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EVALUATION OF INDIGENOUS PLANT EXTRACT AGAINST APHID (SCHIZAPHIS GRAMINUM) UNDER LABORATORY CONDITIONS

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ABSTRACT

Aphid (*Schizaphis graminum*) is a very common pest in Pakistan. It causes the damage to crop harshly by sucking the cell sap of the leaves. To control this pest, lot of chemical has been in use now a day. There is great threat of these chemical on the environment and human health. It is necessary to use alternate of these chemicals to protect the diverse effects. The alternate to these hazardous chemicals is the use of plant extracts that are the part of integrated pest management. The main purpose of this work was to evaluate the effectiveness of plants extract "treatments", such as *Azadirachta indica, Eucalyptus globulus, Acacia nilotica, Citrus aurantium and Cassia fistula*. To achieve this goal, rearing of aphid was done in glass house. Six treatments with three replications were used to find the best results. Treatments were replicated three (3) times and the data was analyzed by using Analysis of Variance (ANOVA) for a Completely Randomized Design. The trials proved that treatments with *Azadirachta indica and Citrus aurantium* showed the best results followed by *Cassia fistula, Eucalyptus globulus* and *Acacia nilotica*. The interval of 24 hours showed the best results while the concentration of 100% showed good results. In conclusion, the findings of the present study could be helpful in the management of *Schizaphis graminum.*

Keywords: Aphid, Plant Extract, Laboratory, *Schizaphis graminum, Triticum aestivum*

INTRODUCTION:

Wheat (*Triticum aestivum* L.) belongs to family Poaceae is one of the first cereals that have been cultivated and the major cereal crop all over the world. It is main food producing crop after the maize [1]. Its role towards the value addition in agriculture is 12.5 % and in GDP is 2.6 %. It is one of the essential staple food crop of Pakistan and mainly exposed to aphids attack that unfavorably affect its productivity. Aphids (Homoptera) the sucking insect pest, mainly causes 35- 40% yield losses [2,3] and 20-80% losses by transmitting fungal and viral diseases [4]. In order to get a good yield and a healthy crop plant protection is must. Pesticides have played an important role in enhancing crop yields through insect pest control [5-9]. In current years, the use of pesticides has become very common. Excessive and random use of pesticides and their residual effect has unrestricted hazards to the environment and other living beings [10]. Fumigation and spraying pesticide release a fair volume of harmful fumes in the atmosphere and its consequences leads to air pollution [11]. Control of aphid populations with insecticides is not advantageous on wheat because of many terrible effects like pesticide residues, environmental pollution, destabilization of ecosystem and enhanced resistance to insecticides in pests. Some botanical extracts from plant containing insecticidal properties are considered fairly safe for environment and public health. It has been said that about 2000 plant species belonging to 170 natural families having insecticidal properties [12]. Keeping the importance of wheat aphids in view the present study was conducted to evaluate insecticidal properties of different plant extracts.

MATERIALS AND METHODS:

The experiment was conducted with three replications and six treatments having 24x45 sq. ft. area under CRD. These treatments included (T1) *Azerchita indica* (T2) *Eucalyptus globus* (T3) *Acacacia nilotica* (T4) *Citrus aurantiun* (T5) *Cassia fistula* and (T6) Control Plot(T0).

Selection of plant material for extracts

Selection of plant species and preparation of leaves extracts of *Azeardirachta indica*, *Eucalyptus globulus*, *Acacia nilotica* and *Citrus aurantium* and *Cassia fistula* were collected from Institute of Agricultural Sciences, University of the Punjab.

Extraction of plant materials

The extracts were prepared according to the standard extraction method [13] by using different techniques. Samples were dried at

40 °C before grinding with an electric grinder. Fresh leaves were harvested from the surrounding areas of the center, brought to the laboratory and washed with clean water. Plant materials were kept in the shade for air-drying and then they were dried in the oven at 60°C to gain constant weight. The prepared fresh leaves were used only for the plant extract.

