Diseases Caused by Oomycetes

First Report of Fruit Rot of *Macadamia* sp. Caused by *Phytophthora heveae* in Yunnan, China

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In May 2018, a fruit rot disease was found in a *Macadamia* plantation in Jinghong, Yunnan, China. According to observation, the disease mainly occurred near the ground fruit, and the incidence rate of fruit close to the ground was 20%, and the fruit became brown and necrotic after infection. At present, the yield loss caused by the disease is less than 1%. *Phytophthora* was isolated from the infected fruit; some identical pure cultures were obtained after several transfers and numbered OJ20180523. On V8 medium, the pathogen mycelium was colorless, producing a large number of oogonium. Oogonium were spherical or nearly globose, and the size was 22 to 30 × 23 to 30 µm, with a thick wall of 2 to 3 µm, before oospores contained in the oogonium were loose. Antheridia was amphigynous and unicellular, 8 to 13 µm in diameter, strong ability to utilize starch. Sporangiophores on V8 medium sparse, simple or irregularly branched. Sporangia produced in Petri culture liquid mostly terminal, basal or laterally attached, nondeciduous, pear shape or asymmetrical shape, with a size of 27 to 41 × 22 to 32 µm, L/B ratio 1.2 to 1.5, papillate with hemispherical apical thickening. Genomic DNA was extracted from OJ20180523 mycelium, and the ITS and YPT1 markers were amplified and sequenced. Resulting sequences had 99 to 100% homology with those of the ITS (MH794288) and YPT1 (MT107900) regions of *Phytophthora heveae* A.W. Thoms. (1929). To produce sporangia, the OJ20180523 colony was

cultured for 5 days on Petri plates up to a 5-mm plug diameter; 10 plugs were added to 50 ml of 10% V8 medium and incubated for 48 h to prepare a zoospore solution. Then a zoospore solution with a concentration of 1×10^2 was prepared. Twenty fruits growing on O.C. *Macadamia* tree were isolated by plastic film; 10 nuts were treated by 10 ml of spore suspension on each fruit using a spraying pot, and 10 were treated with water as a negative control. The test treatment area was isolated with plastic film. All treated fruits were kept at 85% relative humidity in a fresh-keeping bag at 20 to 28°C. On the fifth day, the fruit showed the same symptoms as the infected nuts in the field. The pathogen was successfully reisolated from the infected nut tissues. The experiment was repeated three times, and the same results were obtained. *Phytophthora* identical to the previous colony could be reisolated from the symptomatic fruits but not from the control. Therefore, both molecular and morphological analysis indicated that the pathogenic oomycete corresponded to *P. heveae* (Zhang et al. 1995). It has been reported that *P. cinnamomi* causes stem ulcers and root rot of *Macadamia* in Australia and Florida (Mbaka et al. 2009; Pegg 1973). There were no reports of *Macadamia* diseases caused by *Phytophthora* in China. *P. heveae* causes black streaks and fruit rot of oak, and shrinking disease, causes rotten pods of cocoa, causes spots and blight of young stems and larvae of Brazil nuts, causes ulceration and death of kauri trees and avocado saplings (Zhang et al. 1995), and causes *Tetragastris panamensis* seedlings and *Anacardium excelsum* seedlings to die due to damping-off (Davidson et al. 2000). As far as we know, this is the first report of nut rot of *Macadamia* caused by *P. heveae* in Yunnan, China.

References:

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