

## Utilizing of Plant Extract Garlic Oil against *Aphis Gossypii* and *Tetranychus Urticae*

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### Abstract

The toxicity values of Garlic oil plant extract were estimated at concentrations 0.5, 0.75, 1 and 1.5 cm/liter water for controlling *Aphis gossypii* Glover, 1877 and two spotted spider mite *Tetranychus urticae* Koch. The obtained results demonstrated that , the highest mortality percentage were 91.3 % and 96.7 % at concentrate 1.5cm/liter water for *A. gossypii* and *T. urticae* Respectively, meanwhile, the lowest mortality percentage (43.3 % and 34.7 % for *A. gossypii* and *T. urticae* , respectively) was recorded at concentrate 0.5 cm/liter water .

**Keyword:** Garlic oil, toxicity, LC<sub>50</sub>, LC<sub>90</sub>, *Aphis Gossypii* and *Tetranychus urticae*

### Introduction

Chemical pesticides are generally used to control mite and insect pests. The large scale use of chemicals led to the development of resistance to target pests, and consequently also has a negative effect on natural Enemies and other benefits causing disruption of biodiversity (Akram Saleh Alghamdim, 2018). The growing awareness of the shortcoming of the chemical insecticides has necessitated for the exploration for alternative methods of pest control, which is relatively free from adverse side effects. Among the various alternatives, effective control techniques other than insecticide application against insect pests of agricultural crops are highly demanding (El-Heneidy and Sekamatte, 1996; Cho *et al.* 1995; Zemityet *al* 2006; Hyun Sik Roh *et al* 2011; Mariam *et al.* 2015; Entesar N. Huron *et. al.* 2016;).

On the other hand, the natural enemies and plant extracts have no residual or persistent toxicity in the agro- ecosystem. (Halawa, 2017).Two spotted spider mite *Tetranychus urticae* considered a serious pest on world wide Lee *et al.*(2003).It causes huge injury including flecking , Discoloration(bronzing) and scorching. Although, *Aphis gossypii* prefers the plants belong to family Fabaceae (beans, peas and groundnuts), it is highly polyphagous and has been found on many plant species feeding on the young shoots, leaves, flowers and fruits Aiad . K .A.(2013) and Pervin Erdogan *et al.*(2012).

*A.gossypii* is a vector of several viruses including broad bean mosaic virus, cucumber mosaic virus and groundnut rosette virus Akram Saleh Alghamdi(2018) and Sharifah Fathiyah Sy Mohamada *et al.* (2013). The cowpea aphid has a cosmopolitan distribution. Therefore, recent control technology and relevant tactics reduce the either pesticides application and environment pollution which purposed to achieve sustainable management of pests control. This study aims to throw light on utilizing the different concentrations of garlic oil to

control of *A. gossypii* and *T. urticae* as one of IPM factors

### Material and Methods

A pure culture of *A. gossypii* and *T. urticae* were separately propagated on leaves of *Phaseolus vulgaris* L. Leaf discs of about three-inch in diameter were made and Washed with running water to remove any possible residuals or organisms which may be found on these leaves. The leaf discs were surrounded by tangle foot, which acts as a barrier to prevent mite or insect individuals from escaping and placed on pieces of moisten cotton wool in Petri dishes of 300<sup>cm</sup> diameter, Twenty leaf discs were used as replicates 50 *A. gossypii* individual were placed on each discs, while, 30 individual from *T. urticae* were placed on other twenty discs as separate experiment.

Four concentrations of Garlic oil plant extract (0.5, 0.75, 1, 1.5 cm/liter of water) were prepared to evaluate the mortality percentage of *A. gossypii* and movable Stages of *T.urticae*. Five treatments were conducted under laboratory conditions, .one liter plastic sprinkler used from a distance 20 <sup>cm</sup> to get evenly fog droplets on plant surface. The control replicates had water by the same previous methode . Mortality percentage were taken after 48 hours. The LC<sup>50</sup>were calculated according to Finney (1971).

