Toxic triterpenoid from the stem bark of suren (*Toona sureni*)

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Abstract

Indonesia is one of the centres of diversity which has the potential as source of secondary metabolites which are useful. Family Meliaceae is a wood plant growing in the tropical area. *Toona sureni* is one of the plant species of *Toona* family which has the potential as producer of organic compound that gets toxic characteristic. The purpose of this research are to isolation and characterization toxic active compound of ethyl acetate extract from stem barks of *T. sureni*. The stem barks of *T. sureni* was macerated step by step with n-hexane, ethyl acetate, and methanol at room temperature. Extract of ethyl acetate to be concentrated, fractionated, and its component were separated by various kind methods chromatographic and guided with bioassay, to obtain pure isolate yellows solid form as much 14,1 mg. Extract of ethyl acetate and isolate were tested for their toxicity by method Brine Shrimp Lethality Test (BSLT). The LC$_{50}$ (24 hours) value of ethyl acetate extract was 4,386 ppm and isolate was 13,419 ppm. Phytochemistry Liebermann-Burchard indicate positive to triterpenoid. The pure isolate is characterized and determined by its compound structure with spectroscopy methods. Based on ultraviolet spectrum, infrared, $^1$H-NMR, $^{13}$C-NMR, DEPT 135$^o$, H-H COSY, HMBC, and HMQC characterization, this compound predicted as triterpenoid of tirucalana group.

Keywords: *Toona sureni*, Meliaceae, triterpenoid, toxicity, brine shrimp

Introduction

Indonesia constitutes one of the diversity center at universalizes and as state of tropical climate change, that gets heterogeneous diversity natural resources for production chemical compounds of natural carbon (Yusron dkk., 2005). Organic compounds that consist in plant are benefit for human as cosmetic, insectisida, antifeedant substance, and medicine which make more potential. Base research, *T. sureni* having surenon chemical content, surenin and surenolakton what does growth resistor personation, insektisida and antifeedant (constraining eating energy) to insect larva tests silkworm. That material also evident constitute repellant insect, including mosquito (Kraus et al., 1982). Scientific research about botanical toxicity activity this has never been been reported previous whereas purpose it traditional by society have a lot of is reported, so research about toxic active compound that contained in it important to isolation that active compound, that plant *T. sureni* can be accepted deep cure moderning to solve needful health problem current.

Materials and Methods

Sample that is utilized in this research is stem bark of *T. sureni* one that acquired of Raya Bogor garden West Java. This plant material at determination at Herbarium Bogoriense Bogor West Java. Larva that is utilized for sample toxicity activity (isolate) is larva *A. salina*. Bioindikator is shrimps larva (*Artemia salina*) bred at Organic Laboratory department of Chemistry FMIPA Unpad.

As much 4 kg stem bark of *T. sureni* dried on room temperature until dry. Material already is dry is milled until ground then is maserationed step by step with organic solvent which is n-hexana, ethyl acetate, and methanol up to 3 x 24 hours. To isolation triterpenoid compound, done by separation by use of method kromatografi column by use of gel silica G60 as stasioner fasa and eluen n-hexane-ethyl acetate (9:1). Parting yielding fractions tested by KLT utilizes eluen chloroform-ethyl acetate and monitored by sulfuric acid in 10% of ethanol. Active compound structure will be determined by spectroscopy method covers: infrared spectrophotometer (IR), ultraviolet (UV), $^1$H-NMR, $^{13}$C-NMR, DEPT 135$^o$, H-H COSY, HMBC, and HMQC characterization, this compound predicted as triterpenoid of tirucalana group.

Results and Discussion

Active Isolate of F1E1 is gotten as yellow colored solid. Base measurement $^1$H-NMR, $^{13}$C-NMR, DEPT 135$^o$ technique, and 2D-NMR is gotten marks sense eight methyl carbons, seven methylen carbons, nine methyn carbons (two oxygenated carbons), and six quartener carbons (one carbonil), so isolate F1E1 accomplishes molecule formula C$_{30}$H$_{48}$O$_{3}$. Isolate F1E1 has character not flash under UV light well on
Figure 1 Prediction structure of isolate F1E1 active.

254 nm or even 365 nm. On infrared spectrum isolate F1E1 shows functional group which is hydroxyl group (–OH) on wave number 3429.43 cm⁻¹. It strengthened by marks sense stretching C-O on fingerprint region which is on region 1045.42 cm⁻¹. Besides that, available stretching C-H sp³ on wave number region 2800-3000 cm⁻¹ which is marks sense two absorption bands on 2922.16 cm⁻¹ and 2852.72 cm⁻¹ that preconceived indigenous stretch C-H symmetric and asymmetric CH₂. In the present gem dimethyl by marks sense flexible C-H on wave number 1462.2 cm⁻¹ and 1375.25 cm⁻¹. Absorption band on 1606.7 cm⁻¹ and 889.18 cm⁻¹ indicate C=C bond sp² one that characteristic. Absorption of carbonil group in infrared spectrum is the strong peak on region 1640-1820 cm⁻¹. Absorption band on wave number 1737.86 cm⁻¹ mark sense two absorption bands that is divided becomes sp³ asymmetric CH and sp² symmetric. Absorption band on 1606.7 cm⁻¹ and 889.18 cm⁻¹ indicate C=C bond sp² one that characteristic. Absorption of carbonil group in infrared spectrum is the strong peak on region 1640-1820 cm⁻¹. Absorption band on wave number 1737.86 cm⁻¹ mark sense two absorption bands that is divided becomes sp³ asymmetric CH and sp² symmetric. Absorption band on 1606.7 cm⁻¹ and 889.18 cm⁻¹ indicate C=C bond sp² one that characteristic. Absorption of carbonil group in infrared spectrum is the strong peak on region 1640-1820 cm⁻¹. Absorption band on wave number 1737.86 cm⁻¹ mark sense two absorption bands that is divided becomes sp³ asymmetric CH and sp² symmetric.

After fraction 1 is separated with gravitation chromatography column therefore is gotten 8 fractions. Each fraction was tested by BSLT (brine shrimp lethality test) and accounted by LC₅₀ point with the same way as extract n-heksana so gotten by highest fraction its activity. From BSLT test the result gotten by fraction e have toxicity activity most active which is as big as 9,071 ppm

Table 1 Result tests BSLT fractions of fraction 1.

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Value of LC₅₀ (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1A</td>
<td>42</td>
</tr>
<tr>
<td>F1B</td>
<td>18</td>
</tr>
<tr>
<td>F1C</td>
<td>28</td>
</tr>
<tr>
<td>F1D</td>
<td>13</td>
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<td>9</td>
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<tr>
<td>F1H</td>
<td>117</td>
</tr>
</tbody>
</table>

Conclusions

Toxic active compound can be isolated from the stem bark of T. sureni, as yellow solid as much 14.1 mg, and has LC₅₀ point (24 hours) = 13,419 ppm. Base infrared measurement, ⁱH-NMR, ¹³C-NMR, H-H COSY, HMCO, HMBC, and acquired data of literature get to be predicted that isolat F1E1 is triterpenoid of tirucallana group.

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References

