

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

**Authors :** Imane Naboulsi, Mansour Sobeh, Rachid Lamzira, Karim El Fakhouri, Widad Ben Bakrim, Chaimae Ramdani, Rachid Boulamtat, Mustapha El Bouhssini, Jane ward, Abdelaziz Yasri, Aziz Aboulmouhajir

**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 caused enormous 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/H<sub>2</sub>O) 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. opuntiae* 8 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 ( $24.09 \pm 0.71$  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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