

## RESEARCH ARTICLE

## *In vitro* evaluation of anthelmintic property of *Allium sativum* and *Zingiber officinale* against *Ascaridia galli*, the roundworm of domestic fowl.

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### ABSTRACT

The present study was conducted to evaluate the *in vitro* anthelmintic activity of aqueous extracts of *Allium sativum* and *Zingiber officinale* against *Ascaridia galli*, the intestinal roundworm of domestic fowl. The plant extracts showed concentration- dependent efficacy at 10 %, 20 %, 30 %, 40 % and 50 % concentrations of the extract. The complete mortality was seen in 50 % concentration of the *Allium sativum* extract and *Zingiber officinale* extract after 10 and 12 hours respectively. The present study shows that the extract of *Allium sativum* and *Zingiber officinale* possess anthelmintic activity thus justifying the age-old traditional use of these plants in helminth infestation.

**Keywords** Anthelmintic, *Ascaridia galli*, Nematoda, *Allium sativum*, *Zingiber officinale*

### INTRODUCTION

The growing awareness of environment friendly approaches and the global economic conditions have directed research for biosafe, ecofriendly and economically viable approaches. The anthelmintic activities of various plant extracts have been tested by various researchers in different parts of the world. In the past few years nematologists have attempted with a variety of chemical nematicides for the management of parasitic nematodes but the hazardous effect of chemicals have created interest in searching alternative methods for the management of parasitic nematodes [1].

The rising cost of broad spectrum anthelmintics and concern about the development of the resistance against these compounds in parasites and their toxicity to the host are posing serious threat to continued use of synthetic drugs. Due to this, the scientists are trying to test the anthelmintic properties of their traditional medicinal plants. Numerous traditional plants have been used for centuries for anthelmintic treatment [2-4]. The *in vitro* anthelmintic activity of *Embelia ribes* was assessed by Guru and Mishra [5](1964). Garg and Mehta [6] observed the *in vitro* anthelmintic activity of *Butea frondosa* and *Embelia ribes*. The nematicidal effects of *Ocimum sanctum* on the plant parasitic nematode *Meloidogyne incognita* were assessed by Haseeb and Butool [7]. While performing an *in vitro* study, Yadav *et al* [8] assessed the anthelmintic activity of fresh tuber extract of *Flemingia vestita* against the

nematode *Ascaris Suum*. The nematicidal efficacy of the leaf extract of tulsi (*Ocimum sanctum*) was tested by Saxena *et al* [9]. Singh and Nagaich [10] assessed the efficacy of the aqueous seed extract of *Corica papaya* against common poultry worms *Ascaridia galli* and *Heterakis gallinae*. The anthelmintic activity of *Allium sativum* (garlic) oil and *Ocimum sanctum* on *Ascaridia galli* and *Heterakis gallinae* was discussed by Singh and Nagaich [11,12].

Mishra and Aggarwal [13] tested the phyto-therapeutic and nematicidal effect of neem seed cake and decomposed parts of some plants. The stems and leaves of *Calotropis procera*, *Datura metel* and *Azadirachta indica* were used to control various phytoparasitic nematodes viz. *Meloidogyne incognita*, *Heterodera cajani*, *Rotylenchus reniformis* and *Tylenchorhynchus indicus* infesting pigeonpea. Sujon *et al* [14] performed a detailed study to find out the anthelmintic properties of ten indigenous medicinal plants against gastrointestinal nematodes of goat. Badar *et al* [15] assessed the anthelmintic activity of *Acacia nilotica* bark and leaf extracts against *Haemonchus contortus*. Lalchandama *et al* [16] studied the anthelmintic activity of *Acacia oxyphylla* stem bark against *Ascaridia galli*.

*Ascaridia galli* is the most prevalent and pathogenic nematode species found in the small intestine of domestic fowl, *Gallus domesticus*. The present research paper describes the anthelmintic effects of *Allium sativum* and *Zingiber officinale* against this highly pathogenic nematode of poultry.

## MATERIALS AND METHODS

*Allium sativum* bulbs and *Zingiber officinale* rhizomes were collected from local market. All the collected materials were grinded in mortar and pestle separately and aqueous extracts were prepared.

