ABSTRACT

Biological activity in leaf extracts of Artocarpus altilis Park and other Jamaican plants.

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Bioassay of ethanol extracts of leaves of 60 different plants on adult Tribolium confusum (Duval) treated under Potter's tower revealed that 34 extracts were almost ineffective (0 % to 20 % mortality), 13 were slightly effective (21 % to 40 % mortality), 6 were moderately toxic (41 % to 60 % mortality) while the extracts of Artocarpus altilis, Bontia daphnoides, Capsicum annuum, Cuscuta americana, Cycloptis semicordata, Dioscorea polygonoides and Nicotiana tabacum were highly toxic, inflicting 81 % to 100 % mortality.

Forty seven of the 51 plant extracts inflicted 20 to 50 % mortality on Boophilus microplus (Canestrinii), inhibited oviposition (IO) by 0 to 86 % and hatching (IH) in eggs oviposited by the treated ticks by 0 to 100 %. Generally, there was a direct correlation among toxicity, IO and IH but in three plant extracts, about 10 % mortality was associated with 46 to 100 % IO and IH in the survivours, while the reverse trend was recorded for two plants. The Relative Acaricidal Index

(RAI) based on mortality, IO and IH of 30 plants ranged between 50 and 100, suggesting great potentials for developing acaricides.

The bioactivity of the extracts of different tissues of Artocarpus altilis plant were in the order- leaf > stem = terminal bud > inflorescence = bark > latex.

The leaves yielded 32.2 % crude extract (CE); 56.0 % in ethyl acetate (EAF); 25.5 % in water and 8.4 % in hexane fraction (HF), the order being EAF > CE > water > HF.

CE was twice as toxic as HF and methanol fraction (MF) to T. confusum and Cylas formicarius (Summer). As stomach poison to Plutella xylostella (L) the toxicity was HF > CE > EAF > MF. The adverse growth regulatory action on pupal adult moulting and adult development in P. andraemon was dose dependent. The antifeedant $dose_{95}$ for P. xylostella larvae was HF (28.7 %) > CE (29.8 %) > EAF (34.2 %) > MF (37.5 %).

The optimum attractancy dose of CE of A. altilis (CEA) (7.1 mg/cm^2) for C. formicarius was much less than that of sweet potato vine extract (CESV; 9.5 mg/cm^2). MF, EA and HF, all attracted adult C. formicarius but MF and CE of A. altilis were more attractive than CESV, and CEA. CEA stimulated copulation.

The Ld_{50} for CE, HF and MF of A. altilis for B.

microplus and A. cajennense (data in parenthesis) were 0.57 (6.53), 1.02 (9.93), 0.95 (7.56) respectively; IOd_{50} (inhibition of oviposition) were 0.50 (0.99), 0.79 (1.50) and 0.54 (1.34) respectively; and the IHd_{50} (inhibition of hatching) values were 0.73 (1.63), 1.87 (3.76) and 1.33 (1.97) respectively. Extracts of Azadirachta indica (A. Juss) were just as toxic as those of A. altilis. Significant number of eggs oviposited by the treated ticks were malformed.

The CE inhibited lipid and protein sequestration by oocytes of B. microplus and the catabolism of nutrients during embryogenesis.

The Lt_{50} and Lt_{95} values of CE of A. altilis stored in acetone at 4 °C and 28 °C for T. confusum were 21.429 and 81.658, and 14.488 and 43.212 days respectively. The extract was not phytotoxic at the Ld_{50} X 4 values for T. confusum and P. xylostella.

Topical application of CE, HF and MF of A. altilis on Swiss mice at T. confusum's Ld_{50} X 4 dose (13.9 %) revealed no toxic effect. However, intraperitoneal injection of MF increased while HF decreased the thrombocyte counts significantly. The red blood cells, haemoglobin, and lymphocyte counts were not significantly altered. Gross pathological examinations revealed prolonged atrial contraction in mice.

Fourteen compounds with Rf values between 0.03 to 0.95 were separated from the HF of A. altilis.

Compounds 2/3 and 6/7 were most toxic to C. formicarius. Almost all of the compounds had acaricidal activity; the order of their RAI (in parentheses) being HF (88.3) > 10/11 (71.8) > origin (67.5) > 1 > 2/3 = 8 (50 - 55) > 4 > 5 = 6/7 (40) > 9 (23).

The attractancy of the compounds to C. formicarius was in the order- 6/7 > 1 > 9 > 4, and the repellancy was- 2/3 > 10/11 > 5 > 12 > 8 > 13/14.

Five insecticidally active compounds were isolated from HF of A. altilis, which were partially characterized into three classes, (1) unsaturated pentacyclic triterpene, (2) triglycerides, and (3) unsaturated hydrocarbons. The order of toxicity (Ld_{50} for C. formicarius) of these classes was - unsaturated hydrocarbon > triglycerides > triterpene.