Monilinia laxa on Stone Fruits in Iraq

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ABSTRACT

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Monilinia laxa is reported for the first time in northern Iraq. During January 1979, sporodochia of this fungus were observed on blighted blossoms and twigs of almond and peach trees in northern Iraq. Both almond and peach isolates were pathogenic on blossoms, twigs, and fruit of almond, apricot, peach, and plum. The brown rot pathogen was not found in orchards of apricot, peaches, and plums in central Iraq.

The brown rot fungus, *Monilinia laxa* (Aderh. & Ruhl.) Honey (= *M. cinerea* Bon.; = *Sclerotinia laxa* Aderh. & Ruhl.), has been reported from every continent of the world (2,4,7,9). Hosts include all commercially grown stone and pome fruits and the flowering quince (2,9). This pathogen is more important in causing blossom and twig blight than fruit rot (2,8).

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M. laxa has not previously been reported from Iraq (6; R. S. Mathur, *unpublished*), but we know from old and new cankers and blighted twigs that disease symptoms have occurred on peach at Nineveh Agricultural Experiment Station near Mosul for many years. We first observed the sporodochia of the fungus in January 1978 in an almond orchard at the Bakrajo Agricultural Experiment Station near Sulaimaniyah and on peach trees at Nineveh. The pathogen was not found on other stone fruit or pome fruit trees. This study includes identification of the causal agent, tests for pathogenicity and severity to stone fruit species, and a survey for its presence in the central fruit-growing region of Iraq.

MATERIALS AND METHODS

The fungus was isolated from blighted twigs of almond (*Prunus amygdalus* Batsch) and peach (*Prunus persica* (L.) Batsch) and cultured on either freshly prepared potato-dextrose agar (PDA: 200 g of potato slices, 20 g of dextrose, and 20 g of agar) or water agar (20 g of agar in 1 L of distilled water). Other media used for mycelial growth and sporulation studies were Difco PDA (39 g/L) and Difco

cornmeal agar (17 g/L).

The *M. laxa* conidia used for pathogenicity tests were obtained in two ways. Spores from the sporodochia collected from almond twigs were suspended in distilled water and filtered through two layers of cheesecloth, or single-spored cultures were allowed to grow and sporulate on freshly made PDA under continuous artificial light at 21–25 C for 10 days. Spore concentration was adjusted by dilution with distilled water to 2.5×10^5 spores per milliliter as determined with a hemacytometer.

We inoculated wounded almond shoots (5–15 mm in diameter) by introducing a drop of spore suspension (prepared from sporodochia produced on almond), placing a small piece of wet, sterilized cotton on top, and wrapping the shoot with a plastic ribbon. Ten shoots were inoculated with the spore suspension and 10 others with sterile distilled water. This experiment was conducted at the Bakrajo Station on 20-yr-old trees of unknown cultivar.

Blossoms on cut twigs of plum and apricot shoots were inoculated, placed in moist sand, covered with a plastic sheet, and incubated at about 25 C in a lathhouse at the College of Agriculture in Abu-Ghraib near Baghdad. The inoculated blossoms were considered to be free of *Monilinia* contamination because the disease was not found in the orchard or in other orchards in central Iraq. Fruits were also collected from the same orchard, wound inoculated, and incubated at 20–30 C to determine their susceptibility to the pathogen.

We evaluated the severity of the disease on almond trees by observing 50 blossoms on each of 20 trees after the full-bloom stage of blossoming in the orchard where *M. laxa* was first observed.

RESULTS

During a survey of stone and pome fruit orchards for *M. laxa* in January 1979, we observed an abundance of blossom and twig blight in almond and peach orchards at Sulaimaniyah and Nineveh, respectively. The gray sporodochia were found abundantly on both the blossoms and twigs blighted the previous season. During bloom, the almond orchard at Bakrajo had 33% blossom blight associated with *M. laxa*. The peach orchard at Nineveh had blossom blight but no fruit rot. In the Baghdad area, the orchard owned by the Horticulture Directorate of the Ministry of Agriculture and Agrarian Reform, as well as three privately owned orchards, were free from the disease.

Inoculations of immature green almond and plum produced small, dark spots that expanded into a typical soft, brown decay with masses of spores. Inoculations of almond twigs in an orchard produced infection and running cankers.

The symptoms and pathogenicity reactions on host plants were similar to those described for *M. laxa* isolates in California (7). Mycelial growth of the fungus on synthetic media was also typical of *M. laxa* as opposed to *M. fructicola* or *M. fructigena*. The growth was slow on freshly prepared PDA, Difco PDA, and cornmeal agar. Growth was also limited on water agar, and the mycelium formed an irregular, scalloped margin. With further incubation, the PDA medium turned gray to black, and spermatia were produced in abundance. Conidial production was sparse on all media, but more so on PDA than on cornmeal or water agar. Conidia were lemon shaped, hyaline, and measured 7.6–12.0 × 4.1–8.3 μm (sporodochia on almond twigs), 12.7–20.0 × 8.5–10.6 μm (conidia produced on PDA culture), and 7.6–13.8 × 4.6–12.2 μm (conidia produced on oatmeal agar).

DISCUSSION

Although *M. laxa* was isolated from Iraq for the first time, we believe that the disease has been present for many years but has been overlooked. The director of Nineveh Agriculture Station stated that he had observed the twig and bloom blight for many years and had assumed it was caused by frost injury. The almond trees at Sulaimaniyah had cankers on older wood, which also indicates that the disease occurred previously.

The occurrence of the disease only in northern Iraq and its absence in the central area near Baghdad could be related to precipitation during bloom. The average rainfall in Sulaimaniyah is 603 mm/yr, compared with 121 mm/yr at Baghdad (1,5). Furthermore, the rains at Sulaimaniyah fall from December to February and at Baghdad in December, and stone fruits start to blossom in late January. Temperature is not believed to be a major factor because the temperature range during blossoming at Sulaimaniyah and Baghdad is similar (3).

The detection of *M. laxa* but not *M. fructicola* on almond and peach emphasizes the widespread distribution of *M. laxa* worldwide. The disease may be limited in seriousness to attack of the blossoms, producing loss of fruit only in years with excessive rain or dew during harvest.

Because of the limited surveys made in Iraq, we plan further efforts to evaluate the incidence of the disease in northern Iraq. Special attention will be paid to the major fruit-producing areas north of Mosul and near the Turkish border. Iraqi growers are planting more fruit crops with sprinkler irrigation, which could result in more serious problems of brown rot decay on fruits; in orchards with drip irrigation, however, brown rot problems may be minimal. Effective control measures should be undertaken in sites with brown rot to prevent its spread into new production areas.

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