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Comparative evaluation of Molluscicidal effects of *Securidaca longepedunculata* (Fres.) and *Tephrosia bracteolate (Guilland Perr)* on *Bulinus globosus.*

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ABSTRACT

The molluscicidal activities of ethanoic and methanoic extracts of the leaves, stem barks and roots of *Securidaca longepedunculata* and *Tephrosia bracteolate* against bred *Bulinus globosus* measured 0.50mm to 0.90mm in size, were investigated. The snails were exposed to a serial dilution of 0.1, 0.2, 0.5, 1.0, 2.0, 3.0, 5.0, 7.5 and 10.0ppm of the ethanoic and methanoic extracts of the leaves, stem barks and roots of *S. longepedunculata* and *T. bracteolata* for 24hrs. All tested extracts showed varied snail mortality rates with the different concentrations of ethanoic and methanoic extracts of the plants parts from 0.0 – 100.0%. The lethal concentration LC50 values ranged from 0.15-0.60ppm and LC90 values from 0.80-6.90ppm for both ethanoic and methanoic extracts of *S. longepedunculata* for 24hrs. The two plants showed significant difference ($P<0.05$) in the mortality rates of the snails (*B. globosus*).

Keywords: Plant extracts, mortality Juvenile, *Bulinus globosus*

INTRODUCTION

The toxicity of active ingredients of certain plants to freshwater snails usually leads to death or densities decrease their, Adewumi C. O. and Marquis V. O (1981) & Olofintoye L. K and Akinbile P. A. (2007).

The presence of *Bulinus globosus* in different freshwater habitats in Ekiti State as an important vector of human schistosomiasis has been reported, Olofintoye L. K. (2001); Odaibo A. B. (2004) and Olofintoye L.K. (2005). In addition, the endemicity of Schistosomiasis which may probably results to chronic and debilitating disease that affects people who have had contact with freshwater harbouring infected snails has been observed in the study area, Odaibo A. B. (2004) and Olofintoye L.K. (2005).

The need for control of the freshwater snails is imperative. Therefore, the use of natural plant products as molluscicides were used instead of chemical ones which considered as a source of pollution. Earlier on, some of these medicinal plants have been used in the Laboratory to control freshwater snails. Some of these include, the works of Adewumi and Marquis (1981), Olofintoye and Akinbile (2007), Vasconcellos and Amorin**,** (2003), Jose *et al.* (2003), Azare *et al*. (2007) and Albuquerque *et al*. (2006). This study was planned to evaluate the molluscicidal affect of *Securidaca longepedunculata* and *Tephrosia bracteolate* in the control of Schistosome snail vector *B. globosus*.

MATERIAL AND METHODS

Ethanoic and methanoic extracts were obtained form the leaves, stem barks and root parts of

Securidaca longepedunculata and *Tephrosia bracteolate* collected from forest regrowth and margins in Ado-Ekiti, Ekiti State, Nigeria.

Different concentrations were prepared from vacuum dried methylonic extract of purified leaf, stem bark and root of *S. longepedunculata* and *T. bracteolate.* (the stock solution concentration). The stock solution was diluted with distilled water. Nine different concentrations (0.1, 0.2, 0.5, 1.0, 2.0, 3.0, 5.0, 7.5 and 10.0ppm) were prepared following the method of Sukumaran *et al*. (2002) and Azare *et al.* (2007). For the toxicity test newly hatched juveniles of *B. globosus* which were collected from Ofin stream in Ado-Ekiti in 2009 were use.

Toxicity Test

Ten juvenile snails measured 0.50mm – 0.90mm in size were. exposed to 9 different concentrations each of the extracts. The toxicity test was replicated thrice per concentration for 24^{-h}. Thereafter, the number of died juvenile snail was counted after 24^{-hr} recovery in distilled water. The lethal concentrations of LC_{50} and LC_{90} were calculated by plotting the log concentration against the percentage of mortality after 24-hrs.

Plants Used

S. longepedunculata (Fres)– Polygalacease is known as violet tree. Its active constituents include saponinglycosides of Oleanolic acid, Tannins and Vateriannate methylsalicylate. *T bracteolate* (Guill and Perr) Fabaceae, contains active constituents such as Degudin, Tephrosin, Toxi-carol, Tephrasal, Quoscetrin, Rutin and Rotenone Kloss H. (1987) and Morais S. M. (2005). The two plants are commonly available in the study area. The molluscicidal potency of the extracts of the plants used was tested statistically using chi-square analysis (X^2) and the 95% confidence interval (C.I) was derived for the percentage morality of the snails per concentration.

