

# Induction of Resistance to the Whitefly *Trialeurodes vaporariorum* in Tomato by External Application of JA and BTH

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## Background

Induction of resistance by exogenously applied synthetic jasmonic acid (JA) and salicylic acid (SA) analog Benzothiadiazole (BTH) could supplement biological control strategies. Thus, the influence of JA and BTH application on tomato plants (variety FMTT 260) in relation to its resistance induction against greenhouse whitefly *Trialeurodes vaporariorum* (Westwood) was studied. Induction of resistance was confirmed by the assessment of activated proteinase inhibitors and peroxidases by the enzyme assays.

## Methods

Behavior and population development of *T. vaporariorum* on artificially induced plants were investigated in greenhouse and climate chamber experiments.

1. Preference of adult insects to either treated (0.75 or 1 mM BTH; 1 or 1.5 mM JA) or untreated (control) leaves was assessed.

- Third leaf of treated and control plants arranged in a pair
- 11-13 adults per cage released and their settling observed 24 and 48 hrs after release
- Total number of eggs deposited on each leaf counted

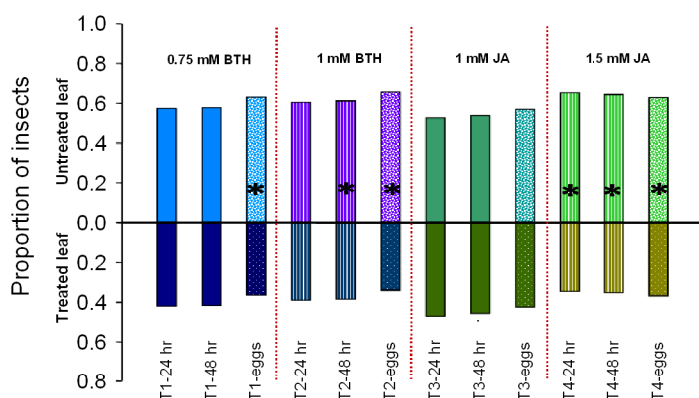


Paired treated and control leaves inside a clip cage.

2. Performance of whitefly on induced tomato plants was evaluated in terms of :  
 A. Percentage of the eggs, larvae and pupae that developed to adult stages  
 B. Fecundity of females developed on induced plants  
 C. Feeding intensity of L1 and late instars on induced plants

## Results

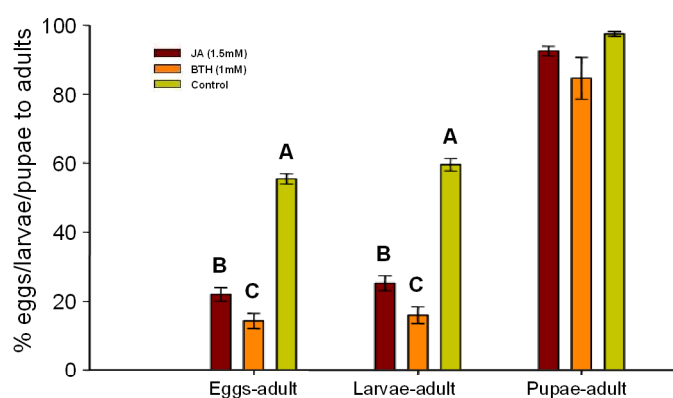
### 1. Proportion of adult insects on treated and control leaves



Asterisk (\*) sign on bars indicates significant difference between the treated and its corresponding control for the choice and egg deposition by females at 5% level of significance. Statistical analysis: Proc GLM (SAS).

- No distinct choice between 0.75 mM treated and untreated (control) leaves but females laid more eggs on control leaves.
- At 1mM BTH, insects showed preference for control leaves after 48 hours.
- No observable effects of 1mM JA.
- *T. vaporariorum* avoided 1.5 mM JA treated leaves early after release and total number of eggs on control leaves was higher.

### 2.A Development of eggs, larvae and pupae to adults



Different letters above bars indicate significant difference between treatments within each group at 5% level of significance. Statistical analysis: ANOVA (SPSS).

- Less than 30% of eggs and larvae reached adulthood on JA and BTH treated plants.
- Compared to JA, BTH produced significant effect.
- At the pupal stage, treatments produced no effect for the development to adult stage.

### 2.B Fecundity of the females emerged from induced plants

Treatments	Eggs/female/day
BTH	5.2500 (B)
Control	8.2250 (A)
JA	8.0418 (A)

- Females emerged from BTH treated plants laid fewer eggs than those from JA and control plants.

## Conclusion

- Adult greenhouse whitefly *T. vaporariorum* refused the JA and BTH treated leaves of tomato plants in choice condition. Also females avoided to lay eggs on them.
- Performance of insects was reduced on treated plants with the possible antibiotic effects on larvae.
- The reduced fecundity of females from BTH treated plants might have long term effects in the population of *T. vaporariorum*.
- No difference in feeding intensity across the treatments strengthened the speculation of an antibiosis mechanism for the reduction of whitefly performance on induced plants.

### 2.C Feeding intensity of larvae on induced plants



Water sensitive yellow paper: blue spots indicate honeydew droplets

- Feeding intensity as estimated by the number of honeydew droplets deposited by early and late instars of *T. vaporariorum* was similar on JA (66.95), BTH (78.22) and control (74.39) plants.