



## Ecofriendly management of aphids on tomato by using *Pongamia glabra* (v) plants extracts

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### Abstract

The study was conducted to find the most effective concentration of *Pongamia glabra* (V) plants extracts to control aphid's pest of tomato. Efficacy of *Pongamia glabra* (V) plants extracts against aphid's mortality on tomato, it was found in the order  $T_1 > T_2 > T_3 > T_4 > T_5 > T_6 > T_8 > T_7$ . and as in hours 24 hrs > 48hrs > 72hrs. From above finding it can be said that maximum of 83.33% aphid's mortality at 72 hours after treatment. Among all the treatments plant extract of 10% leaves extract was recorded minimum 19.12% mortality of aphids at 24 hours. So, it can be said that *Pongamia glabra* (V) plants possess some insecticidal property to control aphids on tomato.

## INTRODUCTION

In conventional farms, farmers use a wide range of pesticides to control the pests. However, with the increasing popularity of organic farming in the country, there is a need to use environment-friendly biopesticides and other bio-based tools to overcome the problem of insect pests. Plants may be an alternative to the currently used insect control agents, because they virtually are a rich source of bioactive organic chemicals (Isman, 1997). usually are inherently less harmful than conventional pesticides. Biopesticides generally affect only the target pest and closely related organisms in contrast to broad-spectrum of conventional pesticides that affect different organisms like birds, insects and mammals. Biopesticides decompose quickly, thereby resulting in lower exposures and largely avoid the pollution problems (Biswas *et al.*, 2014). When used as a component of integrated pest management programs, Biopesticides can greatly decrease the use of conventional pesticides, while vegetable yields remain high.

The tomato is a major vegetable crop that has achieved tremendous popularity over the last century. Tomatoes, aside from being tasty, are very healthy as they are a good source of vitamins A and C. Aphids (*Aphis gossypii*) obligates phloem-feeding and sucking cell contents of infested plants. Severe infestation of aphids can lead to reduced photosynthetic efficiency, vigour and growth and finally reduced crop yield of the plant (Jazzar and Hammad, 2003).

In agriculture Farmers are to face the destructive activities of number of vegetable pests, leading to decrease in yields. A number of chemical pesticides are available in markets for the control of pest of vegetables. However their indiscriminate use has created the problems of air, soil and water pollutions, development of resistance in target insect pest and serious health hazards due to the toxicity of their residues. Efforts are being done for finding alternatives to chemical insecticides to overcome these problems. A survey of literature indicated that very little attention has been paid to this important area of research.

Attempts were made in the past by different authors studying the bio-efficacy of different plant extracts on different pests (Anjorin *et al.*, 2004; Singh and Saratchandra, 2005; Ezekiel *et al.*, 2008; Karunamoorthi K, 2012; Amin *et al.*, 2013 and Rahman *et al.*, 2016). In order to evaluate the impact of bio-efficacy of *Pongamia glabra* plant leaves and seeds extracts in suppressing insect pests of tomato, field experiment was conducted.

## MATERIALS AND METHODS

The field trials study was conducted at Bhende village Tal- Newasa Dist- Ahmednagar, Maharashtra during rabbi 2015 to find the most effective concentration *Pongamia glabra* (V) plant leaves and seeds extract to control aphids on tomato (*Lycopersicon esculentum* L).

### Preparation of plant materials

The plant *Pongamia glabra* (V) were collected from local area of Bhende village and dried under shade for two weeks. The powders were prepared by milling the plant leaves and seeds by using a grinder in the Laboratory.

### Treatment materials

Eight different concentration of leaves and seeds extract of plant and untreated control were used as treatment. These are as follows:

T<sub>1</sub> = 10% leaves aqueous solution, T<sub>2</sub> = 10% seeds aqueous solution, T<sub>3</sub> = 20% leaves aqueous solution, T<sub>4</sub> = 20% seeds aqueous solution, T<sub>5</sub> = 30% leaves aqueous solution, T<sub>6</sub> = 30% seeds aqueous solution, T<sub>7</sub> = 40% leaves aqueous solution, T<sub>8</sub> = 40% seeds aqueous solution, T<sub>9</sub> = Untreated control.

### Percent mortality at various concentration of the treatments

The experimental field was marked into small plots of 3 m X3 m size. Out of these three plants were randomly selected from each plot areas and tagged for recording the further observations. All these selected tomato plants considering aphid's population in experimental areas, different percent of leaves and seed extract of karanaj plants sprays were applied. One was used as a control plot, where the tomato plants are neither sprayed with plant extracts nor with any commercial insecticides. There were total nine treatments including control. The observations of number of aphids before treatment and after treatment was counted and mortality was assessed at 24, 48 and 72 hours after treatment. The experiment was repeated three times and the data should be collected. The percent corrected mortality was calculated by using the formula given by Abbott (1925).

$$\text{Corrected percent Mortality} = \frac{T - C}{100 - C} \times 100$$

Where, T = Per cent mortality in treatment, C= Per cent mortality in control

## RESULTS AND DISCUSSION

In order to evaluate the effect of various treatment of *Pongamia glabra* (V) plants leaves and seeds extracts against aphid's mortality on tomato results are shown in table 1 and illustrated in figure 1. According to observations among all the treatment 40%. leaves aqueous solution (T<sub>7</sub>) was significantly superior over other treatments with aphid's mortality of 83.33% at 72 hours after treatment followed by 10% leaves extract (T<sub>1</sub>) was recorded minimum 19.12% mortality of aphids at 24 hours. At 48 hours treatments of leaves and seed plants extract *Pongamia glabra* (V) with aphid's mortality was recorded minimum 23.08% by 10% leaves extract (T<sub>1</sub>) and 40%. leaves aqueous solution (T<sub>7</sub>) treatments with aphid's mortality was recorded maximum 68.86%.

