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Molluscicidal impacts of some Egyptian plant extracts on protein and DNA-contents of two snail-vectors of schistosomiasis, using electrophoresis

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KEYWORDS

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DNA;
Snails;
Biomphalaria;
Bulinus

Abstract The present work included studies of qualitative and quantitative effects of ethanol extracts from three local plants, namely *Euphorbia splendens* (Euphorbiaceae), *Ziziphus spina-christi* (Rhamnaceae) and *Ambrosia maritime* (Asteraceae) on the protein and DNA-contents of digestive gland of uninfected and infected vectors of schistosomiasis, *Biomphalaria alexandrina* and *Bulinus truncatus*. The electrophoretic pattern of total protein showed differences in number and molecular weights of protein bands. Furthermore, DNA concentration was investigated by measuring the intensity of the genomic bands that showed an increase in infected and treated target-snails. Degradation of protein and high intensity of DNA after treatment with LC_{90} of *E. splendens*, *Z. spina-christi* and *A. maritime* extracts introduce these plants as effective molluscicidal agents.

Introduction

Screening of local plants for molluscicidal activity has received increasing attention by several authors (Bakry et al., 2007).

Extracts of several plant species were proved to have molluscicidal properties against different snail regarding their digestive gland damage; as *Euphorbia splendens* extracts (Tantawy et al., 2000). and *Commiphora molmol* (Al-Mathal and Fouad, 2006).

Today, plant mollusciciding is regarded as an important strategy in the control of the snail hosts of several diseases (Mello-Silva et al., 2006). The use of plants with molluscicidal properties appears to be a simple, inexpensive and safe alternative Detailed Response to (Singh and Singh, 2010; Al-Daihan, 2010). In Egypt, several local plant species were screened and proved to have molluscicidal properties against different snail species, from which; *Ambrosia maritime* (Abo-Basha et al., 1994), *E. splendens* had been recommended by Bakry (2007) and Hassan et al. (2011). According to Mwine (2011), a good number of *Euphorbia* species are actually potent as medicinal plants.

Phytochemical analysis had achieved on several plants to identify the chemical structure of their molluscicidal agents. From these studies, extraction of millaminas present in the latex of *Euphorbia splendens* (Baptista et al., 1997). In this respect,

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alkaloids and saponins are reported among active components of *Euphorbia* species (Siddiqui et al., 2009).

Ziziphus sp. is one of the plants that are used in Egypt for treatment of different diseases (Nawash and Al-Horani, 2011). The phytochemical composition of the plant *Ziziphus spina-cristi* indicated the presence of four saponin glycosides and alkaloids as molluscicides (Anthony, 2005).

Belot et al. (1993) declared that *A. maritime* plant is toxic to snail intermediate hosts of schistosomiasis. Abdel-Galeil (2010) isolated some sesquiterpenes from *A. maritime* that have molluscicidal activities.

DNA is the fundamental building component of all living cells. It regulates the production of proteins and enzymes via the "Central Dogma Theory" (Breithaupt, 2003).

The present work was aimed to study effects of methanol extracts of three local plants, namely *Euphorbia splendens*, *Ziziphus spina-christi* and *Ambrosia maritime* on the protein patterns of digestive gland of two vectors of schistosomiasis, namely *Biomphalaria alexandrina* and *Bulinus truncatus*. Furthermore, DNA-content was investigated by measuring the intensity of the genomic bands.

Material and methods

Tested snails

The uninfected and infected adult snails of *B. alexandrina* and *B. truncatus*, with *Schistosoma mansoni* and *Schistosoma haematobium* respectively, were obtained from laboratory colonies provided from Theodor Bilharz Institue, Guiza, Egypt, through July 2011. Large stock colonies of these snails were reared under laboratory conditions in glass aquaria filled with aerated de-chlorinated tap water. The snails were fed on lettuce leaves. Each group of snail-species had been divided to five subgroups; control, infected and three subgroups of treated snails with the present plant-extracts.

