

Title Repellency and toxicity of troponoid compounds against the adzuki bean beetle, *Callosobruchus chinensis* (L.) (Coleoptera: Bruchidae)

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Abstract

We compared the repellency and toxicity against adzuki bean beetles among six troponoid compounds, and examined the relationship between their structure and activity. γ -Thujaplicin showed the highest repellency against the beetles among the compounds tested, while the repellency of tropiliden was quite low. The results suggested that the keto and hydroxyl groups are important in the repellent properties of troponoid compounds. Although an isopropyl group was also important in repellency, the effect varied according to its position on the seven-member ring; the farther the isopropyl group was from the keto and hydroxyl groups, the higher the repellency became. As with its repellency effect, the toxicity of tropiliden was quite low. Tropone showed the highest toxicity among the compounds tested while its repellency was relatively low. Similar to its repellency, γ -thujaplicin showed the highest toxicity among the thujaplicins. However, the toxicities of α -thujaplicin and β -thujaplicin (hinokitiol) were similar, unlike the repellency. In summary, it appears that the toxicity of troponoid compounds does not always coincide with their repellency. Furthermore, the repellency and toxicity of a mixture of γ -thujaplicin and β -thujaplicin, whose production cost is cheaper than that of hinokitiol alone, were investigated. The mixture strongly repelled the adzuki bean beetles. We conclude that the mixture of γ -thujaplicin and β -thujaplicin is a promising repellent.