### Result and Discussion

The impact of Garlic oil toxicity at concentrations 0.5, 0.75, 1, 1.5 cm/liter of water on mortality percentage of insect pest *A. gossypii* and mite pest *T. urticae* is depicted in tables 1 and 2, respectively, while the comparison of garlic oil toxicity between the mentioned pests was recorded in table 3. In general, the results in tables 1 and 2 showed that, no mortality percentages of *T. urticae* and *A. gossypii* were recorded in the control of all experiments. On the other hand, the obtained data from table(1) and fig(1) denoted to the mortality percentages of *A.*

*gossypii* at concentrations 0.5 , 0.75 , 0.1 and 1.5 cm/liter water which were 43.3 , 56 , 82 and 91%, Respectively, while, LC<sub>50</sub>; LC<sub>90</sub> and slop values were 0.59 mg/l , 1.24mg/l and 3.4 mg/l Respectively.

Therefore, the data represented in table (2) and fig (2) showed that the likewise, a similar trend was observed concerning *T. urticae* individuals mortality percentages that were significantly increased as the concentrations which recorded at the same concentrations (0.5 , 0.75 , 1 , 1.5 cm/liter of water) were 34.7, 48.7, 94 and 96.7% whereas, the LC<sub>50</sub> , LC<sub>90</sub> and slop values of movable stage of *T. urticae* were 0.64 mg/l ,1.13 mg/l and 5.2 mg/l , Respectively . The results mentioned above in the our study revealed that, the individual mortality percentages of *A. gossypii* and *T. urticae* gradually increased with the increase of garlic oils concentrations. Previous studies which agreed with the present work have indicated how various essential oil efficient against pests on plants. Most of the studies reported great potentials of the essential oils to control pests so, the present results are in accordance with those recorded by Akram Saleh Alghamdi in (2018) evaluated the toxicity of four essential oils moringa (*Moringa oleifera*), arugula (*Eruca sativa*), radish (*Raphanus sativus*), and garlic (*Allium sativum*) at the concentrations of 1%, 2%, and 4% on mortality percentage of *Macrosiphum rosae* and *Aphis Fabae* and found that the individual mortality percentages increased with the increase of essential oils concentrations tested at the different exposure duration. In addition the same author mentioned that the garlic oil was recorded the highest mortality percentage of *M. rosae* and *A. fabae* after arugula oil at all concentrations

