The early life toxicity of Godogbo (*Adenia cissampeloides*) stem against catfish juveniles

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Abstract: The use of plant extract as poisons for hunting and fishing is common among fishermen in Nigeria. Fish poisons from plants are also known as piscicides or inchthyotoxins. Several plant species are known to possess bioactive compounds that are toxic to fish. The effect of plant extract is dependent on the type of fish species. This implies that different fishes are either tolerant or susceptible to a particular fish poison. However, the early life toxicity of *Adenia cissampeloides* stem against catfish larvae was carried out under static bioassay condition for 96hrs. Fish larvae tested in methanol extract of stem of *A. cissampeloides* showed various pathological changes such as erratic swimming, moribund behavior, dipigmentation and death in various concentrations (25, 50, 75, 100mg/l) of the substance tested. Mortality of 50% (LC_{50}) of the test organisms (fish larvae) was observed in 50mg/l of the plant extract within 72hrs of application. No pathological changes and mortality was observed in the control group. The implication of this result shows that *A. cissampeloides* is highly toxic to the juveniles of catfish and its use in fishing should be discouraged because of its harmful effect on the aquatic biota.
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Key words: Early, Toxicity, *Adenia cissampeloides*, Stem, Catfish, Juveniles

Introduction

The use of poisons for hunting and fishing is widespread across the whole world (Jett, 1991). Fish poison plants are also known as piscicides or inchthyotoxins and are particularly interesting because they are used for an area effect rather than an individual target. A multiple of plant species are known to possess chemicals that are toxic to fish and evidence suggest that certain plant species have different effects depending on which variety of fish are targeted (Van Andel, 2000). Fish poisons are used in various traditional remedies, not only by the indigenous populations, but also by many. For instance, the leaves of *Clibadium surinamense* is squeenzed into a cup, mixed with few drops of kerosene and taken as a remedy for snakebite. The leaves of *Serjania paucidentete* are boiled and given to babies suffering from thrush resulting from unhygienic milk bottles or dirty nipples (Acevedo-Rodriguez, 1990). The biting sap of *Euphorbia cotinifolia* is dropped on inflamed fingernails to get rid of infection. Fish poisons plants also play a role in the magical belief and practices of Amerindian life. Fish poison plants have provided and will continue to provide food for ancient, primitive and modern Americans. Many fish poisons are grown to manufacture insecticides, but the exploitation of these plants for other uses is possible (Onga, 2002). *Adenia cissampeloides* is a species of plant in the Genus 'Adenia' and was named after a city called Aden in Yamen. The plant possesses a woody stem called the caudex and is the most attractive part of the plant. It is grown in humid area of West Africa (Yeboah-Gyan, 2000). *A. cissampeloides* is cultivated by seeds since cuttings rarely produce caudex. It is mostly grown or found in swampy areas but experiments have shown that *A. cissampeloides* is grown successfully in different soils types and also in a green house (Yeboah-Gyan, 2000). In West Africa, about fifty plants are known to be fish poisons and are used in many parts of the world as a means of obtaining fish from small and large bodies of water (Dalziel, 1937). Although discouraged by authorities and prohibited by law, most fishermen still prefer to kill fish with poisons.

Plate 1: ***Adenia cissampeloides***

In Nigeria, fresh leaves of *A. cissampeloides* is first roasted, pounded and later thrown into dammed portions of rivers or streams that is known to contain large numbers of fishes. Within fifteen minutes, small fishes are found floating dead and within an hour, big fishes are found floating dead (Morah, 1986). Despite the harmful effects of *A. cissampeloides* to aquatic organisms like fish, it has some useful effects to man. In Ghana, the leaves are rubbed on the breast of women after childbirth to promote lactation. *A. cissampeloides* is also confirmed to have some medicinal values, it is used as a remedy for lumbago in southern Nigeria (Morah, 1988). This study was aimed at examining the effect of *A. cissampeloides* on the early life stage of fishes.

Materials and Methods

The stems of *A. cissampeloides* were collected along the swamp area of Calabar-Oban road. The stems were washed and slash into tiny pieces with cutlass and dried under low intensity sunlight for 7 days and further oven dried in a hot air oven at 60^0C. The dried sample was then crushed to powder using mortar and pistle and finally reduced to fine powder using a manual blender. The fine powder of *A. cissampeloides* was extracted by soxhlet method. The powered sample was put in the conical flask together with the solvent (Methanol) and heated to boil. The evaporating solvent was allowed to passed through the powdered sample in the flask, which led to the extraction of bioactive compounds. One gram of the extract was dissolved in 100ml of distilled water to form a stock solution of 10g/l. The extract was first dissolved in 10mls of DMSO and then in 90mls of distilled water. The following concentration were prepared from the stock solution: 25, 50, 70 and 100mg/l respectively. The experiment was carried out using petri dishes. The different concentrations were poured into the petri dished and replicated thrice. The control experiment was made up of distilled water with DMSO without the extract. The petri dishes including the control contained ten (10) fish fry. Observation was made at 24 hour, 48hrs, 72hrs and 96hrs.