RESULTS AND DISCUSSION

The molluscicidal activities of leafs stem bark and roots of *S. longepedunculata* and *T. bracteolate* with ethanol and methanol extracts at different concentrations (0.100m – 10.0ppm) are shown in Tables 1&2.

Table 1 shows the peak molluscicidal activity of leaf, stem bark and the root of *S. longepedumculata* with ethanol and methanol extracts at 10.0ppm concentration ranged from 70%, C. I = 0.42 – 0.98 to 100%, C.I = 0.0–0.0, morality rates of juveniles of *B. globosus* for 24hrs exposure. However, the molluscicidal potency of ethanol extract with the leaf, stem bark and root of *S. longepedunculata* showed higher potency of mortality rates of 100.0%, C.I = 0.0 – 0.0 at 10ppm for 24hrs than the methanol extract.

On the other hand, the effect of the plant extract of *S. longepedunculata* particularly the stem bark recorded very low mortality rate of *B. globosus* 0 %, C.I = 0.0 – 0.0 at 0.1ppm and 0.2ppm to 10.0%, C. I = -0.09 – 0.29 at 0.5ppm for 24hrs. Even though at 0.1ppm to 0.5ppm, the leaf extract recorded 10 %, C.I = -0.09 - 0.29 to 30 %, C.I = 0.20 – 0.58 mortality rates of *B. globosus* at 24hr exposure. More so, the peak mortality rates at lower concentrations of 0.10-0.50ppm of the root of *S. longepedunculata* with ethanol extract ranged from 20.0%, C. I -0.30 – 0.43 to 60.0%, C. I = 0.30 – 0.90 at 24hr expose (Table 1). These observations were similar to the findings of Sukumaran *et al.* (10) and Olofintoye and Akinbile (2).

The lethal concentrations LC_{50} of *S. longepedunculata* with ethanol were 0.15ppm of the leaf, 0.19ppm of the stem bark and 0.18ppm of the root.

The lethal concentrations LC_{90} of *S. longepedunculata* with ethanol extral were 0.80ppm of the 1.80 ppm leaf, of the stem bark and 6.70ppm of the root at 24hrs exposure. (Table 1).

The molluscicidal effect of methanol extract with leaf, stem bark and root of *S. longepedunculata* showed peak mortality rates of 90.0%, C.I = 0.71-1.09 at 10.0ppm at 24hr. but less than what was observed with ethanol extract in Table 1. Similarly, very low mortality rate of 0.0%, C.I = o.0 -0.0 at 0.10ppm was recorded with stem bark extract for 24hrs (Table 1).

The lethal concentration LC_{50} of *S. longepedunculata* with methanol extract were 0.55ppm of the leaf, 0.60ppm of the stem bark and 0.21ppm of the root. The Lethal concentration LC_{90} of *S. longepedunculata* with methanol extract were 3.10ppm of the leaf, 2.50ppm of the stem bark and 2.90ppm of the root for 24hr exposure. These LC_{50} and LC_{90} values agree well with the findings of Ebenso I. E. (1992) and TRipaths S. M. and Singh D. K. (2000).

Statistically, the molluscicidal potency of the leaf, stem bark and the root of *S. longepedunculata* with ethanol and methanol extracts showed significant difference in the mortality rates of juvenile *B. globosus* ($P<0.05$) at different concentrations for 24hrs exposure.

The molluscicidal activities of *S. longepedunculata* on juvenile *B. globosus* may probably due to the active ingredients of saponin – glycosides of Oleanolic acid, Tannins and Vateriannate methylsaliciate Kloss H. (1987); Morais S. M. (2005).

Table 2 shows that the peak molluscicidal activities of the leaf, stem bark and the root of *T. bracteolata* with ethanol and methanol extracts at 10.0ppm ranged from 90.0%, C.I = 0.71-1.04 to 100.0%, C.I = 0.0 – 0.0 and 80.0%, C.I = 0.55 = 1.05 to 90.0%, C.I = 0.71 – 1.04 for 24hrs exposure respectively on juvenile *B. globosus*. However, the low mortality rates of 0.0%, C.I = 0.0 – 0.0 to 10.0%, C.I = -0.09 – 0.29 at 0.10 – 10.0ppm concentrations with ethanol extract of the stem bark and 0.09, C.I 0.0 – 0.0 to 10.0%, C.I = -0.09 – 0.29 mortality rates at 0.10 to 0.5ppm concentrations with methanol extract of the stem bark on *B. globosus* for 24hr exposure (Table 2), and these were similar to what was observed with stem bark of *S. longepedunculata* in (Table 1).