Twenty-gram powder was taken from each plant in a 1000 ml beaker and mixed with 200 ml of different solvents acetone. Mixture is stirred at 6000 rpm for 30 minutes and maintained for two days. The solution was then filtered with Whatman No.1. The filtered materials were taken into the flask and then water and acetone extracts were added. Stock solutions of plant extracts were prepared separately by diluting the condensed extracts with respective solvent acetone. Different concentrations as desired were 25%, 50% and 100%.

Extracts dissolutions

The plant extracts are prepared by dissolving the stock solutions in the respective solvent prior to use of them.

Data recording

The mass rearing of aphid was done in greenhouse by using all possible techniques and methods. The plants were inoculated with apterous adult. After 10 days' aphids were collected from the leaves with help of soft brush. The research was carried out in the laboratory and mortality was determined after 12, 18 and 24 hours from the beginning of exposure when no leg or antennal movements were observed.

Table -2 Treatment vs. Time Interval

Treatments	Extracted Plant	Family	Scientific name
T1	Neem Tree	Meliaceae	*Azadirachta indica*
T2	Eucalyptus	Myrtaceae	*Eucalyptus globulus*
T3	Kikar	Leguminosae	*Acacia nilotica*
T4	Bitter Orange	Rutaceae	*Citrus aurantium*
T5	Amaltas	Leguminosae	*Cassia fistula*

RESULTS:

Treatment vs. Concentration

The results of insect mortality at different concentrations and treatments are given in the graph-1. The results indicated that at 100 % concentration, *Citrus aurantium* showed maximum insect mortality rate which is 20.56 while at this concentration, *Acacia nilotica* showed minimum insect mortality rate which is 17.25. *Citrus aurantium*at 100 % concentration showed significant results with *Eucalyptus globulus*, *Acacia nilotica* and *Cassia fistula* while non-significant results were found with *Azadirachta indica*. It is indicated from the Graph-1 results that at 50 % concentration again *Citrus aurantium*

showed maximum insect mortality rate which is 19.12 while *Acacia nilotica* again showed minimum mortality rate which is 14.81. At 50 % concentration, *Citrus aurantium* showed significant results with *Azadirachta indica*, *Eucalyptus globulus*, and *Acacia nilotica* while non-significant results were found with *Cassia fistula*.

It is also concluded that at 25 % concentration, the highest mortality rate was observed in *Cassia fistula* 17.06 followed by *Citrus aurantium*, *Eucalyptus globulus, Azadirachta indica and Acacia nilotica* with mortality rate 16.43, 16.37, 15.69 and 12.625 respectively. At 25 % concentration, *Cassia fistula* showed significant results with *Azadirachta indica* and *Acacia nilotica* while non-significant results were found with *Eucalyptus globulus* and *Citrus aurantium*.

The results of insect mortality at different treatment and time interval are given in the Graph-2. The results indicated that after 6 hours *Citrus aurantium* showed maximum insect mortality rate which is 13.94 while *Acacia nilotica* showed minimum insect mortality rate which is 10.063. The *Citrus aurantium*, *Azadirachta indica*, *Eucalyptus globulus*, *Acacia nilotica* and *Cassia fistula* showed significant results. It is indicated from the results that after 12 hours *Cassia fistula* showed maximum insect mortality rate which is 13.688 while *Acacacianilotica* again showed minimum mortality rate which is 11.06 followed by *Cassia fistula, Eucalyptus globulus*, *Acacia nilotica*, *Azadirachta indica* and *Citrus aurantium*. It is indicated from the results that after 18 hours *Eucalyptus globulus* showed maximum insect mortality rate which is 14.250 while *Acacia nilotica* again showed minimum mortality rate which is 11.68. After 24 hours the highest mortality rate was observed in *Azadirachta indica* which is 14.81 followed by *Cassia fistula*, *Citrus aurantium*, *Eucalyptus globulus*, and *Acacia nilotica* respectively.

