

Abstract of MSc. Thesis

“Real-time PCR detection of *Phytophthora* spp. in some horticultural crops and study of the fungus biodiversity in Egypt”

The genus *Phytophthora* includes severe plant pathogens that cause damages and yield losses on many food crops. *Phytophthora infestans* is the causal agent of tomato and potato late blight. Its infection cycle is rapid and may destroy a plant in a few days, if temperature and humidity conditions are optimal. In this study, 49 soil and plant Egyptian samples were collected from different farms of Delta region (Menofia, Qalyubia, and Giza Governorates), in Egypt to study *P. infestans*. Moreover, the Egyptian farms were surveyed on tomato, potato and pepper crops at different time intervals, from September 2016 until May 2017. In addition, ten Italian samples were collected to identify the *P. infestans* from a tomato crop at the greenhouse at Carovigno (Italy) on May 15th, 2017. The samples were screened by specific and universal primers of ITS regions of the rDNA of *P. infestans* and *Phytophthora* spp. respectively, followed by sequencing of the obtained PCR products. The results revealed that eight and five of Egyptian and Italian samples were positive to the pathogen, respectively. The obtained sequences were deposited in GenBank under accession numbers from MF680412.1 to MF680423.1. DNA analysis showed that eight Egyptian isolates belonged to *Phytophthora infestans* and five Italian isolates related to *P. parasitica* with high similarity from 97% to 99.869% of the nearest ones registered NCBI and CBS DNA databases, respectively. Moreover, the microscopic and sequencing results allowed identification of a further fungus, *Nigrospora* sp. (MF940333.1) as shown by 99% similarity to GenBank accession KT192335.1. The screening of the Egyptian and Italian

Phytophthora populations by the Molecular beacon (MB) *avr3a* probe showed that *avr3a/avr3a* genotype was more widespread in Italian populations than Egyptian populations. In a further study, the expression of plant defense genes *PAL 5*, *PIN II*, *PR1* and *LOX D* was studied in Tondino tomato. The gene transcripts increased 4 and 7 days after artificial inoculation with *P. infestans* strain CBS 120920. These defense genes may be exploited to screen the tomato resistant cultivars to *P. infestans* before cultivation on large scale to avoid yield losses. Furthermore, they may be useful when studying the host reaction in testing or selection assays of tomato cultivars.

Keywords: *Phytophthora infestans*, *Phytophthora* spp., ITS-PCR, sequencing, Molecular beacon probe *avr3a*, defense genes expression, Real time PCR, *avr3a* virulent gene, tomato, potato, pepper