THE ROLE OF ALLELOCHEMICALS IN DETERMINING PLANT RESISTANCE AGAINST CERTAIN KEY PESTS ATTACKING TOMATOES

By

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B. Sc. Agric. (Plant Protection), Ain Shams Univ. 2004.

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ABSTRACT

Emad Samir Kamel Mansour "The Role of Allelochemicals in Determining Plant Resistance against Certain Key Pests Attacking Tomatoes" unpublished Ph. D. Thesis, Department of Plant Protection, Faculty of Agriculture, Ain Shams University, 2017.

The present study was carried out to evaluate the susceptibility of certain tomato cultivars, *i.e.* Amberial, Alissia, FMX1077, GS, Hainze, Hebal, Hybrid 65010, Hybrid133 K-186, logen, Nong New and Super Strain B to infestation by sap-sucking and leaf miner key insect pests, *i.e. Aphis gossypii Bemisia tabaci*, *Liriomyza* sp. and *Tuta absoluta*. The monitoring procedure of the main primary and secondary plant metabolites substances in infested and uninfested tomato plants was carried out during autumn and summer plantations for the tested cultivars. The resistance and susceptible correlation between infestation by key insect pests and certain primary and secondary metabolite contents in certain cultivars were estimated. Also, the acylsugars allelochemical in certain tomato cultivars in summer and autumn plantations was determined. In addition, an identification and quantification of allelochemicals present in certain tomato cultivars was determined by GC-MS technique. The differential of Zingiberene, linalool and TMTT gene expression levels in certain cultivars of tomato plants were evaluated. The role of certain fertilizers on contents of some primary and secondary metabolites present in GS tomato cultivar was studied**.**

Data revealed that GS cultivar was the most susceptible tomato cultivar to infested by *Aphis gossypii* and *Bemisia tabaci* sap-sucking insects and *Liriomyza sp.* and *Tuta absoluta* leaf miners. Also, Amberial and Hainze cultivars were susceptible to infested by both of leaf miners. The K-186, Hybrid 65010, FMX1077 and Logen were found to be resistant to the four insect pests during autumn 2013 and 2014 seasons.

In 2014 and 2015 summer plantations, the GS, Super Strain B, Hybrid 133 and Hebal were appeared to be susceptible to sap-sucking insects, while GS and Hainze were susceptible to leaf miners. Meanwhile, Alissia cultivar was the most resistant cultivar to the tested sap-sucking and leaf miner insects. Super Strain B proved to be resistant also to leaf miner insects.

It could be concluded that there was a decrease in primary and secondary plant metabolic substances in all tested resistance and susceptible tomato cultivars in uninfested plants (coated plantation) than in infested plants (open field plantation) during autumn and summer plantations, due to the absence of insect infestation stress which stimulate the evolution of biochemical defense. In general the infestation of tomato plants by certain herbivores were changed in the plant metabolites in each of resistance and susceptible cultivars. The changes in amount of primary and secondary plant metabolic substances were highly evident in resistance than susceptible one. It could be concluded that the three investigated phenolic compounds (simple phenols, tannins and flavonoids) and alkaloids recorded the highest negative correlation coefficient with *T. absoluta* and *Liriomyza. sp* leaf miners infestation for both of the two resistant tomato cultivars (Alissia & K-186). The increasing of each of alkaloids and terpenoids contents resulted in decreasing of population density for the sap-sucking insects *A. gossypii* and *B.tabaci* infested both of investigated Alissia and K-186 cultivars. Also the simple phenols may have a role in the resistance of K-186 for *A. gossypii*.

The allelochemicals 2-Tridoconone, 2-undeconone, Zingiberene, TMTT , DMNT and Salicylic acid compounds were found in highly contents in Alissia and K-186 resistant tomato cultivars in summer and autumn plantations than that in the susceptible one (GS cultivar). The data revealed that the gene expression levels were differed according to tested tomato cultivars for each of investigated gene. Thus the investigated

Zingiberene, linalool and TMTT gene expression have a role for the inducing of resistance against key insects in tomato cultivars.

The macro nutrient elements, *i.e.* nitrate and phosphate have a significant role in certain allelochemical content in the tomato cultivar (GS). The simple phenols, alkaloids, terpenoids and flavonoids compounds increased significantly by increasing the rate of nitrate fertilizer. Also the soluble proteins and simple phenols were significantly increased by increasing of potassium sulfate rate of application.

Key words:

Tomato cultivars, *Aphis gossypii*, *Bemisia tabaci*, *Liriomyza* sp., *Tuta absoluta*, Susceptibility, Allelochemicals, phenolic compound, alkaloids, terpenoids, Zingiberene, linalool, TMTT, GC/MS, qRT-PCR and fertilization.

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