Naturally infected intestines of Domestic fowls (*Gallus gallus domesticus*) were collected from the abattoirs from different parts of Punjab, India. These were taken to the laboratory, cut open and searched for adult male and females of *Ascaridia galli*. Motile active worms were collected in petri dishes containing normal saline. The fresh worms were directly placed in different concentrations of the plant extracts, along with an artificial media i.e. Tyrode's solution, in different petri dishes maintained at room temperature. Simultaneously one group of worms placed in Tyrode's solution alone served as control. Vigilant observations

were made on the physical activity of the nematodes and time taken to attain death was recorded.

## RESULTS AND DISCUSSION

The extract of *Allium sativum* and *Zingiber officinale* was found to be a highly effective nematicide exhibiting profound dose-dependent activity at all concentrations tested. In case of *Allium sativum* extract treatment, significant mortality was observed at 16 hours in the lowest concentration (10%) and at 10 hours in highest concentration (50%). The extract of *Zingiber officinale* also showed concentration dependent efficacy on the nematode, *Ascaridia galli*. Significant mortality was observed at 16 hours in lowest concentration (10%) and at 12 hours in highest concentration (50%).

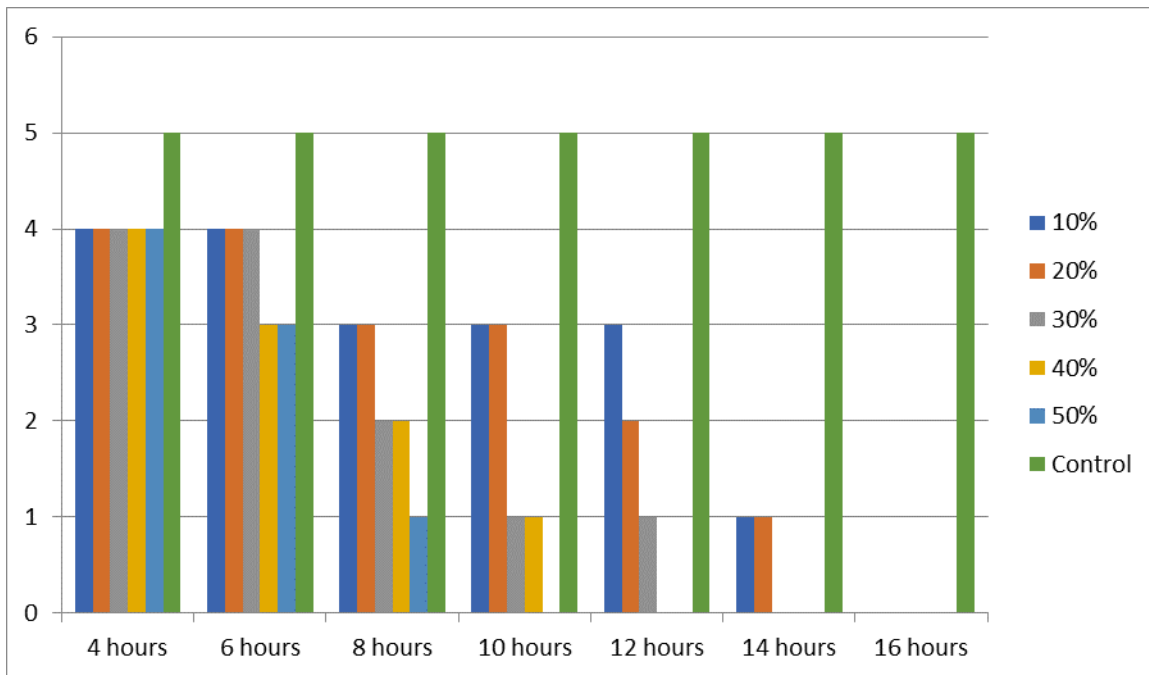
The motility of worms was seen declining after 6 hours of treatment with 40 % and 50 % concentrations of *Allium sativum* extract. The worms placed in these concentrations showed motility after 6 hours. All the worms were found dead in 50 % concentration at 10 hours observation, whereas those placed in 40 % concentration still showed poor motility at same time interval. The worms placed in lower concentrations (10 % and 20 %) showed moderate motility after 12 and 10 hours respectively. After 14 hours, poor motility was observed in all the worms placed in 10 and 20 % concentrations. The complete mortality of worms placed in 20 % concentration of *Allium sativum* extract. The nematodes of control group showed vigorous motility even after 16 hours.

