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Bacterial Blight of Shallot, Caused by *Pseudomonas syringae* pv. *porri*, a New Disease in Korea

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Shallots (*Allium cepa* var. *ascalonicum* L.) affected by bacterial blight disease received for diagnosis in March 2007 (Fig. 1A). Grower has estimated and we have confirmed that as much as two-third of the plant was affected by the disease in fields in the Daejung District, Seokwipo of Jeju, Korea in April, 2007. The symptoms on leaves included yellowish and brownish leaf blight on leaf surface. Seriously infected plants shriveled and died in fields. Two isolates, BC2489 and BC2498 were recovered on trypticase soy agar (TSA) from symptomatic leaves of the plants. Pathogenicity was evaluated on seven-week-old shallots by spot and spray inoculation. Bacteria were grown on TSA for 48 h at 28°C. Five µl of bacterial suspension in sterile distilled water (10^5 cfu/ml) were spot-inoculated on pinpricked positions of five detached leaves for each isolate. The detached leaves were incubated in a plastic box with high humidity at 28°C. Spot-inoculated surfaces turned white three days after inoculation followed by brownish discoloration. A bacterial suspension in sterile distilled water (50 ml at 10^5 cfu/ml) was sprayed onto three plants for each isolate. Plants were maintained in a growth chamber at 26°C and 90% relative humidity. Isolates induced identical symptoms two weeks after spray inoculation as those originally observed on shallots in the fields (Fig. 1B). Bacteria were reisolated 3 weeks after inoculation from diseased lesions surface sterilized in 70% ethanol for 1 min and the identity of the reisolated bacteria confirmed by analyzing the sequences of *rpoD* gene (Sawada et al., 1999). No symptoms were noted on detached leaves and intact plants inoculated with sterilized distilled water. The isolates were fluorescent on King's B agar and Gram-negative, aerobic rods with one to four polar flagella. The isolates belonged to *Pseudomonas syringae* (LOPAT) group 1a (+, -, -, -, +) (Lelliott et al., 1966). The *gyrB* and *rpoD* regions (Sawada et al., 1999), and *rpoB* region (Tayeb et al., 2005) of the isolates were partially sequenced to aid in identification of the two original field isolates using reported primers (Sawada et al., 1999; Tayeb et al., 2005). The *rpoB* region (1,119 bp) of the isolates shared 100% sequence identity with *P. s.* pv. *porri* CFBP 1908^{PT}. Phylogenetic analysis based on partial sequences of the *gyrB* (686 bp) and *rpoD* (615 bp) loci of *Pseudomonas* spp. available in the Genbank (Sawada et al., 1999; Tayeb et al., 2005), the reference strain of *P. syringae* pv. *porri* CFBP 1908^{PT}, and the isolates reported in this study was conducted using Jukes-Cantor model in MEGA Version 4.1 (Tamura et al., 2007). The isolates and the reference strain of *P. syringae* pv. *porri* CFBP 1908^{PT} were clustered in one group (Fig. 2A and 2B). On the basis of

Fig. 1. Bacterial blight symptoms on shallot in field (A). Symptoms on shallot induced two weeks after spray inoculation with a cell suspension (10^5 cfu/ml) of *Pseudomonas syringae* pv. *porri* strain BC2486 from shallot (B).

Fig. 2. Phylogenetic trees derived from the neighbor joining model in MEGA software (ver. 4.1) based on partial sequences of *gyrB* (A) and *rpoD* (B) genes of *Pseudomonas syringae* pv. *porri* strains BC2486 and BC2498 from shallot. Number represents bootstrap values based on 500 samples.

phenotypic, pathological characteristics and the sequences, the two isolates were identified as *P. syringae* pv. *porri*. To our knowledge, this is the first report of bacterial blight of shallot caused by *P. syringae* pv. *porri* in Korea. The disease is expected to have a significant economic impact on shallot culture in the fields of Jeju Province in Korea.

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