

ABSTRACT

Ten pathogenic isolates of *Macrophomina phaseolina*, the causal pathogen of charcoal rot disease, were isolated from naturally diseased plants in five governorates. The results indicated that the harmful effects that induced by the different tested isolates of *M. phaseolina* were occurred actually during seedling stage causing (the pre- and/or post-emergence stages as well as during maturity (development of charcoal rot). The sesame isolate (M4) exhibited the highest disease incidence through pathogenicity test. *Trichoderma viride-1* and *Trichoderma* sp. (No. 5) were the most antagonistic fungi, whereas *Bacillus subtilis* and *Pseudomonas fluorescense* were the best antagonistic bacteria for limiting growth of *Macrophomina* isolates on agar plates. As for the aqueous filtered and autoclaved extracts, cumin (*Cuminum cyminum*) and thyme (*Thymus vulgaris*) as well as cumin and clove (*Eugenia caryophyllus*) caused the highest suppressive effect on the linear growth of 3 isolates of *M. phaseolina*. meanwhile commercial plant oil of cumin and marjoram (*Majorana hortensis*) caused the highest suppressive effect on the linear growth of 3 isolates of *M. phaseolina*. *Trichoderma viridi-1* followed by *Trichoderma harzianum* and *Trichoderma* sp. No. 5 were the best antagonistic fungi. *Bacillus subtilis* and *Pseudomonas fluorescense* were the best antagonistic bacteria for controlling disease incidence at seedling and/or maturity stages. Maxim and Rizolex-T, as seed treatment, were the best fungicidal treatments, whereas, Plant guard and Bio-Zied were the best commercial biocontrol for controlling infection with *M. phaseolina* on sesame plants under greenhouse conditions. The best control of charcoal rot disease

on sesame plants could be obtained by soaking sesame seeds in filtered extracts of cumin, thyme and garlic or autoclaved extracts of cumin and clove. Salicylic acid (SA) at (2&4mM) and cobalt chloride (CoCl₂) at 1&2mg/l were the most effective chemical inducers for reducing damping off and charcoal rot disease on sesame plants. The activity of some oxidative enzymes *i.e.* peroxidase and polyphenol oxidase, the amounts of phenol contents and sugars content were obviously higher in tissues of sesame plants that were grown from seeds treated with any of the tested chemical inducers than those grown from untreated seeds (control). Salicylic acid (SA) at 2&4mM and cobalt chloride (CoCl₂) at 1&2mg/l were the most effective chemical inducers for increasing activity of oxidative enzymes *i.e.* peroxidase and polyphenol oxidase and the amounts of phenol contents and sugars content. Several various treatments were effective in controlling charcoal rot disease and increasing seed yield production of sesame, under field conditions in two successive seasons 2009 and 2010. Shandaweel 3, Sohag 1, and Taka 2 were the least susceptible cultivars. *Pseudomonas flurescense* and *Trichoderma viride-2* were the best antagonistic microorganisms. Maxim was the best chemical fungicide while Bio-Zeid was the best biocontrol. Cumin plant oil and filtered extract of garlic proved to be the best plant extracts. Oxalic acid at 4mM and SA at 2mM were the most effective organic acids, while cobalt chloride at 2mg/l and 1mg/l and calcium chloride at 8mM were the superior mineral salts treatments mineral salts for reducing incidence of charcoal rot and increasing seed yield production.

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