



First report of *Stagonosporopsis citrulli* causing gummy stem blight of watermelon in Taiwan

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Received: 2 April 2018 / Accepted: 15 October 2018 / Published online: 26 October 2018
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Watermelon [*Citrullus lanatus* (Thunb.) Matsum. & Nakai, Cucurbitaceae] is an important fruit crop in Taiwan. A severe foliar disease of watermelon cv. ‘China Baby’ with the disease incidence of 100% was observed in Chiayi city, Taiwan in 2017. Symptoms were circular dark brown necrotic spots and resembled symptoms of gummy stem blight. A fungus was consistently isolated from surface-sterilized leaf samples. After incubation on quarter-strength PDA for 14 days, the isolates, CL2 and CL3, formed dark olivaceous colonies with grayish aerial mycelia. The isolates did not sporulate under the experimental conditions. Based on the colony morphology, the isolates were similar to two morphologically indistinguishable but genetically distinct *Stagonosporopsis* species (Stewart et al. 2015), *Stagonosporopsis cucurbitacearum* (Fr.) Aveskamp, Gruyter & Verkley (Keinath et al. 1995) and *Stagonosporopsis citrulli* M.T. Brewer & J.E. Stewart (Stewart et al. 2015). The isolates were further identified by sequencing of the internal transcribed spacer (ITS) region of the rDNA and partial sequences of beta-tubulin (*BTUB*), chitin synthase (*CHS*), and calmodulin (*CAL*) genes (Stewart et al. 2015). The sequences were deposited in GenBank under accession numbers MG963959–MG963960 and MG968862–MG968867. The ITS sequences of the isolates showed 100% identity with *Stagonosporopsis citrulli* ex-type strain C5–5 (KJ855546) by BLASTn analysis. The *CAL* sequences of the isolates CL2 and CL3 were 100% and 99.8% identical to that of *S. citrulli* C5–5 (KJ855658). The *CHS* and *BTUB* sequences of the two isolates shared 100% identity with those of *S. citrulli* C5–5 (KJ855714 and KJ855602). Multilocus sequence analysis of four concatenated loci (ITS, *CHS*, *CAL*, *BTUB*) of the isolates and reference sequences (Stewart et al. 2015) retrieved

from GenBank was conducted. The two isolates clustered together with *S. citrulli* C5–5 in a well-supported clade, revealing that the watermelon isolates are *S. citrulli*. To fulfill Koch’s postulates, watermelon cv. ‘China Baby’ leaves were inoculated with the *S. citrulli* isolates according to the method of Rennberger et al. (2017). The inoculated leaves showed symptoms indistinguishable to those of natural infections. The same fungus was successfully re-isolated from the symptomatic leaves. The control leaves remained symptomless. Currently, the pathogen was recorded as causal agent of gummy stem blight on the same plant host in Georgia, USA (Stewart et al. 2015). To the best of our knowledge, this is the first report of *S. citrulli* causing gummy stem blight of watermelon in Taiwan.

Acknowledgements This work was financed by the Ministry of Science and Technology (MOST, grant number 106-2311-B-415-001), Taiwan, R.O.C.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Research involving human participants and/or animals The authors declare that no human participants and animals were involved in this study.

Informed consent This manuscript is new and not being considered elsewhere. All authors have approved the submission of this manuscript.

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