



First report of *Phytophthora taxon niederhauserii* causing decline of almond in Turkey

I. Kurbetli* and K. Değirmenci

Plant Protection Central Research Institute, 06172 Ankara, Turkey

*E-mail: kurbetli@gmail.com

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Turkey is among the top ten countries for almond (*Prunus dulcis*) production in the world. In 2009, losses of approximately 5% were observed in Kayseri province associated with a decline of two-year-old almond trees in an orchard containing 600 almond trees, cvs. Nonpareil, Ferraduel and Ferragnes, originally grown in a nursery in Yalova province. Affected trees developed small chlorotic leaves that wilted, and had cankers on the basal stems. Some of the affected trees had dried completely. Infected stem tissues, cut into nine to ten small pieces (5x3 mm), were plated onto P5ARPH-CMA (Jeffers & Martin, 1986) without surface disinfection. Plates were incubated for three to five days at 22°C in darkness from which a *Phytophthora* sp. was consistently recovered. Actively growing mycelium was transferred to carrot piece agar (40 g/l carrot pieces; 20 g/l agar) containing 20 mg/l β-sitosterol. The unidentified *Phytophthora* sp. did not produce sexual structures in single culture. Non-papillate sporangia, ellipsoid to ovoid with tapered bases, 64.5-83.3 μm long (mean 69.3 μm) and 36.1-45.0 μm wide (mean 38.3 μm), with length-to-width ratios of about 1.8 were produced abundantly in non-sterile soil extract solution. The sporangia proliferated internally or externally, presenting both nested and extended proliferation of the sporangium (Fig. 1). Colonies grew very slowly at 35°C. Isolates were identified as *P. taxon niederhauserii* by sequence analysis of the ribosomal DNA internal transcribed spacers 1 and 2 using ITS1 and ITS2 primers (GenBank Accession No. HQ681251). The sequence was 99% identical to sequences of *P. taxon niederhauserii* isolates (AY550915 and FN252859).

One representative isolate was used to inoculate eight two-year-old almond

plants with an agar plug of actively growing mycelium that was attached to exposed cambium of the basal stem. Agar plugs without mycelium were used for eight control plants. The plants were kept in a controlled greenhouse at 25°C and watered weekly. All plants inoculated with *P. taxon niederhauserii* collapsed after four weeks. Control plants remained healthy (Fig. 2). The pathogen was re-isolated from necrotic basal stems. *Phytophthora taxon niederhauserii*, proposed as a new species in 2003, was originally isolated from *Thuja occidentalis* and *Hedera helix* plants grown in glasshouses in North Carolina, USA. In 2007, it was found on *Ceanothus* sp. in Santa Barbara County (California, USA). In Australia, it has been detected on imported nursery plants and in natural ecosystems on *Banksia prionotes*. In Europe, *P. taxon niederhauserii* was detected on potted *Callistemon citrinus*, *Cistus* spp., *Banksia speciosa*, various *Begonia* hybrids, *Hedera helix*, *Kalanchoe blossfeldiana*, *Sinningia speciosa*, and *Peperomia clusiifolia*. In Spain, *P. taxon niederhauserii* has been detected on almond trees in 2007 (EPPO, 2009). As far as is known, this is the first report of *Phytophthora taxon niederhauserii* in Turkey.

References

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Figure 1



Figure 2

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