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TOXICOLOGICAL STUDY OF THE MOLLUSCICIDAL LATEX OF *EUPHORBIA SPLENDENS:* IRRITANT ACTION ON SKIN AND EYE

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Aqueous solutions of the molluscicidal latex of Euphorbia splendens *are irritant to the rabbit eye in concentrations higher than 0.35% and to the rabbit skin in concentrations higher than 0.5%. Although this irritant potential does not preclude its use as a molluscicide, special precautions are recommended for handling and application of the product and the hazard of skin tumor-promoting potencial should be carefully investigated before its use for schistosomiasis vector control.*

Key words: *Euphorbia splendens* – plant molluscicide – schistosomiasis – skin irritation – eye irritation – toxicology

The combined application of molluscicides for snail control and chemotherapy of the affected population is one of the most effective strategies to reduce the prevalence and morbidity of schistosomiasis in endemic areas. In Brazil, where this disease is a serious public health problem, many plants have been screened for molluscicidal activity so that an effective product could be found and be used as a low cost alternative to the very expensive (and up to now imported) synthetic compounds available for schistosomiasis vector control. Recently, Vasconcellos & Schall (1986) reported that the latex of "Coroa de Cristo" ("Christ's Crown", *Euphorbia splendens*, var. *hislopii*) could be a useful plant molluscicide since it is highly active at low concentrations (LC90 for laboratory snails is 0.5 ppm and for field snails is 4 ppm), is biodegradable and the plant is easily cultivated in endemic areas and produces a rather large amount of latex throughout the year.

Different species of Euphorbiaceae family are known to have molluscicidal activity but, even though they might be very active, their practical use for snail control has not been considered because of the potential toxicological problems of these taxa. Many species of the Euphorbiaceae contain contact irritant compounds and phorbol esters are frequently encountered in several genera of this family, including *Croton* and *Euphorbia* (Farnsworth et al., 1987). Phorbol esters are known to be potent promoters of tumor growth *in vivo* and enhance *in vitro* malignant transformation of cells (Williams & Weisburger, 1986). The introduction of any pesticide into the environment, whether it be a synthetic compound or a natural product, requires a prior study of its possible effects on mammals and in other non-target organisms. In this case, taking into account previous toxicological information on Euphorbiaceae, skin and eye irritancy and tumor-promoting potential must be carefully investigated before any attempt to use the latex in ponds, irrigation channels or water supplies that people may use. This study is part of a more comprehensive and stepwise designed toxicological evaluation of *E. splendens* latex aimed at verifying whether it can be used as a molluscicide in snail control.

MATERIALS AND METHODS

Albino New Zealand rabbits, weighing 2500 to 3000 g and kept under controlled environmental conditions (21-23 °C), were used for the assessment of eye and skin irritation potential. Eye irritancy was tested as recommended by the Food and Drug Administration (Federal Register, 1973). Six rabbits were used for each concentration of the lyophilized latex (0.05%, 0.25%, 0.35% and 0.50% w/v aqueous solution). The test solution (0.1 ml) was dropped into the conjunctival sac formed by pulling the lower lid away from the eyeball and

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the lids were held together for one second. The untreated eye served as a control and the ocular reaction was scored at 24, 48 and 72 h and, also, 7 days later. The FDA's criteria were used to classify the test solutions as irritant or non-irritant. Skin irritation potential was assessed as described by Draize (1955). Six rabbits were used per lyophilized latex concentration (0.5%, 1.0% w/v aqueous solution and undiluted latex). Twenty-four hours before treatment the hair on the back was closely shorn in order to obtain four (2 x 2 cm) bare areas. The skin was abraded (two incisions through the stratum corneum with an hypodermic needle) in two of these four areas whereas in the remaining areas the skin was kept intact. The test solution (0.5 ml) was applied to one abraded and one intact skin area under an occlusive patch. The two untreated skin regions served as control areas. The total erythema and edema scores were added in both 24 and 72 h readings and the Primary Irritation Index (PII) is the combined average of the scores for intact and abraded skin. According to the PII the test solution was classified as: non-irritant (less than 1), mild irritant (from 1 through to 2), moderate irritant (between 2 and 6) and severe irritant (higher than 6).

RESULTS AND DISCUSSION

As it can be seen in Table the aqueous solutions of the *E. splendens* latex are not irritant to the rabbit skin (acute exposure) under a concentration below 0.5% (5000 ppm) and to the rabbit eye under a concentration below 0.35% (3500 ppm). Since it was reported that the LC90 for field snails is 4 ppm there is apparently a wide safety margin between the maximum effective molluscicidal concentration and the lowest eye and skin irritant concentrations. The results also show, however, that the undiluted latex or very concentrated solutions of the latex are likely to be quite irritant (undiluted latex is a severe irritant) to the eyes and to the skin. Therefore, special precautions should be taken – such as use of protective glasses and gloves – during preparation, handling and application of the product.

TABLE

Results of eye and skin irritation testing of different concentrations of the *Euphorbia splendens* latex (albino rabbits)

Concentration	pH	Eye irritancy classif.	Skin irritancy PII/classif.
0.05%	–	Non-irritant	–
0.25%	5.2	Non-irritant	–
0.35%	5.2	Non-irritant	–
0.50%	5.2	Irritant	0.75/Non-irritant
1.00%	5.2	–	2.35/Moderate irritant
Undiluted	–	–	6.40/Severe irritant

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