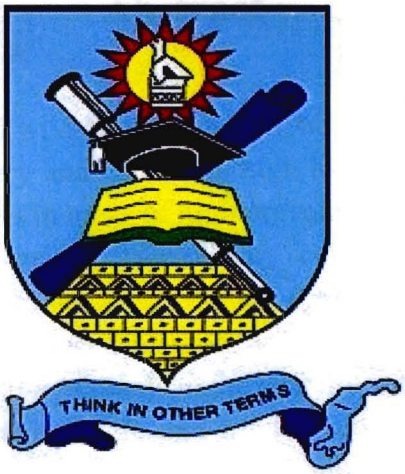

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The effects of known and candidate natural molluscicides on aquatic ecosystems

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Abstract

Fascioliasis affects domestic and wild animals in Zimbabwe and is endemic in most parts of the country. Prevalence rates vary and can be as high as 90% depending on location. This presents a serious economic threat in areas of high prevalence. Since intermediate snail-hosts are required in the transmission of fascioliasis, controlling snail populations using molluscicides is one effective way of combating the spread of the disease. The widespread use of molluscicides has however faced resistance due to non-target toxicity. Researchers have therefore turned their attention to plants in the search for novel candidate molluscicides. Plant compounds are often touted as safe and easily biodegradable. This study sought to identify plant extracts that can be a source of highly specific molluscicides for the control of *Lymnaea natalensis*, the intermediate host of fascioliasis. To ascertain the specificity of the extracts, their toxicity to a closely related non-vector snail, *Helisoma duryi* was determined. Methanolic extracts of the bark powder of seven plants were tested for molluscicidal activity against *L. natalensis* and *H. duryi* for periods ranging from 24 to 96 hours. Snails were then exposed to sub-lethal concentrations of the molluscicidal extracts for 96 hours. The effect of the molluscicide on anti-oxidant, esterase and glutathione-related enzymes in the snails was then studied. All the extracts tested had some level of molluscicidal activity against both snail species. The most effective extract against *L. natalensis* was *Pterocarpus angolensis* (24 hr LC_{50}, 56 mg/L). For *H. duryi*, the most effective was *Agave attenuata* (24 hr LC_{50}, 134 mg/L). The methanolic extracts tested showed some selective activity against *L. natalensis*. The extracts were shown to be potent inhibitors and activators of various antioxidant and esterase enzymes in the snail tissues. Species differences in the snails' response to molluscicides and the implications of molluscicide exposure on oxidative stress are also discussed. The selectivity of the extracts therefore arises in part due to the differing biochemical effects of the extracts on the two snail species. The plant extracts studied hold great potential in the development of novel and highly selective molluscicides against *L. natalensis*. It is recommended that further studies be carried out to isolate the active principles from the crude extracts.