EFFECT OF FERTILIZER AND BIOLOGICAL TREATMENTS ON CONTROLLING POWDERY MILDEW DISEASE IN SOME VEGETABLE CROPS

BY

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B.Sc. Agric. Sc. (Plant Pathology), Ain Shams University, 2004

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ABSTRACT

Maha Helmy Mohamed Hassan: Effect of Fertilizer and Biological Treatments on Controlling Powdery Mildew Diseases in some Vegetable Crops. Unpublished M.SC. Thesis, Department of Plant Pathology, Faculty of Agriculture, Ain Shams University, 2009.

The present study was carried out to evaluate the efficacy of some chemical and biotic inducers of resistance in controlling powdery mildew of cantaloupe and pepper plants caused by *Podosphaera xanthii* and *Leveillula taurica*, respectively. The tested chemicals namely, mono-potassium phosphate (KH_2PO_4), di-potassium phosphate (K_2HPO_4) and potassium silicate (K_2SiO_3) were applied as foliar treatment. However, the bioagents namely, *Bacillus subtilis* as (Rhizo-N®), *Trichoderma harzianum* as (Plant Guard®), two isolates of *Pseudomonas fluorescens* (Pf1 and Pf2), one isolate of *Trichoderma harzianum* (T1), and *Trichoderma viride* (T2) were applied as seed and soil treatment. Combined treatment of chemical and biotic inducers was also tested.

The efficacy of treatments was expressed as reduction in disease severity and conidial production on leaf tissue. The highest significant reduction in disease severity were recorded when K_2SiO_3 (17 mM), KH_2PO_4 (100 mM) and K_2HPO_4 (100 mM) were applied as foliar spray the reduction in disease severity reached 72.6, 62.5 and 47.8 % on cantaloupe plants, respectively and 59.0, 54.6 and 50.0 % on pepper plants, respectively. As for the biotic inducers results showed that Rhizo-N® (*Bacillus subtilis*) and Plant Guard® (*Trichoderma harzianum*) significantly decreased powdery mildew severity compared with untreated control, reduction in disease severity recorded 65.3 and 67.1 % in cantaloupe plants and 46.8 and 44.7 % in pepper plants, respectively.

Results clearly showed that the application of chemical inducers as foliar spray combined with biological inducers as seed or soil treatment showed more reduction in disease severity of powdery mildew than chemical and biological inducers alone. Biochemical studies showed that

the biotic and chemical treatments increased enzyme activities such as peroxidase and polyphenol oxidase as well as phenols and pigments. Treatment of pepper plants stimulated synthesis of new peroxidase enzymes, treatment with Plant Guard® showed two isozymes, application with K_2SiO_3 (17 mM) and KH_2PO_4 (100 mM) showed one isozyme. Three new protein bands with MW of 92.4, 18.0 and 8.5 KD were detected as the result of treatment with K_2HPO_4 (100 mM) in cantaloupe plants. Meanwhile, treatment cantaloupe plants with K_2SiO_3 (17 mM) and KH_2PO_4 (100 mM) showed one new protein band with different molecular weight 51.9 and 9.8 KD, respectively. While, at least one similar protein band was detected at the same position as a result of most of the chemical or biological inducers (22.2 KD) in pepper plants. All tested chemical and biological inducers of resistance improved plant growth, fresh weight, dry weight, plant height and leaf area (cm^2) and increased the number of leaves per plant in cantaloupe or reduced the defoliation in pepper as compared with untreated control.

Keywords:

Cantaloupe, pepper, powdery mildew, *Podosphaera xanthii*, *Leveillula taurica*, induced resistance, foliar fertilizers, potassium silicate, potassium phosphate, *Bacillus subtilis, Pseudomonas fluorescense, Trichoderma harzianum, Trichoderma viride*.

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