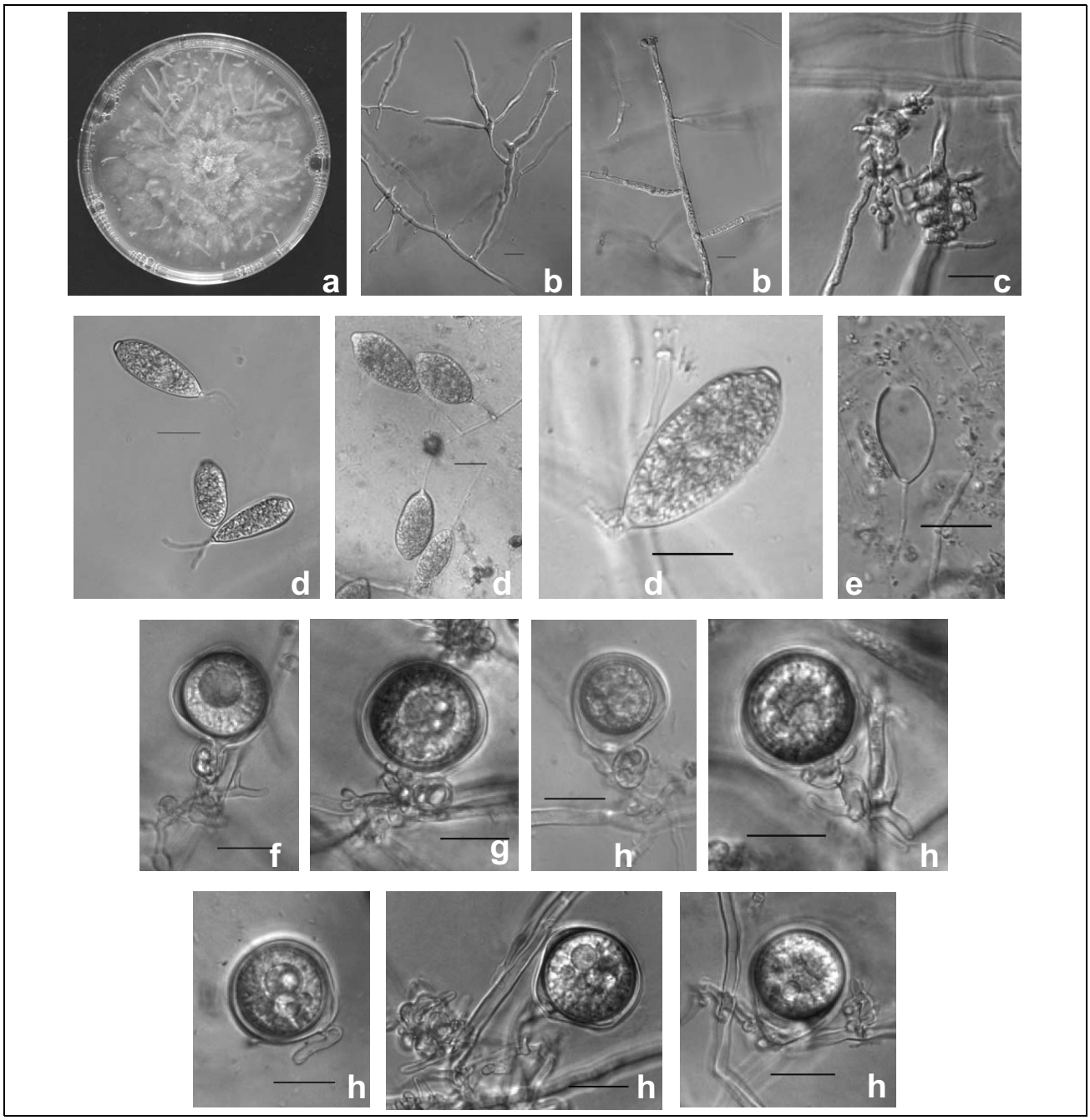

Figure 2. *Phytophthora hibernalis* BBA 13/02-1 and BBA 13/02-2, a – stellate to rosaceous colony pattern, b – hyphae, c – hyphal swellings on areal mycelium, d – sporangia with long pedicels, e – empty sporangium, f – amphigynous antheridium, g – paragynous antheridium, h – gametangia (— = 20 µm, all data from carrot piece agar)

piece agar. Re-isolation of *P. hibernalis* was positive with both isolates and with both *Rosa* cultivars.

As far as we know this is the first report of *P. hibernalis* on *Rosa.* The results of the infection studies did not provide conclusive evidence of the aggressiveness of this pathogen on roses or confirm *P. hibernalis* as the only cause of the rose decline of *Rosa* cv. Chevy Chase. However this may be related to differences in the resistance of the rose cultivars used or the environmental conditions in our pathogenicity test compared to the overwintered plants of cv. Chevy Chase. Further studies must be conducted to determine the significance of *P. hibernalis* as a pathogen on these plants. The reported host range of *P. hibernalis* is limited and it is mainly known as a pathogen on *Citrus* spp. (Erwin and Ribeiro, 1996). It has however been detected recently on Rhododendron in the USA (Blomquist et al., 2005).

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