The lethal concentrations LC_{50} of *T. bracteolate* with ethanol extract were 0.19ppm of the leaf, 0.45ppm of the stem bark and 0.35ppm of the root for 24-hrs and the lethal concentrations LC_{90} of *T. bracteolate* with ethanol extract were 1.60ppm of the leaf, 1.80ppm of the stem bark and 1.90ppm of the root for 24-hrs.

With methanol extract, the concentrations LC_{50} of *T. bracteolate* were 0.18ppm of the leaf, 0.30ppm of the stem bark and 0.44ppm for 24-hr. LC_{90} recorded 0.90ppm of the leaf, 1.20ppm of the stem bark and 2.40ppm of the root for 24-hrs. The lethal concentrations of LC_{50} and LC_{90} values observed in this plant were lower than the findings of Hashem and Fetyani, TRipaths S. M. and Singh D. K. (2000).

Chi Square (X^2) analysis shows that moluscicidal potency of the leaf, stem bark and the root of the *T. bracteolate* with ethanol and methanol extracts revealed significant difference in the mortality rate of juvenile *B.globosus* ($P<0.05$) at different concentrations for 24-hrs. It then suggests that the molluscicidal potency of the *T. bracteolata*on juvenile of *B. globosus*may probably due to active ingredients of Degcidin, Tephrosin, Toxi-carol, Temphrasal, Quoscentrin,

Rutin and Rotenone Tahraoui A. E.J.(2007) and Agra, M. F.(2007).

In conclusion, the use of *S. longepedunculata* and *T. bracteolate* products as molluscicides in the control of schistosome vector *B.globosus* may play a vital role, since the plants are commonly available all the year round in the study area.

Table 1: Mortality rates of leaf, stem bark and root of *S. longepedunculata* with ethanonic and methanoic extracts against *B. globosus*.

Plant parts	Conc. Ppm	Ethanol Extract Mortality (%)	C.I*	Methanol extract Mortality (%)	C.I*
	0.1	1(10.0)	-0.09 - 0.29	0 (0.0)	0.0 - 0.0
	0.2	3(30.0)	0.02 – 0.58	1 (10.0)	- 0.09 - 0.29
	0.5	3(30.0)	0.02 – 0.58	1 (10.0)	- 0.09 - 0.29
Leaf	1.0	5(50.0)	0.19 – 0.81	2 (20.0)	-0.03 - 0.43
	2.0	5(50.0)	0.19 – 0.81	3 (30.0)	0.02 - 0.58
	3.0	5(50.0)	0.19 – 0.81	3 (30.0)	0.02 - 0.58
	5.0	6(60.0)	0.30 – 0.90	4 (40.0)	-0.10 - 0.70
	7.5	7(70.0)	0.42 – 0.98	6 (60.0)	0.30 - 0.90
	10.0	10(100.0)	0.0 – 0.0	9 (90.0)	0.71 – 1.09
Control	-	0 (0.0)	0.0 – 0.0	0 (0.0)	0.0 - 0.0
	0.1	0 (0.0)	0.0 – 0.0	0 (0.0)	0.0 - 0.0
	0.2	0 (0.0)	0.0 – 0.0	0 (0.0)	0.0 - 0.0
Stem bark	0.5	1 (10.0)	-0.09 – 0.29	0 (0.0)	0.0 - 0.0
	1.0	5 (50.0)	0.09 – 0.81	3 (30.0)	0.02 - 0.58
	2.0	7 (70.0)	0.42 – 0.98	3 (30.0)	0.02 - 0.58
	3.0	7 (70.0)	0.42 – 0.90	6 (60.0)	0.30 - 0.90
	5.0	9 (90.0)	0.71 – 1.09	6 (60.0)	0.30 - 0.90
	7.5	10 (100.0)	0.0 – 0.0	7 (70.0)	0.42 - 0.90
	10.0	10 (100.0)	0.0 – 0.0	7 (70.0)	0.42 - 0.90
Control	-	0 (0.0)	0.0 – 0.0	0 (0.0)	0.0 - 0.0
	0.1	2 (20.0)	-0.03 – 0.43	1 (10.0)	-0.09 - 0.29
	0.2	2 (20.0)	-0.03 – 0.43	2 (20.0)	-0.03 - 0.43
Root	0.5	6 (60.0)	0.30 – 0.90	3 (30.0)	0.02 - 0.58
	1.0	6 (60.0)	0.30 – 0.90	7 (70.0)	0.42 - 0.98
	2.0	7 (70.0)	0.42 – 0.98	7 (70.0)	0.42 - 0.98
	3.0	8 (80.0)	0.55 – 1.05	7 (70.0)	0.42 - 0.98
	5.0	8 (80.0)	0.55 – 1.05	8 (80.0)	0.55 – 1.05
	7.5	10 (100.0)	0.0 – 0.0	9 (90.0)	0.71 – 1.09
	10.0	10 (100.0)	0.0 – 0.0	9 (90.0)	0.71 – 1.09
Control	-	0 (0.0)	0.0 – 0.0	0 (0.0)	0.0 - 0.0

