

ABSTRACT

Disease survey indicated that, root-rot and/or wilt disease of mango rootstocks was distributed in all examined locations of six different governorates of Egypt. The lowest percentage of natural infection in seedling was noticed in El-Giza governorate and the lowest percentage of natural infection of trees was noticed in Aswan governorate, while the highest percentage of both natural infection of seedlings and trees was obtained at El-Sharkia governorate. Fourteen fungal genera were isolated from naturally infected seedlings or trees of mango rootstocks. The most frequently isolated fungi were *Botryodiplodia theobromae* Pat. followed by *Fusarium solani* (Mart) Sacc. while *Ganoderma* sp. was the lowest one. Drip irrigation system was more suitable for the disease spread than surface irrigation system. The highest percentage of disease incidence was recorded in sandy soil and the lowest one in fine textural soil. *B. theobromae* and *F. solani* were the most pathogenic fungi, while *Ganoderma* sp. caused the lowest percentage of infection. All the tested rootstocks varieties were susceptible to infect by the pathogenic fungi. The most resistance rootstock variety for all tested fungi was SH 1 followed by Sediek, while G3 was the lowest one. The primer P3 was the highest in its ability to flank the DNA sequences of all the tested pathogenic fungal genera- *Botryodiplodia theobromae*, *Pestalotia* spp. and *Rhizoctonia solani* Kühn. isolates than the primer P4 in random amplified polymorphic DNA (RAPD) analysis. Light microscope used in histopathological studies of transverse and longitudinal root sections of mango (*Mangifera indica* L.) after 14 days from artificially infected, 6 month old

rootstock cv. G3 (highly susceptible), by the tested pathogenic fungi revealed that, the cortex layer was completely colonized by *Botryodiplodia theobromae* Pat., *Fusarium solani* (Mart) Sacc., *Rhizoctonia solani* Kühn. and *Macrophomina phaseolina* (Tassi) Goid. This colonization was associated with disorganized epidermal and cortical cells in addition to a dark brown color consisting of crushed and necrotic cells and tissues. Such disorders were not observed in case of *Pestalotia* sp. or *Phytophthora* sp. Thirty days after artificial inoculation of tissues the necrosis was observed in both xylem parenchyma and xylem vessels. The tested fungi caused significant increase in the total and reducing sugars contents in the infected roots than control. The infection of mango rootstock var. G3 (highly susceptible) exhibited a decrease of total and free phenols and increase of conjugated phenols compared with the control (non infected). No differences were recorded between amino acids in healthy and diseased rootstocks. *In vitro* experiments, *Majorana hortensis* was the most effective plant essential oil (E.O) inhibited the mycelial growth of the pathogenic fungi tested, while *Persea Americana* was the lowest effective one. Under greenhouse conditions, no effect of essential oil (EO) was recorded when applied at 15 days after soil infestation, while the best effect was when applied at the same time of soil infestation. The EO of *Majorana hortensis* was the most effective against tested fungi compared with EO of *Mentha arvensis*. *Trichoderma harzianum* Gent. was the most effective fungal isolate while, bacterial isolate *Bacillus subtilis* was the most effective isolate, also *Streptomyces* isolate No.2 was the most effective actinomycetes isolates when tested under laboratory

conditions for their effect on mycelial growth of pathogenic fungi as zone inhibition. Under greenhouse conditions, the most effective fungal isolates was *Trichoderma harzianum*, bacterial isolate *Bacillus subtilis* and *Streptomyces* sp. isolate No.2 from the actinomycetes isolates. Increasing in bioagent inoculum resulted in decreasing percentage of the disease. Time of adding bioagent inoculum was most important in controlling the disease, where the most effective time was 7 days before infection with the tested pathogenic fungi. Topsin-M was the most effective fungicide *in vitro*, as it recorded the highest reduction of mycelial growth of tested isolates followed by Kema-Z. On the other hand, Kocide 101 was the lowest one. Under greenhouse conditions, the highest effect of fungicides tested was recorded when these fungicides applied at the same time of soil infestation followed by 7 days and 30 days. The most effective fungicide against *F. solani* and *B. theobromae* was Topsin-M, while Rhizolex-T was the lowest effective one. The highest effect against *M. phaseolina* was recorded by Rhizolex-T followed by Topsin-M then Kema-Z.

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