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Shoot Blight of Suckers of Common Lilac caused by *Phytophthora citricola*

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Shoot blight of suckers of common lilac plants (*Syringa vulgaris*) was found in an apartment garden in Daegu, Korea. The causal organism was a species of *Phytophthora*, which was homothallic with paragynous antheridium. Oogonia were globose and measured 21.5-34.0 μm with an average of 29.7±3.2 μm in diameter. Oospores in oogonia were round, light orange brown when mature, mostly plerotic, and measured an average of 25.6±3 μm in diameter. Antheridia were ovoid and around 11.7× 7.8 μm. Sporangia seldom formed on agar media but formed abundantly in water. Sporangia that formed in water were semipapillate, ovoid obpyriform, non-caducous, and 23.4-66.3×17.6-37.1 μm in dimension with l/b ratio of 1.46. The causal organism was identified as *Phytophthora citricola* Sawada on the basis of morphological characteristics. This is the first report of shoot blight caused by *P. citricola* Sawada in lilac suckers in Korea.

Keywords : landscape plant, *Syringa vulgaris*, taxonomy.

A blight disease was found occurring on young shoots of suckers of common lilac plants (*Syringa vulgaris* L.) growing in an apartment garden in Daegu, Korea in May 2003 (Fig. 1A). A species of *Phytophthora* was isolated from the lesions. The isolate formed sex organs in single culture on V8 juice agar plates, but seldom produced sporangia on the agar medium. The isolate, however, formed sporangia readily when mycelial pieces were placed in water. The sporangia formed simple sympodial sporangiophores. The sporangia were semipapillate, ovoid obpyriform, non-caducous, and measured 23.4-66.3×17.6-37.1 μm with an average of 40.3±9.2×27.6±4.4 μm and l/b ratio of 1.46 (Fig. 2A). Sporangia were very variable in shape. The ovoid obpyriform was the most common, but variously distorted ones were also observed (Fig. 2B). Oogonia were globose and measured 21.5-34.0 μm with an average of 29.7±3.2 μm in diameter (Fig. 2C, D). Sometimes oogonia appeared to be tapering to a funnel-shaped base (Fig. 2E, F) as described in *P. citricola* by Erwin and Ribeiro (1996) and

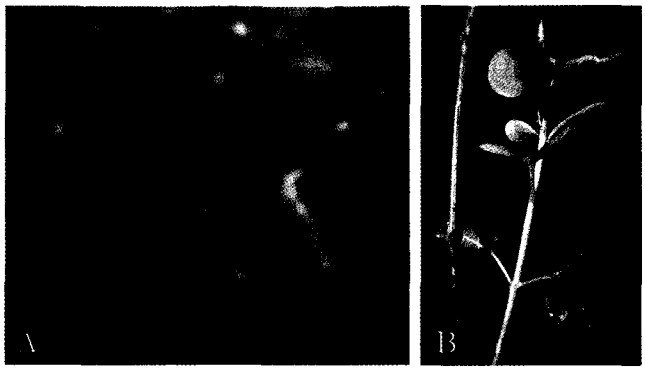

Fig. 1. Shoot blight of lilac in an apartment garden in Daegu City (**A**). Symptoms induced by artificial inoculation (**B**).

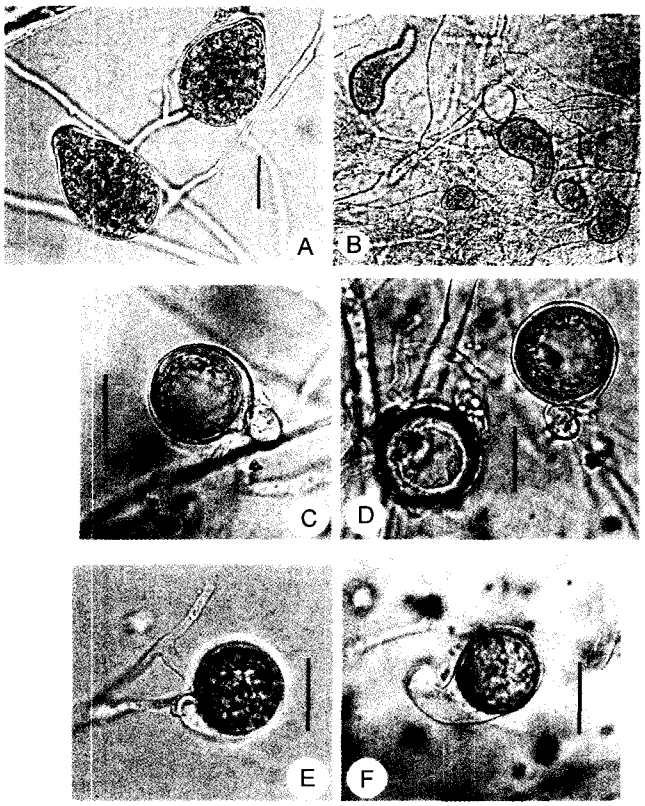

Fig. 2. *Phytophthora citricola*, a causal agent of a shoot blight of lilac suckers. (A) Sporangia on a sympodial sporangiophore; (B) Sporangia in distorted forms; (C-D) Oogonia with paragynous antheridia; (E-F) Oogonia with funnel-shaped base. Bar = 20 μm.