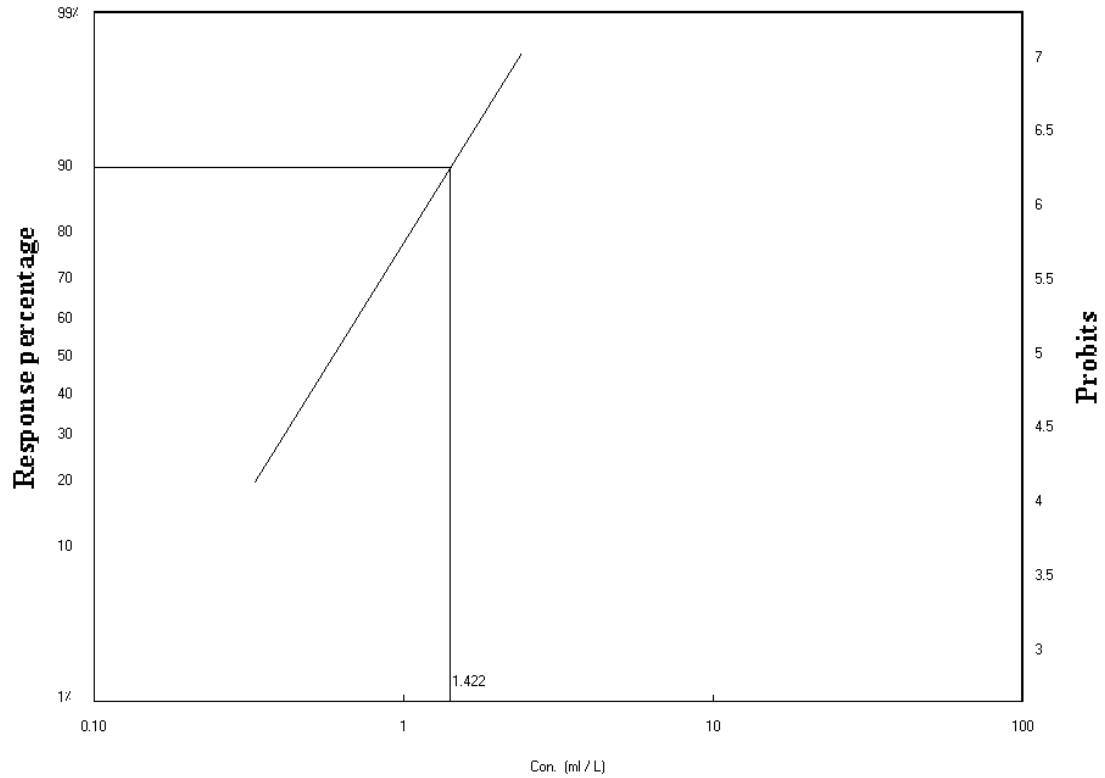
Furthermore, the present results are agreed with the previous results that recorded by Aiad (2013) who evaluated four plant extracts ( *Aqueous garlic* ' Anise oil 'Garlic oil and linen seed oil) at concentrations 1; 1.5 and 3 cm/ liter of water on the two spotted spider mite *Tetranychus urticae* and found that the mortality Aqueous garlic extract was the most effective 86% and 96% at concentrations 1.5 and 2 cm/liter water, respectively . while , the mortality of Anis oil was 68% , 69% and 90% at concentrations 1<sup>cm</sup> '1.5<sup>cm</sup> and 2<sup>cm</sup> /litre of water , respectively. In addition that several authors in previous studies evaluated different plant extracts on the mortality percentage of *T. urticae* such as

Pervin Erdogan *et al.* (2012) who determined the efficacy of plant extracted from five different plants [*Allium sativum* L.(Amaryllidaceae), *Rhododendron luteum* S. (Ericaceae), *Helichrysum arenarium* L. (Asteraceae), *veratrum album* L. (Liliaaceae), and *Tanacetum parthemium* L (Asteraceae)] and found that high moratlity percentage of *T. urticae* was caused by the lowest- concentration of the plant extracts mentiond above. Therefore, th mite pest *T. urticae* was affected by the plant extract camphor (100%) through the study that carried out by Ghada E. A *et. al.* (2015)

**Conclusion:** This investigation indicated the possible use of such essential oils at low concentration against two species of pest tested in vitro. Therefore, future studies are needed to characterize the active compounds in the tested essential oils that have pesticidal properties and possessing complex modes of action before recommend it for IPM program against *A. gossypii* and *T. urticae*.

