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Chemical Composition and Insecticidal Properties of Moroccan Plant Extracts against Dactylopius Opuntiae (Cockerell) Under Laboratory and Greenhouse Conditions

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Abstract : The wild cochineal Dactylopius opuntiae (Cockerell) (Hemiptera: Dactylopiidae) is the major insect pest of the prickly pear Opuntia ficus-indica (L.) in Morocco, which has causedenormous socio-economic and environmental losses to this crop in recent years. This study aimed to investigate the insecticidal potential of six aqueous (100% water), and methanolic (20/80 (v/v) MeOH/H2O) extracts obtained from aromatic and medicinal plants growing in arid and semi-arid regions of Morocco to control nymphs and adult females of D. opuntiae, under laboratory and greenhouse conditions. Under laboratory conditions, the aqueous extracts of Atriplex halimus at 5% caused significant mortality in nymphs with 71% four days after application and 88%on adult females of D. opuntiae8 days post-treatment. Under greenhouse conditions, the aqueous extract of A. halimus combined with black soap at 10 g/L showed the highest mortality rate of nymphs with 100%, 4 days after application. The adult females' mortality increased significantly to reach 83.75%,14 days after the second application of A. halimus aqueous extract at 5%. Phytochemical analysis of the water extract of A. halimus revealed a high content of saponins (24.09 ± 0.71 mg SSE/g DW) compared to other plant extracts, which was confirmed by LC-MS characterization that showed the presence of 36 triterpenoid saponin compounds (derived from oleic-12-en-28-oic acid), in addition to phytoecdysones, simple carboxylic acids, and flavonoids. These findings showed that using the aqueous extract of A. halimus as a biological pesticide could be incorporated into the management package to control the wild cochineal as a safe alternative to chemical insecticides.

Keywords : dactylopius opuntiae, opuntia ficus-indica L., plant extracts, toxicity, atriplex halimus, saponins
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