Concentration vs. Time Interval

The results of insect mortality at different concentrations and time intervals are given in the Graph-3. The results indicated that at 100% concentration, maximum insect mortality rate was observed after 6 hours which is 19.65. Similarly at 50% concentration maximum insect mortality rate was observed after 6 hours which is 18.95 and minimum mortality rate was found after 24 hours. It is also observed from Graph-3 that at 25% concentration, the highest mortality rate was observed after 6 hours which is 17.60 while minimum mortality rate was found after 24 hours which is 13.70.

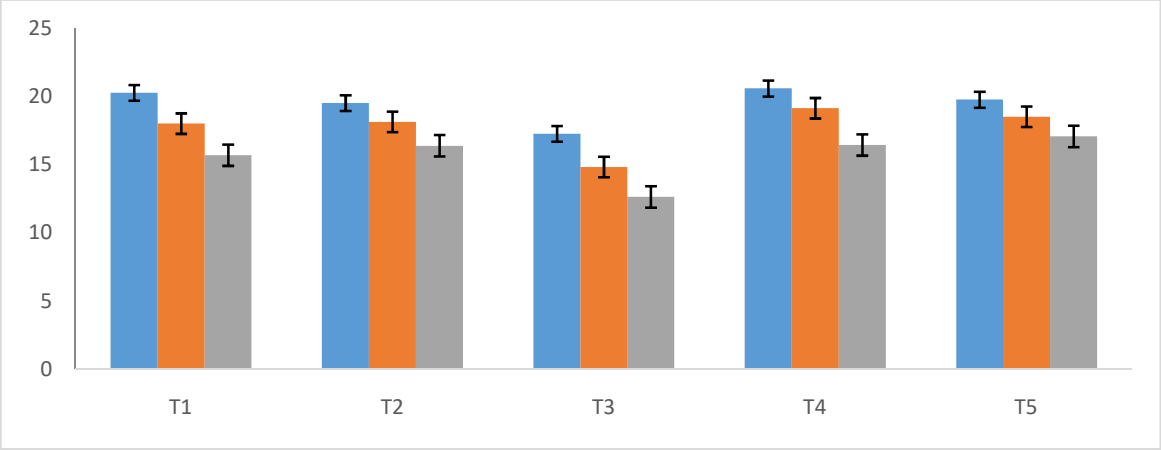

Fig. 1: Graph between Concentrations and Treatments

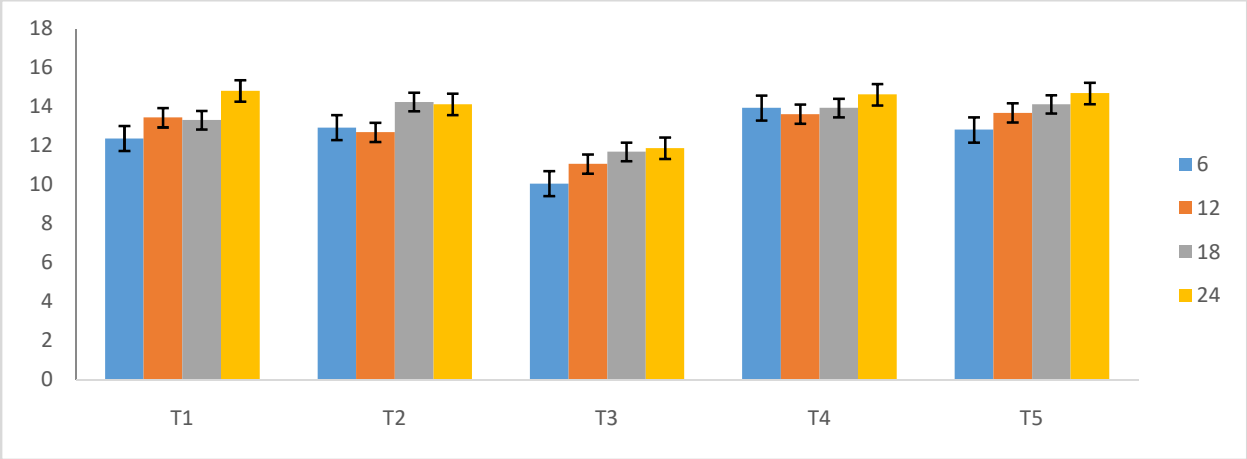

Fig. 2: Graph between Time Interval and Treatments

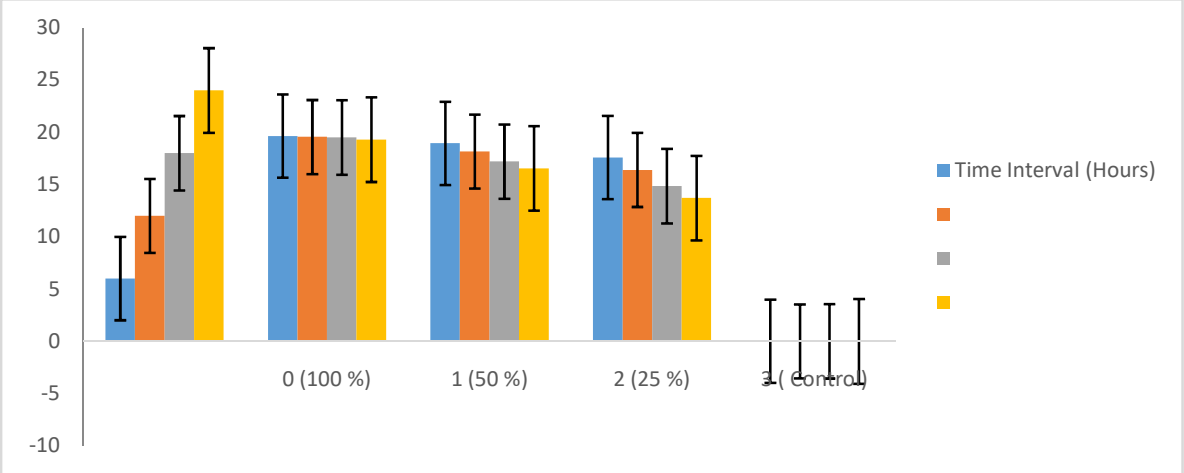

Fig. 3: Graph between Concentration and Time interval

DISCUSSION:

Experimental results showed that the percentage mortality fluctuates with the change of concentrations as well as time intervals, which have impact on the population of *Schizaphis graminum.*

There are lot of plants extracts (Sprays), prepared by scientists, that are available in the market. The chemicals are economical and very effective against the sucking insect pests. Citrus peel spray showed better results as compared to other plant extracts against aphid because it contained sulphur and polyphenolic compounds [14-16]. In present study the citrus species also showed a remarkable mortality affect at all concentrations. The same results were reported by different researchers with accordance to ours [17-20]. *Eucalyptus globulus* showed mortality rate of 80% at 100% concentration. In another study, *E. globulus* showed mortality rate of 32% at this concentration [21,22]. *Acacia nilotica* showed low mortality rate at all concentrations but another study revealed a significant result of *A. nilotica* against *Callosobruchus chinensis* (pulse beetle). Many scientists used the ornamental and medicinal plant extracts against different species of the aphid. The aphidicidal activity of cold and hot water extracts of some indigenous plants, *Azadirachta indica* A. Juss (neem), *C. procera* (Aiton) W.T. Aiton (akanda), *Polygonum hydropiper* L. (biskatali) and Ipomoea sepiaria J. Koenig ex Roxb. (bankalmi),have been use against the bean aphid, Aphis craccivora Koch and found that hot water extracts of *P. hydropiper* and *A. indica* were found to be highly effective [23].

CONCLUSION:

The results indicated that *Azerchita indica* showed maximum mortality while the Acacacia nilotica showed the lowest mortality at the most suitable time and concentration. It was concluded that the present study could be helpful for the management of aphid and important tool in IPM.

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