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بسم اللّه الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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قسم

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INDUCTION OF TOMATO PLANTS FOR MOSAIC DISEASE RESISTANCE

By

FARIDA MOHAMED MAHMOUD

B.Sc. Agric. Sc. (Plant Pathology), Fac. of Agric., Ain Shams Univ., 2010

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ABSTRACT

Farida Mohamed Mahmoud. Induction of Tomato Plants for Moasic Disease Resistance, Unpublished M.Sc. thesis., Department of plant pathology, Faculty of Agriculture, Ain Shams University, 2021.

Tomato plants are most important economic vegetable crop in Egypt and the world. Tomato is subjected to several diseases, which cause considerable yield losses. Virus diseases are considered to be one of the most important problems affecting tomato production. *Tobacco mosaic virus* (TMV) is one of the most economically important virus infecting tomato plants and other different types of plants leading to yield losses and quality degradation. The present study aimed to investigate ability of riboflavin as inducer to induce resistance in different cultivars of tomato plants against TMV infection

Treatment with riboflavin was demonstrated to induce defence responses and systemic acquired resistance against TMV in indicator hosts and tomato plants. Three concentration of riboflavin (0.5, 2.5 and 5.0mM) was studied. Treatments with riboflavin reduced TMV incidence and disease severity in tomato plants. In addition, treatments reduce number of local lesions in indicator hosts.

The present study demonstrated that, exogenous application of 2.5mM riboflavin, 5 days before virus challenge was the most effective concentration. The higher concentration did not increase the effect. The induction disease resistance and reduction of TMV infectivity in tomato plants were determined by indirect ELISA and local lesion host plant assay.

The effect of 2.5mM riboflavin in TMV incidence and disease severity was studied from 0 to 20 days after treatment. In time course investigation, 2.5mM riboflavin treatment reduces the virus symptoms particularly at 9 days, where after the symptoms become evident.

The expression of defence genes *PR10* and *PAL* were studied by reverse transcription polymerase chain reaction (RT-PCR). PR10 exhibited ribonucleolytic activity against *tobacco mosaic virus* RNA and *PAL* involved in phytoalexine or phenolic compound biosynthesis. Treatment with 2.5 mM riboflavin induced the accumulation of PAL-mRNA, particularly at the beginning 3 hours, followed by obviously decrease at 6 h, and raised again at 12 h after treatment.

While, pathogenesis related protein PR10 gene was efficiently transcribed into an mRNA as detected by the presence of specific amplicons of expected molecular weight (217 bp). PR10 accumulation was notable increased at 3h, and followed by markedly increase at 6, and 12h after treatment with 2.5 mM riboflavin .

Treatment with riboflavin enhanced activities of peroxidase (PO) and Polyphenol Oxidase (PPO) in treated inoculated plants which catalyze the formation of lignin, and other oxidative phenols that contribute to the formation of defense barriers for reinforcing the cell structure The activity of PO and PPO was examined by specific enzyme assay for each one. The activity of enzyme was higher in treated inoculated plants than those of healthy ones were and reached the highest level at 8 days after treatment.

Finally, histochemical changes in cell death were detected by using trypan blue staining. Formation cell death increased with time at treatment and its reached maximum in 24 hours after treatment.

Keywords: Tomato, *Tobacco moaic virus* (TMV), Peroxidase, Polyphenol oxidase, Phenylalanine ammonia-layse, PR proteins, PR gene expression

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