Isolation, Structure Determination, and Mode of Action of Insecticidal Compound from *Barringtonia asiatica*

Rani Maharani[1], Safri Ishmayana[1], Yusuf Hidayat[2], Danar Dono[2]

[1]Department of Chemistry, Faculty of Mathematics and Natural Sciences, Padjadjaran University, Jalan Raya Bandung Sumedang Km 21 Jatinangor
[2]Department of Plant Protection, Faculty of Agriculture, Padjadjaran University, Jalan Raya Bandung Sumedang Km 21 Jatinangor

Abstract

One oleanane glycoside was successfully isolated from the seeds of *Barringtonia asiatica*. The structure of this compound was determined by one- and two- dimensional ^{1}H-NMR and ^{13}C-NMR and by direct comparison with standard compound. This compound showed the highest insecticidal activity against *Crocidolomia pavonana*. We also examine the inhibitory activity of the active compound against some digestive enzymes, namely α-amylase, invertase and protease. The isolated compound did not show any inhibitory activity against any of the enzymes tested, on contrary, it increase the activity of protease. In conclusions, *B. asiatica* seeds have a very high insecticidal activity compound that is potential for natural insecticide application.

Key words: *Barringtonia asiatica*, oleanane glycoside, insecticidal activity, and *Crocidolomia pavonana*

Introduction

Currently, insecticidal compounds become very important substances in agricultural field, since they are needed for controlling insect pests. The harmful effect of synthetic insecticides on the environment has stimulated researches on finding new natural insecticidal compounds that more environmental friendly.

One of potential source of natural insecticidal compound is *Barringtonia asiatica*. The seeds of this plant have been used to stupefy fish and octopus in many Pacific islands (Etoh, 2001). Recent finding suggest that methanol extract from this plant also has an insecticidal activity against *Crocidolomia pavonana* (Dono & Sujana, 2007).

The structure of active insecticidal compound from *B. asiatica* has not been investigated yet. Mode of action of this compound is also not understood. In order to get a deep understanding on the mode of action of the insecticidal compound, a research investigating the structure and mode of action of the active compound need to be achieved. Deeper understanding in mode of action of this compound can lead to the development of new insecticide compound that has a high activity but environmental friendly.

Some indications showed that bioactive compound from *B. asiatica* influence digestive system of *C. pavonana* indicated by lowering the growth rate of second instars larvae. Inhibition of digestive enzymes could decrease the absorption of nutrition and results in lowering growth rate of *C. pavonana* larvae. Hirashima *et al.* (1990) found that an insecticidal compound (salithion) could act as carbohydrases inhibitor. The result of the experiment showed that the active compound could suppress the growth of particular insect.

By the result of Dono & Sudjana (2007), we have a hypothesis that the active insecticidal compound from *B. asiatica* also has a mode of action on the digestive enzyme of the larvae *C. pavonana*. Therefore the objectives of this research are to isolate and determine the structure of active insecticidal compound from *B. asiatica* and additionally, to determine inhibitory activity of the insecticidal compound against some digestive enzymes.

Materials and Methods

General