



Research Article

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Isolation of triterpenoid from stem bark of *Pometia pinnata*, Forst & Forst

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ABSTRACT

A pentacyclic triterpenoid identified as taraxerone (*D*-friedoolean-14-en-3-one) was successfully isolated from *n*-hexane extract of the stem bark of *Pometia pinnata*, Forst & Forst. The presence of this compound was reported for the first time from this medicinal plant. The structure of this compound was characterized based on spectroscopic analysis and comparison with published information in the literature.

**Keywords:** *Pometia pinnata* Forst & Forst, stem bark, taraxerone.

INTRODUCTION

*Pometia pinnata*, Forst & Forst, a member of Sapindaceae family, is widely distributed in Asia Pacific included Malaysia, Indonesia, Philippines, Papua New Guinea, until Solomon Islands, Fiji and Tonga [1]. The leaves and bark are used in traditionally medicine to treat mouth infections, abdominal ailments including stomach complaints, diarrhea, dysentery, obstetric and gynaecological complaints [1-3]. Previous investigation, a new triterpenoid saponin named pometin, and kaemferol 3-*O*- $\alpha$ -L-rhamnopyranoside and 3-*O*-[ $\alpha$ -L-arabinofuranosyl - (1 $\rightarrow$ 4) - $\alpha$ -L-rhamnopyranosyl-(1 $\rightarrow$ 2) -  $\alpha$ -L-arabinopyranosyl]- hederagenin have been isolated from the stem bark and leaves of *Pometia pinnata*, Forst & Forst [4-5], successively. Another report showed methanol extract of stem bark has antioxidant property [6], and anti bacterial against gram-positive bacteria of *Staphylococcus aureus* [7].

Based on phytochemical screening, besides saponin as the main component, stem bark of *Pometia pinnata*, Forst & Forst also contains triterpenoid, phenolic, coumarin, and flavonoid compounds to be explored. The current study reports the isolation and characterization of one pentacyclic triterpenoid from the hexane extract of *Pometia pinnata*, Forst & Forst stem bark.

EXPERIMENTAL SECTION

General

The conventional column chromatography was carried out using silica gel G60 (Merck). Thin layer chromatography (TLC) was performed over precoated silica gel G60-F<sub>254</sub>. Preparative plate (20x20 cm, 0.5 mm thickness, E Merck) was used to check the purity of the compound and visualized under UV light of 254 nm and 365 nm and followed by charring the compound after spraying the plate with 10% sulphuric acid. IR spectra were recorded on Perkin Elmer FT-IR Spectrometer, NMR spectral analyses were carried out with JEOL Delta2-NMR spectrometer at 500 MHz (<sup>1</sup>H, <sup>13</sup>C DEPT, HMQC and HMBC) in CDCl<sub>3</sub> with TMS as an internal standard. Melting points were determined with a Gallenkamp Melting Point Apparatus (digital series) and were uncorrected.

Plant Material

*Pometia pinnata*, Forst & Forst stem bark was collected from Air Tawar Padang, West Sumatera Indonesia. The plant was identified in Herbarium of Andalas University (ANDA) of Biology Department.

**Extraction and Isolation**

Stem bark powder was macerated using n-hexane for 3 days at room temperature for 5 replications. The extract was evaporated using a rotary evaporator to yield n-hexane crude extract. The crude extract (26 g) was then purified with gravity column chromatography used n-hexane 100%, and n-hexane: ethyl acetate (9.5:0.5 until 8:2) to afford some vials. Each vial was checked with TLC, and vials with the same pattern were combined to afford 6 fractions (A-F). Fraction B was washed with acetone to yield white crystal (130 mg). The crystal showed two spots on TLC with eluents n-hexane : dichloromethane/DCM (2:3). The crystal was more purified with column chromatography, eluents n-hexane: DCM (3:2). This process gave compound 1 as white crystalline solid (57 mg). TLC of this crystal produced one spot, R<sub>f</sub> = 0.7 and 0.73 (eluents n-hexane: DCM, 1:1 and 2:3).

**RESULTS AND DISCUSSION**

The isolated compound, melting point at 141-142°C, gave red color with Lieberman-Burchard reagent indicating the presence of triterpenoid skeletons. IR spectrum showed absorption band at  $\nu_{\text{maks}}$  1707  $\text{cm}^{-1}$  indicating a carbonyl group, and a band at  $\nu_{\text{maks}}$  2938 and 2854  $\text{cm}^{-1}$  indicating a stretching vibration of C-H aliphatic, specific for methyl ( $\text{CH}_3$ ) and methylene ( $\text{CH}_2$ ) groups. These data were supported with absorption bands at 1448  $\text{cm}^{-1}$  and 1376  $\text{cm}^{-1}$  indicating the presence of dimethyl group as the sign of triterpenoid compounds.

