

## Abstract

### First Report of Homothallic Isolates of *Phytophthora infestans* in Commercial Potato Crops (*Solanum tuberosum*) in the Toluca Valley, Mexico

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*Phytophthora infestans* causes severe symptoms of wilt disease on potato crops (*Solanum tuberosum*) in the Toluca Valley (Mexico) despite the use of fungicides. *P. infestans* oospores produced by sexual reproduction can survive in the soil for many years, resisting harsh environments. In many agroecosystems, oospores germinate in the beginning of a season, which represents the initial inoculum for epidemics. The sexual cycle of the pathogen allows the generation of recombinant genotypes that can be more pathogenic or even resistant to chemicals. This paper presents a study of 20 isolates of *P. infestans* collected from potato crops in the Toluca Valley within the municipality of Zinacantepec (Mexico State). Isolates were obtained from potato foliar infected tissues. The pathogen was confirmed as *P. infestans* on the basis of morphological characters (1). Sporangia were caducous, ovoid, limoniform, semipapillate, and were  $28.4 \pm 1.3 \times 17.6 \pm 1.2 \mu\text{m}$  (height  $\times$  width). Mycelium was coenocytic with hyphal diameter of 5 to 8  $\mu\text{m}$ . Five isolates were collected in 2011, and 15 in 2012. Isolates were transferred by hyphal tip to culture medium plates with V8 juice agar and incubated at 19°C. All the isolates were mated to determine the mating type with the reference isolates J104 (A1) and J204 (A2), which were provided by the Michoacana University of San Nicolás de Hidalgo (Mx). Isolates that produced oospores with both A1 and A2 testers (J104 and J204) and in a single culture were designated homothallic. Results show that two out of the five isolates collected in 2011 were homothallic and the other three were type A1. Regarding the 15 isolates collected in 2012, six were typed as A1, five as A2, and four were homothallic. The heterothallic isolates only produce oospores when mated with the opposite mating type. The homothallic isolates possessed the ability to act as A1 and A2 during heterothallic mating and were found capable of producing sexual structures (oogonia and amphigynous antheridia) in a single culture, a phenomenon not observed in isolates that are strictly A1 or A2. Oospores formed were aplerotic and measured  $32.2 \pm 3.3 \mu\text{m}$  in diameter. Single-sporangium progeny were produced from the six homothallic isolates to be analyzed to confirm the occurrence of the self-fertility. Assessment of 48 single-sporangium progeny from the homothallic isolates resulted in 22 homothallic, 12 A1, 10 A2, and four sterile. These results differ from those found by Grünwald et al. (3), who conducted a study with isolates collected from the Toluca Valley region in 1997 and 1998, finding a 1:1 frequency between compatibility types A1 and A2. Fernández et al. (2) studied a broad population of 27 isolates from potato crops in the state of Michoacán (Mx), and found two homothallic isolates among heterothallic isolates; the ratio was 1:1. Also, homothallic isolates have been found in Spain and China (4). To our knowledge, this is the first report of the occurrence of homothallic *P. infestans* isolates in commercial potato crops (*S. tuberosum*) in the Toluca Valley, Mexico.

**References:** (1) D. C. Erwin and O. K. Ribeiro, Page 346 in: *Phytophthora Diseases Worldwide*. The American Phytopathological Society. St. Paul, MN, 1996. (2) S. P. Fernández et al. *Rev. Mexicana Fitopatol.* 23:191, 2005. (3) N. J. Grünwald et al. *Phytopathology* 91:883, 2001. (4) M. Han et al. *J. Eukaryotic Microbiol.* 60:79, 2013.