

Toxicity of Five Medicinal Plants *Aloe Vera*, *Achillea Millefolium*, *Berberis Aristata*, *Hydrastis Canadensis* L. and *Sanguinaria Canadensis* L. Against *Tribolium Castaneum*, *Rhyzopertha Dominica* and *Callosobruchus analis*

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Abstract: Some well-known medicinal herbs: *Aloe vera*, *Achillea millefolium*, *Berberis aristata*, *Hydrastis canadensis* L. and *Sanguinaria canadensis* L. are frequently used in natural medicine. These are substantial part of Homeopathic and *Unani tib* materia medica. These plant materials are used in this research. Extracts of these herbs were evaluated for toxicity potential against *Tribolium castaneum*, *Rhyzopertha dominica* and *Callosobruchus analis* at 1019.10 micrograms/cm². As a result of this study, *Aloe vera* and *Sanguinaria canadensis* L. showed low activity (20% mortality) against *Tribolium castaneum* and *Rhyzopertha dominica*, respectively. While, all the other three plant extracts were inactive.

Keywords: Pakistani medicinal plants, Grain pests, Contact insecticidal test, Impregnated filter paper method.

INTRODUCTION

Assaying of five well-known medicinal plant extracts for their possible insecticidal potential was aimed to get an overview of its toxic potential and assessing its safety to be used as a drug agent. In this respect LD₅₀ and LD₂₅ were also evaluated by insecticidal assays [1-3].

In the present study braches of *Achillea millefolium* L., peel exudate of *Aloe vera* (L.) Burm. F, dried root and root bark of *Berberis aristata* DC., *Hydrastis canadensis* L. and *Sanguinaria canadensis* L. were evaluated. In this research these were tested *in vitro* for their toxicological (insecticidal) potential at the same testing concentration.

MATERIALS AND METHOD

Plant Identification

The dried achenes of *Achillea millefolium* L., the crystals of dried peel exudate of *Aloe vera* (L.) Burm. F and dried root and root bark of *Berberis aristata* DC. were purchased from Hakim sons, street Darya gali, Boulton market, Karachi and these specimens were then identified by Prof. Dr. Ghazala H. Rizwani, Dept. of Pharmacognosy, University of Karachi and deposited in the Herbal museum of Department of

Pharmacognosy, University of Karachi with the voucher specimen number 088, 089 and 047, respectively. whereas, ethanolic extracts of *Hydrastis canadensis* L. (120 ml) and *Sanguinaria canadensis* L. (120ml), Batch # 032191622Q and 0217191622Q and lot # 015611793 Q and lot # 0035 (L) (BM Private Ltd.) respectively, were purchased from the local Homeopathic pharmacy.

Plant Extraction

Dried herbal parts of *Achillea millefolium* L. and *Berberis aristata* DC. were macerated with 95% ethanol for fifteen days. After that percolate was concentrated at reduced pressure and controlled temperature *i.e.* 40°C in the rotary vacuum evaporator (Eyela, Japan). Brown, shiny and lumpy viscous liquid was obtained with very nice and flowery fragrance as *Achillea millefolium* L. extract. When followed the same procedure, dark brown, smooth and odorless semi-solid paste like material was obtained as *Berberis aristata* DC. extract. Along with the plant material, Homeopathic mother tincture of *Hydrastis canadensis* L. (120 ml) Batch # 032191622Q and 0217191622Q (Homeopathic stores and medicines) and of *Sanguinaria canadensis* L. (120ml) lot # 015611793 Q (Homeopathic stores and medicines) and lot # 0035 (L) (BM Private Ltd.) were also purchased from the Homeopathic pharmacy, opposite Central Homeopathic college, Nazimabad, Karachi for performing this research work. Same procedure was adopted for the mother tinctures of both the plants to obtain

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concentrated extracts in yellowish green colour (890 mg) and dark brown (1.2 g) solidified residues respectively.

Impregnated Filter Paper Test

The stored grain insects were cultured in the laboratory under controlled conditions (temperature and humidity) in plastic bottles supplied with sterile breeding media. Insects of uniform age and size were used for the experiment. The filter paper was cut according to the size of petri plate (9 cm or 90 mm) and they were put in the plate. Plant extracts were prepared by dissolving 20 mg test sample in 2 ml Ethanol solvent. The whole sample was loaded over the filter paper with the help of micropipette. The final amount of the tested plant extract was 1019.10 microgram/cm². The plates were left for 24 hours to evaporate the solvent completely. Next day (after the evaporation of solvent) 10 insects of under test specie were put in each plate (test and control) with the help of a clean brush. Healthy and active insects of same size and age were taken for the study. The plates were incubated at 27 °C for 24 hours with 50% relative humidity in growth chamber. The survival of the insects was observed after 24 hours of incubation. Positive and negative controls were run with the each plant extracts test run. Positive control contained standard insecticide (Permethrin 239.5 microgram/cm²) and test insects. We used that concentration of insecticide, which is effective against all the under test insects. Negative control contained just ethanol solvent and the test insects.

The Percentage inhibition or Percentage Mortality was calculated with the help of the following formula:

$$\% \text{ Mortality} = (100) - \left\{ \frac{\text{no. of insects alive in test}}{\text{no. of insects alive in negative control}} \times (100) \right\}$$

RESULTS

All the plant extracts at 1019.10 micrograms/cm² showed to be inactive against all the insects used except *Aloe vera* which showed low mortality, i.e. 20 %, against one of the insects, namely, *Tribolium castaneum*, while *Sanguinaria canadensis* showed 20% mortality against *Rhyzopertha dominica*. Rest of the under the test plant extracts were found to be inactive against all the insects tested. Nevertheless, permethrin, at 239.5 microgram/cm² showed 100% mortality for all the insects.

DISCUSSION

The well-known plants *Achillea millefolium* L. and *Aloe vera* (L.) Burm. F use in natural medicine has been well established all over the world, whereas; *Berberis aristata* DC. is a *Unani* and *Ayurvedic* medicine's herb, and; *Hydrastis canadensis* L. and *Sanguinaria canadensis* L. are in Homeopathic Materia Medica [2, 3].

Previously, these medicinal plants have showed toxicity [4-8]. For instance, *Aloevera* showed some toxicity against *Artemai napulii* [4], while, *S. canadensis* showed high toxicity potential against aquatic organisms [5]. Nevertheless, *H. canadensis* showed tumorigenic potential [6]. In addition, berberine is phototoxic [7], while, yarrow showed 4.19% LC50 against small cabbage *Pierisrapae* L. [8]. But in our study, the tested concentration (1019.10 micrograms/cm²) was too less to show considerable mortality. Increased mortality for the tested plant extracts might be seen when the concentration of plant extract/s would be enhanced.

FUTURE PROSPECT

Further research in this respect might be beneficial in the grain industry and for farmers.

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