Tested plants

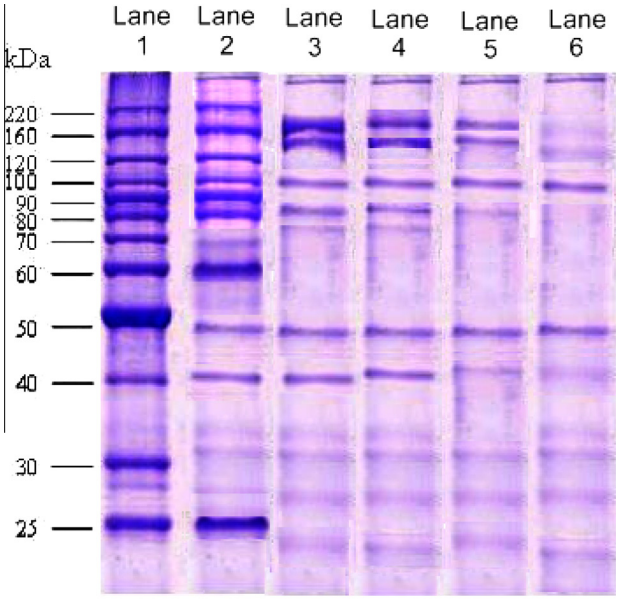
The three native plants; *Euphorbia splendens*, *Ziziphus spina-christi* and *Ambrosia maritime*; were chosen and identified by Department of Botany, Faculty of Science, Ain Shams University, Cairo.

Preparation of plant extracts

Preparation of the present plant-extracts had been achieved according to method of Bakry (2009). The summarized steps of Bakery's method included cleaning, cutting and drying about 250 g of the present plants. Then, the air dried powdered plant material was extracted with 70% ethanol, filtered and distilled off at temperature under 50 °C and the residues were stored.

Molluscicidal evaluation of different plant extracts

All bioassay experiments were carried out under laboratory controlled conditions according to methods of Abbott (1925), Finny (1971) and Bakry (2009).



Lane 1: Marker.

Lane 2: Uninfected and un-treated "Control".

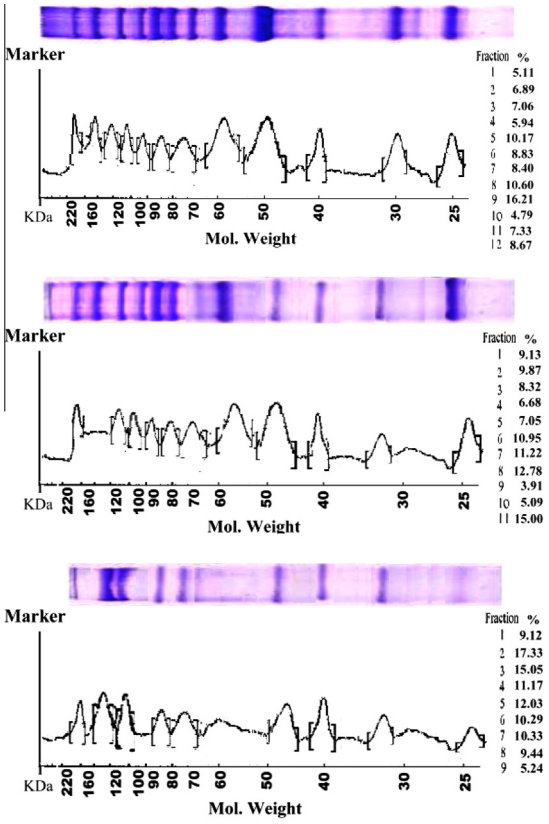
Lane 3: Infected "with *Schistosoma haematobium* ".

Lane 4: Treated with *A. maritime*.

Lane 5: Treated with *Z. spina-christi*.

Lane 6: Treated with *E. splendens*.

Figure 1 Polyacrylamide gel Electrophoresis (PAGE)-technique showing total protein bands of *B. trunctus*.



Figures 2–4 Scanning of PAGE showing total protein-bands of marker, control and infected *B. truncatus* (2 = marker, 3 = Control and 4 = infected *B. truncatus* with *Schistosoma haematobium*).