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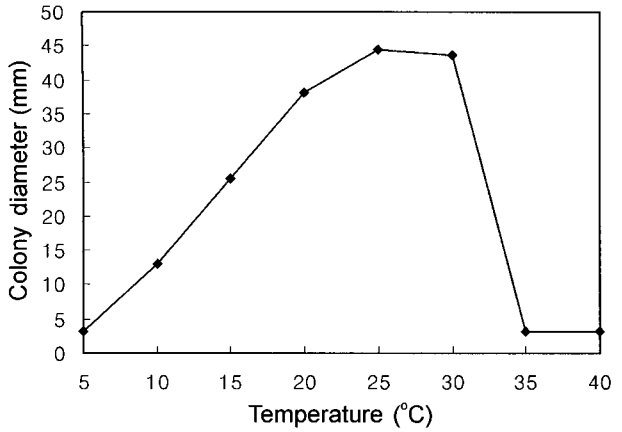

Fig. 3. Effect of temperature on mycelial growth of *Phytophthora citricola* infecting suckers of the common lilac.

Katsura (1972). Antheridia were mostly paragynous, globose to ovoid, and 11.7×7.8 μm in size.

Mature oospores were light orange brown in color, mostly plerotic in the oogonia, but aplerotic ones were occasionally observed, and measured an average 25.6±3 μm in diameter (Fig. 2C, D).

The effect of temperature on mycelial growth was studied. Mycelial plugs punched out from the actively growing culture on PDA by a cork borer were transferred to PDA plates. The plates were cultured in incubators in eight different temperature regimes (5, 10, 15, 20, 25, 30, 35 and 40°C). Colony diameter measured 8 days after inoculation is shown in Fig. 3. Optimum temperature for mycelial growth was 25°C. The fungus did not grow at 5 and 35°C or over.

For the pathogenicity test, the isolate was first cultured on V8 juice agar plates for 6 days. Then, the culture plates were flooded with sterile distilled water and incubated under continuous fluorescent light irradiation for 3 days for sporulation. A sporangial suspension of 10^4 sporangia per ml was prepared by collecting the sporangia from the culture and diluting with the aid of a hemocytometer. The sporangial suspension was sprayed on a young shoot grown out from a transplant in a pot, and the plant was covered with a plastic film bag to keep it humid, and then incubated for 48 h in a 25-28°C room. Then, symptoms similar to the natural ones appeared at the conclusion of incubation (Fig. 1B). The pathogenic fungus was re-isolated from the diseased tissue. Pathogenicity of the isolate was also tested by inoculation of detached leaves. Detached leaves were inoculated by placing mycelial plugs on the leaves and incubating the leaves in humidified plastic boxes at room conditions of around 25°C. Water-soaking lesions became noticeable 4 days after inoculation. When keys and descriptions for the identification of *Phytophthora* species were followed on the basis of morphological characteristics and pathogenicity (Ho, 1981, 1992; Ho et al., 1995; Jee, 2000; Katsura, 1972; Newhook et al., 1978; Stamps et al., 1990; Waterhouse, 1963, 1970), the isolate was identified as *Phytophthora citricola* Sawada. Dimensions of asexual and sexual organs were consistent with previous descriptions (Erwin and Ribeiro, 1996). Shoot blight of the suckers of the common lilac caused by *P. citricola* was reported in the United States and in Canada (Erwin and Ribeiro, 1996). Jee et al. (1998) reported fruit rot of jujube caused by *P. citricola* in Korea, which was the first report of a plant disease caused by the said *Phytophthora* species in the country. Meanwhile, this current study is the first report of the occurrence of shoot blight of lilac suckers caused by *P. citricola* in Korea. Two additional species of *Phytophthora*, *P. cactorum and P. syringae*, have been reported to infect common lilac causing leaf and twig blight, and downy mildew, leaf spot or shoot dieback, respectively (Erwin and Ribeiro, 1996). *P. cactorum*, which is classified in group I, is distinct from *P. citricola* in terms of its conspicuously papillate, caducous sporangia with pedicel (Stamps et al., 1990). *P. syringae* is classified in group III as *P. citricola*, but the isolate in this current study, *P. citricola*, differed

Table 1. Characteristics of the causal organism of shoot blight of lilac suckers in an apartment garden

Organ	Characteristics
Mycelium	Hyaline, coenocytic, mature mycelium 5.0-7.5 μm thick Optimum for growth 25°C, no growth at 5°C and at 35°C
Sporangium	Formed in water Ovoid obpyriform with wide variation Noncaducous on simple sympodial sporangiophores 23.4-66.3×17.6-37.1 μm in range, 40.3±9.2×27.6±4.4 μm in average l/b ratio: 1.46
Oogonium	Globose, 21.5-34.0 μm with an average of 29.7±3.2 μm in diameter, sometimes tapering to a funnel-shaped base
Oospore	Light orange brown when mature, plerotic in oogonium 19.5-29.3 μm in range, 25.6±3.0 μm in average
Antheridium	Ovoid, mostly paragynous 11.7×7.8 μm

from *P. syringae* by its morphology of sporangia, oogonia, and growth temperature. The isolate in this study produced sporangia with very variable shapes, as shown in Fig. 2B, and oogonia that were sometimes tapering to a funnel-shaped base (Fig. 2E, F) and grew at above 25°C (Fig. 3). This is in contrast to *P. syringae*, which is known not to produce variable sporangia and oogonia with funnel-shaped base, and of which maximum growth temperature is known to be 23-25°C (Katsura, 1972; Ribeiro et al., 1996; Stamps et al., 1990).

The disease occurred only on the young shoots of suckers. It did not affect trunks or foliage on the canopy of the main plants. The disease was found only on suckers growing out from the trees on the north side of a 15-story apartment building. Thus, rainy weather in April to May in 2003, the proximity to soil of the suckers (Erwin et al., 1983), and the tender growth of the suckers in the shade would have been predisposing factors to the occurrence of the disease in the apartment garden. The disease was first observed in early May 2003, then it slowly diminished with increase in temperature. Thus, it was considered a mild disease of lilacs.

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