Results and Discussion

The early life toxicity of methanol extract of stem of *A. cissampeloides* resulted in various pathological changes and mortality of *Heterobranschus longifilies* juveniles in the different concentration of the plant. Mortality ranged from 0% in the control, 33.33% in the 25mg/l, 53.33% in 50mg/l and 96.66% and 100% in 70 and 100mg/l respectively of the extract. Mortality of 50% of the test organisms occurred in 43mg/l of the substance. Affected fish larvae started with moribund behavior, erratic swimming, depigmentaion and cessation of breathing. Similar pathological changes and mortality was not observed in the control. Hence, mortality was attributed to the effect of the extract. Van-Andel (2000) assets that a multiple of plants are known to posses chemicals that are toxic to fish and evidence suggest that certain plant species have different effects depending on which variety of fish is targeted. The result reveals that the extract affected the mortality significantly ($P<0.005$), which confirms the report of Van-Andel (2000).

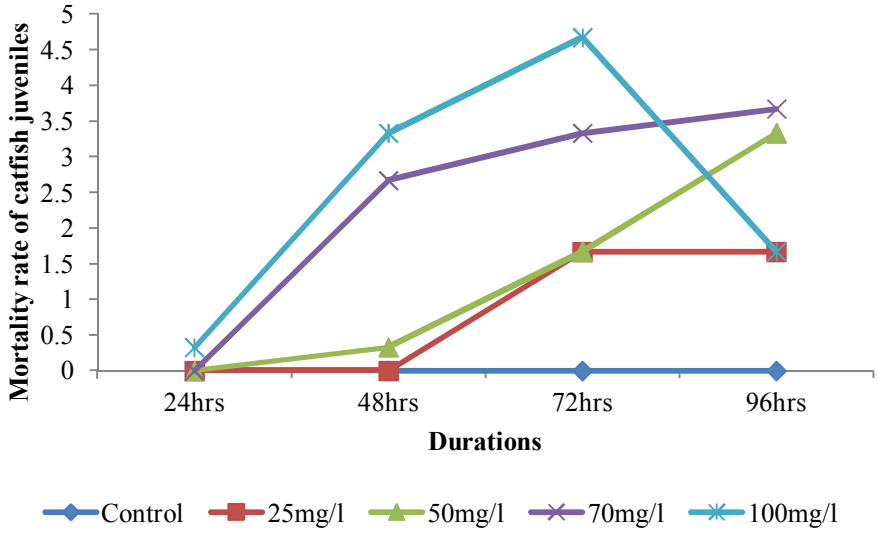

Fig. 1 Effect of *A. cissampeloides* on the survivability of catfish juveniles

Fish poisoning plant contain some bioactive compounds such as alkaloids, resin, tannin, saponin, nicotine, diosgenin etc. these bioactive compounds are toxic to fish at high concentration. The chemical constituents of *A. cissampeloides* mainly saponins which are commonly used as fish poison (Elpel, 2000) could be responsible for the high mortality in *Heterobranchus longifilis*. According to Mckim (1977), fish early life stages (embryo and Juveniles) are most vulnerable to fish plant poison. Fish plant poison is known to cause depletion of oxygen in the affected medium. Muirhead-Thompson (1971) revealed that greater toxic effect of plant or toxicants are more effective at higher temperature and shortened fish survival. It is probable that these factors might have contributed to the mortality rate of the catfish. Fishermen are known to pound and mix these substances (fish poison) in small pools of water containing fishes. Application of fish poison substances in water bodies within the aquatic environment could result in environmental degradation, depletion of dissolved oxygen and extinction of some endangered species that may not have been investigated. Nearly all varieties of fish poison are known to liberate cyanide into water (Bearez, 1997). The active substance in these plants are slowly exalted into the bodies of water in slow flowing stream and becomes lethal to fish that comes in contact with it (Heizes, 1953). The indiscriminate use of plants poison in aquatic environment can also lead to mortality of cattle that drink from the affected water (Heizes, 1953).

Conclusion

The toxic effect of *A. cissampeloides* on fishes is alarming and drastic measures should be taken to underscore it usage in aquatic environment, since probably the effect might not only be on the fishes but the entire aquatic ecosystem and humans that make use of the source.

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