C.I* = 95% Confidence interval.

Table 2: Mortality rates of leaf, stem bark and root of *T. bracteolata* with Ethanonic and methanoic extracts against *B. globosus*.

Plant parts	Conc. Ppm	Ethanol Extract Mortality (%)	C.I*	Methanol extract Mortality (%)	C.I*
	0.1	1(10.0)	-0.09 - 0.29	0 (0.0)	0.0 - 0.0
Leaf	0.2	1(10.0)	-0.09 – 0.29	1 (10.0)	- 0.09 - 0.29
	0.5	3(30.0)	0.02 – 0.58	1 (10.0)	- 0.09 - 0.29
	1.0	3(30.0)	0.02 – 0.58	2 (20.0)	-0.03 - 0.43
	2.0	6(60.0)	0.30 – 0.90	4 (40.0)	-0.10 - 0.70
	3.0	6(60.0)	0.30 – 0.90	6 (60.0)	0.30 - 0.90
	5.0	8(80.0)	0.30 – 0.90	8 (80.0)	0.55 - 1.05
	7.5	9(70.0)	0.55 – 1.05	8 (80.0)	0.55 – 1.05
	10.0	10(100.0)	0.42 – 0.98	9 (90.0)	0.71 – 1.09
Control	-	0 (0.0)	0.0 – 0.0	0 (0.0)	0.0 - 0.0
	0.1	0 (0.0)	0.0 – 0.0	0 (0.0)	0.0 - 0.0
	0.2	0 (0.0)	0.0 – 0.0	0 (0.0)	0.0 - 0.0
Stem bark	0.5	0 (0.0)	0.0 – 0.0	1 (10.0)	-0.09 - 0.29
	1.0	1(10.0)	0.0 – 0.0	2 (20.0)	-0.03 - 0.43
	2.0	3 (30.0)	-0.09 – 0.29	2 (20.0)	-0.03 - 0.43
	3.0	3(30.0)	0.02 – 0.58	4 (40.0)	-0.10 - 0.70
	5.0	4 (40.0)	0.02 – 0.58	5 (50.0)	0.19 - 0.81
	7.5	7 (70.0)	-0.10 – 0.70	6 (60.0)	0.30 - 0.90
	10.0	7 (70.0)	0.42– 0.98	8 (80.0)	0.55 – 1.05
Control	-	0 (0.0)	0.42 – 0.98	0 (0.0)	0.0 - 0.0
	0.1	1 (10.0)	-0.09 – 0.29	2 (20.0)	-0.03 - 0.43
	0.2	1 (10.0)	-0.09 – 0.29	2 (20.0)	-0.03 - 0.43
Root	0.5	2 (20.0)	-0.30 – 0.43	4 (40.0)	-0.10 - 0.70
	1.0	2 (20.0)	-0.30 – 0.43	5 (50.0)	0.19 – 0.81
	2.0	4 (40.0)	-0.10 – 0.70	5 (50.0)	0.19 - 0.81
	3.0	4 (40.0)	-0.10 – 0.70	6 (60.0)	0.30 - 0.90
	5.0	5 (50.0)	0.19 – 0.81	6 (60.0)	0.30 – 0.90
	7.5	7(70.0)	0.42 – 0.98	8 (80.0)	0.55 – 1.05
	10.0	7(70.0)	0.42 – 0.98	9 (90.0)	0.71 – 1.09
Control	-	0 (0.0)	0.0 – 0.0	0 (0.0)	0.0 - 0.0

C.I* = 95% Confidence Interval.

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