Molluscicidal properties of some common medicinal plants against the vector snails *Indoplanorbis exustus*

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Abstract: Molluscicidal property of *Balanites aegyptiaca, Eclipta alba, Cissus quandragularis* against the snails *Indoplanorbis exustus* was studied. It was observed that the toxicity of different preparation for molluscs was both time and dose dependent. On the basis of these results it may conclude that, the Ethanolic extract of *E. alba* may be used for the pest management, however, further animal study is needed to confirm its physiological toxicity.
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Key words: *Balanites aegyptiaca, Eclipta alba, Cissus quandragularis*, *Indoplanorbis exustus*, molluscicidal property

1. Introduction

Fascioliasis is an important live stock heath problem (Singh, 1981; Agarwal, 1988). This disease is transmitted by the flukes *Fasciola hepatica* and *Fasciola gigantica* through the vector snail *Indoplanorbis exustus* (Singh, 1981). Snail control with mollucicides has been one of the effective methods used for rapid and effective control of disease (Tiwari, 2011, 2012, 2013 a, b, c, d). Bait formulation of different molluscicides, would be an effective tool for selective killing of the snail with minimal adverse effect on the environment (Tiwari and Singh, 2004 a, b; 2007). The high cost of synthetic molluscicides, used in the control of the the intermediate snail hosts, has resulted in renewed interest in plant molluscicides, therefore the history of the use of plant molluscicides, is reviewed. Although screening programmes have been conducted in many countries, no efforts have been made to identify the plants that would be suitable for use locally, using appropriate technology's. The aim of present study was to evaluate molluscicidal activity of some medicinal plants *Balanites aegyptiaca, Eclipta alba, Cissus quandragularis* against *I. exustus* to explore the full potential use of these plants as molluscicides in future.

2. Materials and Methods

2.1 Collection of plant material

Aerial part of *Balanites aegyptiaca, Eclipta alba, Cissus quandragularis* were collected freshly from the botanical garden of MGPG college, Gorakhpur, which were previously planted and different preparation were made for the toxicity studies. Toxicity experiments were performed by the method of Singh and Agarwal (1984).

Adult *I. exustus* (2.25±0.2 cm in length) were collected locally from lakes and low lying submerged fields and were used as test animals. Ten experimental animals were kept in glass aquaria .Snails were exposed to different conditions (dechlorinated tap water extract, chlorinated water extract, distilled water extract, ethanolic extract) containing 2 litre each and 5 mg fresh aerial plant extract. Required amount of synthetic molluscicides were used as control groups. Toxicity were observe after 24, 48 hrs. The weight of the dechlorinated tap water extract, chlorinated water extract, distilled water extract; ethanolic extract was taken as the final strength per liter of a aquarium water.

Results

Table shows the toxicity of different preparations of some medicinal plants against snail *I. exustus* and shows that the toxicity was both time and dose dependent, activity decreased with decrease dose and increase time. The 24h LC50 of the ethanolic extract of *E. alba* were higher in comparison to *B. aegyptiaca* but lower than those of *C. quandragularis* moreover dechlorinated tapwater and distilled water extracts in *C. quadrangularis* and *E. alba* and tap water extract in *B. aegyptiaca* have shown lowest activity during all the screening periods i.e. after 24 and 48 hrs.

The results clearly indicates that the leaves of some medicinal plants are an important source of a botanical molluscicides. The toxicity study revealed that the toxic component of *E. alba, C. quandragularis, B aegyptiaca* leaves are soluble in both water and ethanol. Glycosides, steroids and terpenoid have been isolated from different parts of these plants (Kirtikar, 2001), which may be the

responsible agents for its molluscicidal activity. A comparison of the molluscicidal activity of the ethanolic extracts of *E. alba, C. quandragularis and B. aegyptiaca* were more potent.

3. Discussion

Mortality rate of *I. exustus* was recorded after every 24 hrs. up to 48 hrs. and dead *I. exustus* were removed instantly from aquaria due to risk of contamination with other animals**.** Snail mortality was established by the contraction of body within the shell; no response to needle probe was taken as evidence of death (Singh *et al*.,1996). Lethal concentration was observed between exposure time and different concentration of extracted leaf material of plants. The LC 50 values are tabulated in the table. Ethanolic extract of *E. alba, C. quandragularis, B. aegyptiaca* leaves were found to be most potent molluscicidal activity than rest of the medium. Lethal concentration of ethanolic extract of *E. alba* at 24 hrs:10 mg/l, 48 hrs.:8mg/l, *C. quandragularis* at 24 hrs.:11 mg/l ,48 hrs.:8.4 mg/l and of *B. aegyptiaca* at 24 hrs.10.9 mg/l 48 hrs.:9 mg/l respectively. Niclosamide has been used as standard molluscicide (LC50 at 24 hrs. is 11.8 mg/l) against *I. exustus* (Singh, 1998). Mortality rate of *E. alba* is best than rest of the plants is only due to the presence of wedelolactone (Guha Bakshi, 2001), while *in B aegyptiaca* has steroidal saponin Diosgenin (Guha Bakshi, 1999), and a mixture of deltonin and 25 isodeltonin (Brimer, 2007) therefore shows enchance molluscicidal activity (Bah, 2006). Similarly Syall et al. (1991) reported that *C. quandragularis* has molluscicidal activity against schitosomiasis.

In light of above facts, we wish to report in this paper that the selected plant species (*E. alba, C. quandragularis, B. aegyptiaca*) shows enhanced molluscicidal activity as compared to an expensive synthetic molluscicides (Clark, 1997). The order of 24 hrs. Toxicity against *I. exustus* was Ethanolic extract >Chlorinated water extract>Distilled water extract>Dechlorinated tap water extract, with respect to *E. alba* > *B. aegyptiaca*> *C. quandragularis* receptivity. The mechanism by which these leaf extract killed snails is not exactly known and will require further biochemical studies for elucidation.

Table- 1 Lethal toxicity of *Cissus quandragularis, Eclipta alba, Balanites aegyptiaca* against the vector snail *Indoplanorbis exustus* when exposed to conditions under 24 and 48h.

EXTRACT	LC50 mg/l	24 Hrs.	48 Hrs
Cissus quadrangularis			
dechlorinated tap water extract		80	70
chlorinated water extract		80	70
distilled water extract		48	46
ethanolic extract		11	8.4

	EXTRACT		LC50 mg/l
		24 Hrs	48Hrs
Eclipta alba	dechlorinated tap water extract	40	35
	chlorinated water extract	40	35
	distilled water extract	35	35
	ethanolic extract	10	8
	EXTRACT		**LC50 mg/l**
		24 Hrs	**48Hrs**
Balanites aegyptiaca	dechlorinated tap water extract	85	72
	chlorinated water extract	60	50
	distilled water extract	55	50
	ethanolic extract	10.9	9

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