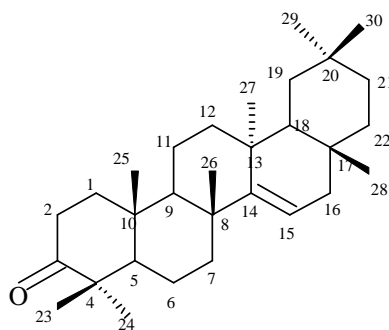
**Table 1.**  $^1\text{H}$  NMR and  $^{13}\text{C}$  NMR chemical shift values (ppm) of isolated compound and from literature (in  $\text{CDCl}_3$ )

$^{13}\text{C}$		DEPT	$^1\text{H}$ NMR	
Compound 1	Literature		Compound 1	Literature
38,54	38,33	$\text{CH}_2$		
34,34	34,14	$\text{CH}_2$		
217,74	217,60	C		
47,76	47,58	C		
55,96	55,76	CH		
20,15	19,94	$\text{CH}_2$		
35,26	35,08	$\text{CH}_2$		
39,06	38,86	C		
49,98	48,68	CH		
35,95	35,77	C		
17,63	17,43	$\text{CH}_2$		
37,88	37,73	$\text{CH}_2$		
37,93	37,63	C		
157,78	157,58	C		
117,37	117,18	CH	5,56 (1H,dd ; J=8,4, 3,0 Hz)	5,54(dd, J=8,4, 3,6 Hz)
36,83	36,65	$\text{CH}_2$		
37,72	37,52	C		
48,98	48,76	CH		
40,82	40,61	$\text{CH}_2$		
28,98	28,79	C		
33,73	33,55	$\text{CH}_2$		
33,24	33,06	$\text{CH}_2$		
26,25	26,08	$\text{CH}_3$	1,07 (3H,s)	1,06 (s)
21,68	21,33	$\text{CH}_3$	1,06 (3H,s)	1,05 (s)
14,99	14,80	$\text{CH}_3$	1,08 (3H,s)	1,07 (s)
30,03	29,84	$\text{CH}_3$	0,90 (3H,s)	0,888 (s)
25,77	25,56	$\text{CH}_3$	1,13 (3H,s)	1,12 (s)
30,11	29,91	$\text{CH}_3$	0,82 (3H,s)	0,81 (s)
33,55	33,34	$\text{CH}_3$	0,95 (3H,s)	0,93 (s)
21,53	21,48	$\text{CH}_3$	0,91 (3H,s)	0,894 (s)

$^1\text{H}$  NMR,  $^{13}\text{C}$  NMR, and DEPT spectral data of compound 1 can be seen in Table 1.  $^1\text{H}$  NMR spectrum showed 8 singlet methyl signals (specific for triterpenoids) at chemical shifts  $\delta_{\text{H}}$  0.82, 0.90, 0.91, 0.95, 1.06, 1.07, 1.08, and 1.13 ppm. This spectrum also revealed one doublet signal at  $\delta_{\text{H}}$  5.56 ppm ( $J = 8.4$  and 3.0 Hz) indicating one olefinic

proton.  $^{13}\text{C}$  NMR spectrum displayed 30 carbon atoms, explained with DEPT (Distortionless enhancement by polarization transfer) as 8 methyl groups, 10 methylene groups, 4 methine groups, and 4 quaternary carbons.

One quaternary carbon,  $\delta_{\text{C}}$  217.74 ppm was typical for carbonyl  $\text{C}=\text{O}$ , while there were two  $\text{sp}^2$  carbons ( $-\text{CH}=\text{CH}-$ ) at  $\delta_{\text{C}}$  157.78 and 117.37 ppm indicating one double bond at position of C-14 and C-15, successively. From these data and by comparison with literature, the isolated compound was assigned as taraxerone or D-friedolean-14-en-3-one. This is the first time that taraxerone is isolated from *Pometia pinnata*, Forst & Forst. The structure can be seen in Figure 1.



**Fig 1. Structure of taraxerone**

### CONCLUSION

A pentacyclic triterpenoid compound has been successfully isolated from stem bark of *Pometia pinnata*, Forst & Forst. The structure of the isolated compound was determined from spectroscopy analysis (IR,  $^1\text{H}$  NMR,  $^{13}\text{C}$  NMR, HMQC, and HMBC) and also by comparing with literature. The isolated compound was assigned as taraxerone. Taraxerone was isolated and reported for the first time in this plant.

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