The extract of *Zingiber officinale* was found to be effective against *Ascaridia galli* during present *in vitro* study. The nematodes of all the groups placed in *Z. officinale* extract showed decreased motility. The dose dependent mortality was also observed. After an interval of 6 hours the worms placed in 40 % and 50 % concentrations showed moderate motility. The death of the worms in 40 % and 50 % concentrations occurred after an interval of 14 and 12 hours respectively. The nematodes placed in 10 % and 20 % concentrations showed poor movement after 16 hours in lower concentrations of the extract. The complete mortality was observed after 16 hours in all the concentrations, being fast in 20 % concentration which occurred after 12 hours.

A decreased motility and dose-dependent mortality was also observed by Lalchandama *et al* [16] while assessing the anthelmintic activity of *Acacia oxyphylla* stem bark against *Ascaridia galli*. Badar *et al* [15] while

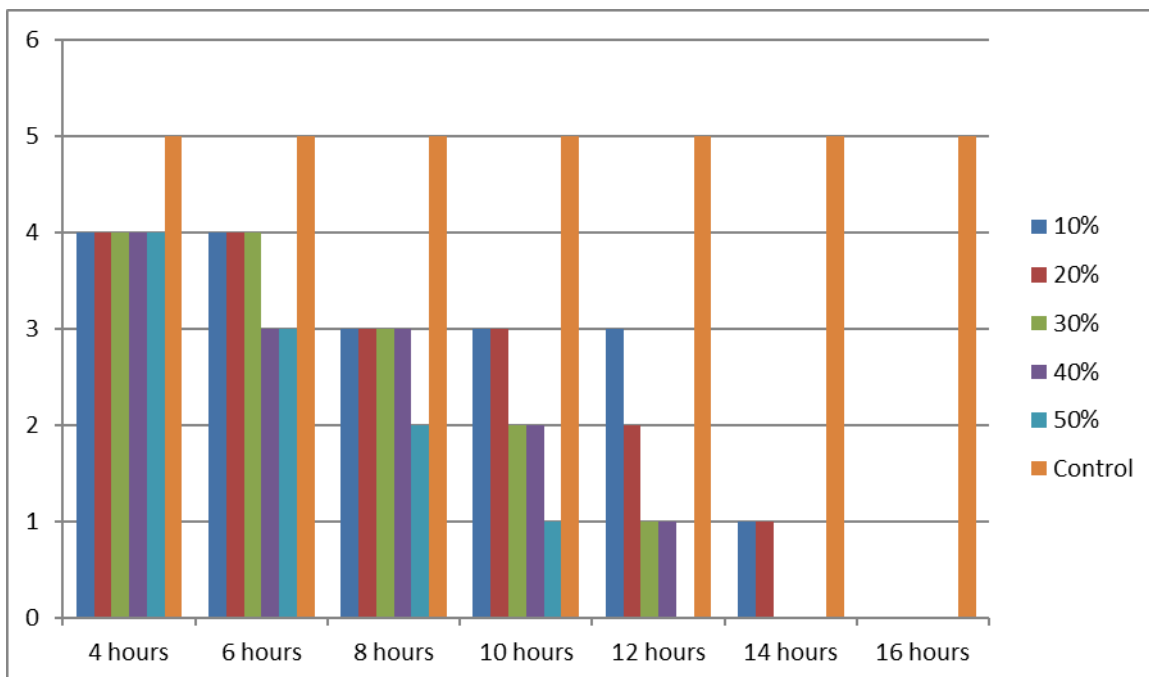
testing the *in vivo* and *in vitro* anthelmintic activity of *Acacia nilotica* found decrease in motility and dose-dependent mortality of *Haemonchus contortus*. Leaves

of *Acacia* were found to have higher effects *in vitro* whereas the bark proved to be a better ovicidal in egg hatch test.



0= No motility (Died), 1= Poor motility, 2= Feeble motility, 3= Moderate motility, 4= Good motility, 5= Vigorous motility

**Figure 1: Motility of *Ascaridia galli* in different concentrations of the *Allium sativum* extract along with control at various time intervals.**



0= No motility (Died), 1= Poor motility, 2= Feeble motility, 3= Moderate motility, 4= Good motility, 5= Vigorous motility

**Figure 2: Motility of *Ascaridia galli* in different concentrations of the *Zingiber officinale* extract along with control at various time intervals.**

In the present investigation the dose-dependent mortality of *Ascaridia galli* was seen with the extracts of *Allium sativum* and *Zingiber officinale*. Thus the present study shows that the extract of *Allium sativum* and *Zingiber officinale* possess anthelmintic activity thus justifying the age-old traditional use of these plants in helminth infestation.

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