The hundreds of plant species have been reported against various insect pests on vegetables

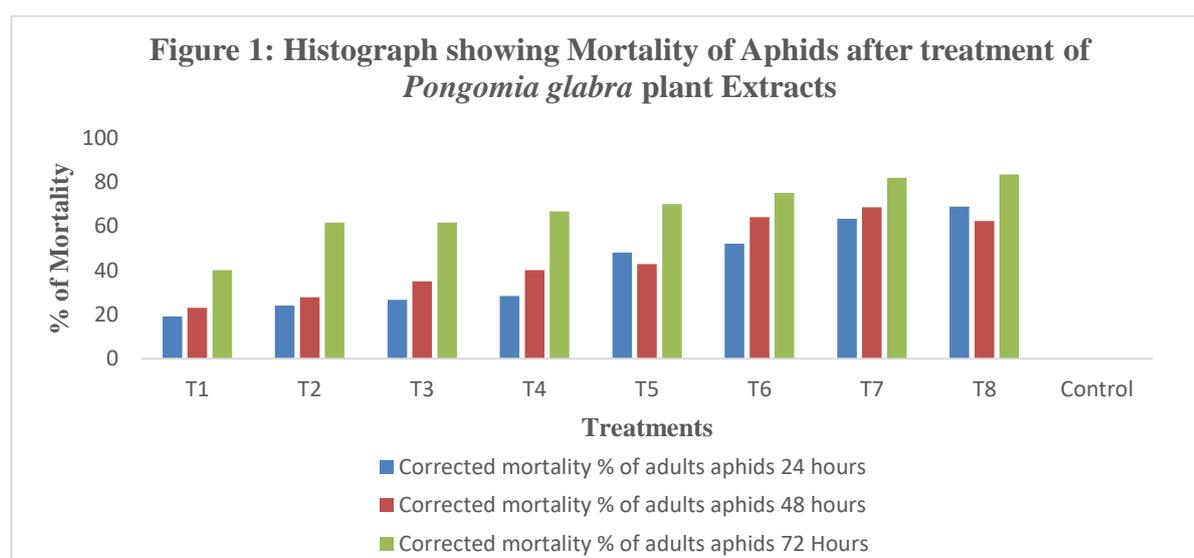
and crops. Botanical pesticides have high compatibility with insect pest management and act as a synergistic component in number of integrated pest management (IPM) strategies reported by (Srinivasan, 2012). Nigam *et al.* (1994) reported that neem and neem product are promising natural insecticide are effective against more than 350 species of arthropods, 12 species of nematodes, 15 species of fungi, three viruses, two species of snails and one crustacean species. Tomlin (2007) suggested that azadirachtin and tetranortritarpinoid was major active ingredient isolated from neem, which is known to disrupt the metamorphosis of insect's pesticides, has not been proved correct. Neem bio-pesticides are systemic in nature and provide long term protection to plants against pests. Pollinator insects, bees and other useful organisms are not affected by neem based pesticides (Salma Mazid *et al.*, 2011).

**Table 1: Comparison of Corrected mortality % of aphids after treatments at 24, 48 & 72 hours**

Treatments	Corrected mortality % of adults aphids		
	24 hours	48 hours	72 Hours
10% leaves aqueous solution (T <sub>1</sub> )	19.12	23.08	40.00
10% seed aqueous solution (T <sub>2</sub> )	24.00	27.78	61.54
20% leaves aqueous solution (T <sub>3</sub> )	26.67	35.00	61.54
20% seed aqueous solution (T <sub>4</sub> )	28.40	40.00	66.67
30% .leaves aqueous solution (T <sub>5</sub> )	47.94	42.86	70.00
30% seed aqueous solution (T <sub>6</sub> )	52.08	64.00	75.00
40% leaves aqueous solution (T <sub>7</sub> )	68.36	68.57	83.33
40% seeds aqueous solution (T <sub>8</sub> )	63.86	62.25	81.81
Control	00.00	00.00	00.00

Vegetable pest problem has become acute in recent years and due to pest vegetable yield was decrease. Chemical control of pest was not favored at present because of insecticides resistance among pests and environment imbalance created. Therefore, alternative control method is needed. The use of plant extract should be promoted to reduce the toxic load of insecticides on the environment (Raja and Ignacimuthu, 2001). Application of chemical insecticides to control the pest resulting in problem

like residual effects, pest resistance and toxicity to the component of the ecosystem, plant extracts could be effectively employed in pest control programs. Plant sources possess a wide range of pharmaceutical and insecticidal properties (Vinayagam A., 2008). Azadirachtin has no side effect on birds and other animals (Martineau, 1994). The several formulations with azadiachtin concentration effect against vegetable insect pest under field conditions (Anis *et al.*, 2010).



The proposed investigation was help in finding out alternate ways of controlling pests, with locally available wild plant extracts. This has been also helped in bio-controlling of pests without harming the environment. This was help in production of low cost, environment friendly and effective Bio-pesticides which can be locally produced even by the end users (farmers) these bio-pesticides should be less harmful than conventional pesticides. They have cheap and effective in controlling agricultural pests and indicate that plant extracts have great potential as an alternative strategy to pesticides for vegetable pests. The need for a continuous supply of food has led conventional agriculture to be strongly dependent on chemicals. The increasing concern of consumers and government on food safety has led growers to explore new environmentally friendly methods to replace, or at least supplement, the current chemical-based practices. The use of bio-pesticides has emerged as promising alternative to chemical pesticides

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