Chemical analysis of Datura metel leaves and investigation of the acute toxicity on grasshoppers and red ants

Kuganathan, N.[a] and Ganeshalingam, S.[b]

[a] Department of Chemistry, University of Jaffna, Thirunelvely, Jaffna, Sri Lanka
[b] Department of Chemistry, University of Bath, Bath, BA2 7AY, United Kingdom

Abstract

The present study was carried out to analyse the inorganic and organic contents in the leaf of Datura metel and to investigate the acute toxicity at varying concentrations on grasshoppers and red ants. We determined the calcium, magnesium and phosphorous in the ionic state quantitatively and carried out screening tests and solvent extraction using chloroform to find out the presence of organic groups such as alkaloids, flavanoids, saponins and steroids. The concentration of Ca^{2+}, Mg^{2+}, Fe^{3+} and PO_4^{3-} were found to be $(4.28 \pm 0.05)\times10^4$, $(3.86 \pm 0.009)\times10^4$, $(2.33 \pm 0.007)\times10^4$ and $(4.65 \pm 0.06)\times10^4$ ppm respectively. The screening tests confirmed the presence of alkaloids and steroids and the absence of saponins and flavanoids. Increasing concentrations of the plant extracts (2500-15000 ppm) were added to grasshoppers (n = 10) and red ants (n = 10) in an experimental chamber. After 10 minutes of exposure, the numbers of live insects were counted. The results showed the EC_{50} value was 12000 ppm for grasshoppers and 11600 ppm for red ants. Percentage mortality increased from 20-60% with increasing concentrations. Our results indicated that extract of Datura metel leaves at higher concentrations was more toxic and it can be used as an insecticide against grasshoppers and red ants.

Author keywords

Datura metel; Grasshoppers; Insecticide; Medicinal plant; Red ants