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Molluscicidal activity of underutilized plant *Calotropis procera* (Ait.) R.Br

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Abstract

Calotropis procera commonly known as 'Arkra' is a popular medicinal plant found through the tropics of Asia and Africa. It has been widely used in traditional system for the tereatmentof the variety of disease due to the presence of various Cardenolides, triterpenoid, anthocyanins and hydrocarbon in it. In this paper an attempt to evaluate the toxicity of crude extract of leaves and stem bark of plant *C. procera* against harmful snail *Lymnaea acuminata* and *I. exustus* is made. These snails act as vactor for the causative organisim of facioliasis disease in herbivorous domestic animals. One of the best method to control this disease is to control these vactor snails . This can be a lone by using chemical pesticides or plant best pestisides. The chemical bestiside has been implicated in cousing in environmental problem. Hence the degradable plant best pestiside are considered as solution to this problem. The toxicity of aqueous extract of crude leaves and stem bark were both time and dose dependent. Aqueous extract of leaves of *Calotropis pacera* wash more toxic than aqueous extract of stem bark. The 96 hours LC_{50} of aqueous extract of leaves and stem bark was 201.30 mg/l and 248.36mg/l respectively against *Lymnaea acuminata* and *I. exustus*.

Lymnaeidaemolluscs like *Lymnaea acuminata* and *I. exustus*[1,3] are considered as the intermediate host of *Fasciola hepatica*. The snails causes fascioliasis disease in the herbivorous domestic animal[3] and causes morbidity, mortality and economic losses. One of the best method to control this disease is to destroy the carrier snail. This can be achieved by either using chemical pesticide[1,4] or by using plant based pesticides. The chemical pesticides have been implicated in causing environmental problem such as ground and surface water contamination, negative effect on non-target organism accidental poisoning of human beings and development of pesticides resistance[6]. Degradable plant based pesticides can help to find an answer to this problem. Switch over to botanical pesticides made us turn to a locally available underutilized plant like *Calotropis procera* (Ait.) R.Br. It is a plant that belongs

to the family Asclepiadaceae. It is a xerophytic shrub widely found in west Africa, Madagascar, the Arabian peninsula, Southern Asia and Indochina to Malaysia[10]. It occurs throughout India, *C. procera* commonly known as Sodon apple, Calotrope, French cotton, small crown flower (English) *algodon de seda, cotton frence, bomboa* (Spanish) *arbre de soie and bios Canon* (French)[5,7-9]. The present study aims to evaluate the molluscicidal activity of the plant *C. procera* against *L. acuminata* and *I. exustus*.

Plant Material :

The leaves and stem bark of *C. procera* were collected from the nearest area of Ramgarh lake in the distict Gorakhpur of Uttar Pradesh, India and identified by the herbarium of the Botany department of D.D.U. university Gorakhpur, Uttar Pradesh.

Preparation of Aqueous extract :

Ten gram of fresh leaves and stem bark of the plant were mixed with 100ml of water in an electric macerator. The extraxt was passed through Whatmann filter paper and the filterate was dried and used for the treatment.

Animal Collection :

Adult *L. acuminata* (2.25±2cm length) and *I. exustus* (0.8±0.037cm) were collected locally and used as experimental animals. The animals were allowed to acclimatize for 72 hours. Toxicity method was performed by the method Sing and Agarwal (Singh and Agarwal 1984). Ten experimental animals were kept in a glass aquarium containing 3 litres of dechlorinated water at 24°C. The experimental animals were exposed continuously for 96 hour to different concentrations of plants extract (table-1). The pH of water was 7.1-7.3 and dissoloved oxygen was 6.5-7.2 mg/litre. Six aquaria were set up for each concentration. Control animals were given equal amount of the de-chlorinated water, mortality was recorded at every 24 hours (24,48,72,96 hours) during over all exposure period .dead animals were removed on each observation to avoid contamination in aquarium water. Snail mortality was established by the contraction of the body with in the shell and no response to the needle probe was taken as evidence to death. LC_{50} value, Upper ,lower, confidence limit (UCL and LCL) and slop values were calculated according to the method of the Polo computer program of Russell *et. al*.[12].

Tables-2 and 3 indicate that the toxicity of the aqueous extract of leaves and stem bark of plant *C. procera* against *L. acuminata* and *I.exustus* was time and concentration dependent. Table-2 show that the LC_{50} of 24h of aqueous extract of leaves and stem bark of *C. procera* against *L. acuminata* were 1237.60mg/l and 1663.80mg/l respectively. The LC_{50} of 96 hours of aqueous extract of leaves and stem bark of *C. procera* against *L. acuminata* was 201.30mg/l and 248.36mg/l respectively .Similarly table 3 show the LC_{50} of 24 hours of aqueous extract of leaves and stem bark of *C. procera* against *I. exustus* was 1114.07mg/l and 1748.73 respectively. The results indicate that the toxicity of equeous extract of leaves and stem bark of *C.procera* against *L. acuminata* and *I. exustus* is time and dose dependent. It also indicates that aqueous extract of leaves of *C. procera* was

more toxic than stem bark in *L. acuminata* and *I. exustus*.

Table-1 Concentration of aqueous crude extract of leaves and stem bark of *C. procera* used for toxicity determination against *L. acuminata* and *indoplanorbis exustus*

S. N.	Treatment of aqueo-usextract	*L. acuminata* mg/l	*I. exustus* mg/l
1.	Leaves	100,500,1000,1500,2000	100,500,1000,1500,2000
2.	Stem bark	100,500, 1000,1500,2000	100,500,1000,1500,2000

Table -2 Toxicity of aqueous extract of leaves extract of Leaves of plant *C. procera* against *L. acuminata*

Period	LC_{50} w/v mg/l aqueous extract of leaves	LC_{50} w/v mg/l aqueous extract of stem bark
24 h	1237.60	1663.80
48h	833.08	788.98
72h	498.83	389.61
96h	201.30	248.36

Table-3. Toxicity of aqueous extract of leaves and stembark of plant *C. procera* against *I. exustus*

Period	LC_{50} w/v mg/l aqueous extract of leaves	LC_{50} w/v mg/l aqueous extract of stem bark
24h	1114.07	1748.73
48h	721.60	872.44
72h	306.60	406.82
96h	125.18	251.34

All parts of *C. procera* yield latex. The leaves have more latex than stem bark. The latex contains glycosides, calotropin, uscharin, calotoxin,calactin, uscharin, cardiac. Calotropagenin is the common aglycone of all the glycoside. Calotropin and uscharin that show Digitalin is like action on the heart (Ref). A non toxic proteolytic enzyme (2-3 percent) has been isolated from the latex. The latex of this plant also contains poisonous constituents[2]. Our results on the toxicity of leaves of *C. procera* show that it is highly effective against *L. acuminata* and *I. exustus* than stem bark. The study also reveals that the toxic components of latex of leaves of *C. procera* are more soluble in aqueous extract than stem bark.

The extracts of leaves of plant *C. procera* exhibit excellent molluscicidal activity against *L. acuminata* and *I. exustus*. These plants are easily available. Hence they can be effectively used to control of the snail *L. acuminata* and *I. exustus*. Those are vectors of various flukes.

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