**Table 1.** Evaluation toxicity of Garlic oil plant extract on *A. Gosypii*

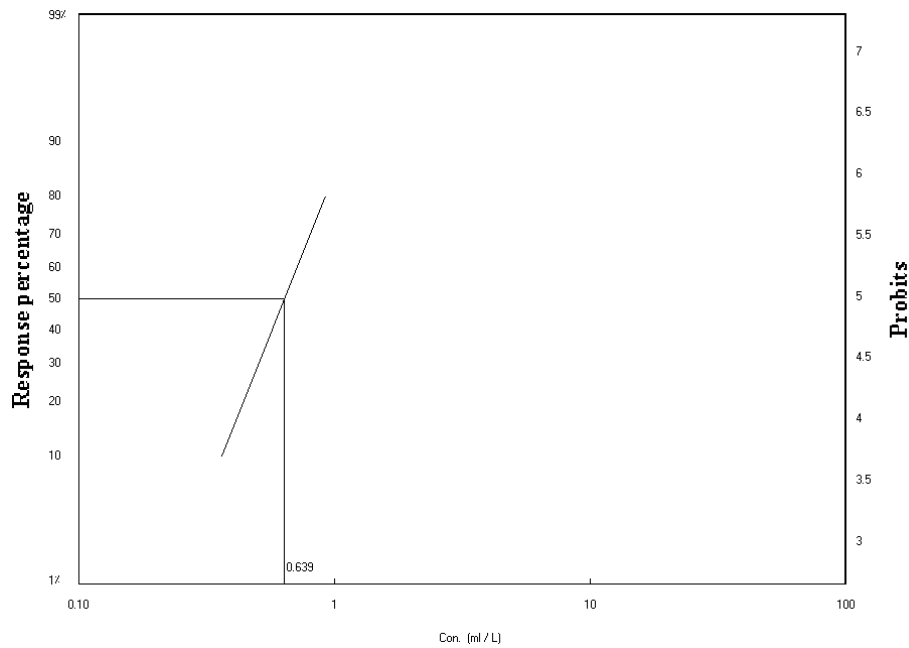
| Tested organisms values | Concentrations |      |     |      | LC <sub>50</sub> | LC <sub>90</sub> | slop |
|-------------------------|----------------|------|-----|------|------------------|------------------|------|
|                         | 0.5            | 0.75 | 0.1 | 1.5  | mg/L             | mg/L             |      |
| <i>A.gossypii</i>       | 43.3           | 56   | 82  | 91.3 | 0.59             | 1.24             | 3.4  |
| Control                 | 0              | 0    | 0   | 0    | -                | -                | -    |



**Fig. 1.** Toxicity of Garlic oil plant extract against *Aphis gossypii*.

**Table 2.** Evaluation toxicity of Garlic oil plant extract on *T. urticae*

| Tested organisms values            | Concentrations |      |     |     | LC <sub>50</sub><br>mg/L | LC <sub>90</sub><br>mg/L | Slop |
|------------------------------------|----------------|------|-----|-----|--------------------------|--------------------------|------|
|                                    | 0.5            | 0.75 | 0.1 | 1.5 |                          |                          |      |
| Movable stage of <i>T. urticae</i> | 34.7           | 48.7 | 94  | 96  | 0.64                     | 1.13                     | 5.2  |
| Control                            | 0              | 0    | 0   | 0   | -                        | -                        | -    |



**Fig.(2):** Toxicity of Garlic oil plant extract against movable stages of *Tetranychus urticae*

**Table 3.** Comparison of Garlic oil toxicity between *Aphis gossypii*. And *T. urticae*

| Tested organisms values            | Concentrations |      |     |      | LC <sub>50</sub> | LC <sub>90</sub> | slop |
|------------------------------------|----------------|------|-----|------|------------------|------------------|------|
|                                    | 0.5            | 0.75 | 0.1 | 1.5  | mg/L             | mg/L             |      |
| <i>A. gossypii</i>                 | 43.3           | 56   | 82  | 91.3 | 0.59             | 1.24             | 3.4  |
| Movable stage of <i>T. urticae</i> | 34.7           | 48.7 | 94  | 96   | 0.64             | 1.13             | 5.2  |
| control                            | 0              | 0    | 0   | 0    | -                | -                | -    |

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## تقييم سمية المستخلص النباتي زيت الثوم ضد المن والعنكبوت الاحمر العادي

خالد عبد العزيز عياد

معهد بحوث وقاية النباتات-مركز البحوث الزراعية -الدقى-جيزة-مصر

قدرت سمية المستخلص النباتي لزيت الثوم على القطن بتركيزات 0.5 و 0.75 و 1.0 و 1.5 سم/لتر فكانت نسبة الموت 43.3 ، 56 ، 82 ، 91.3% على التوالي وبنفس التركيزات قدرت سمية المستخلص على الأطوار المتحركة من العنكبوت الأحمر ذات البقعتين وكان تأثير سمية المستخلص النباتي على نسبة موت الأطوار المتحركة هي كالتالي : 34.7 ، 48.7 ، 94 ، 96% على التوالي