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Biostatic Activity of Eusiderin I From Eusideroxylon Zwagery Against Sclerotium Rolfsii

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A B S T R A C T

Research on biostatic activity of Eusiderin I from *Eusideroxylon zwagery* against *Sclerotium rolfsii* had been carried out. The isolated Eusiderin I was a white crystal with melting point in such 99-100 °C. The UV spectra in $CHCl_3$ showed absorbance at λ_{maks} (log ε) 241 (4,99) and 273 (4,83) and the infra-red spectra of this compound showed the sharp aromatic C-H stretching vibration at 3079 cm^{-1}, aliphatic C-H stretching vibration at 2975 and 2933 cm^{-1}, aromatic C-H bending vibration also shown in finger print 998, 829 and 637 cm^{-1}. These vibration regions also indicate the substituted aromatic system. The sharp aromatic C=C stretching vibration also shown in 1597 and 1508 cm^{-1}. Peak with wave number of 1358-1136 cm^{-1} was C-O-C groups. The biostatic activity test of Eusiderin I from Bulian wood (*Eusideroxylon zwagery*) to phatogen fungi of *Sclerotium rolfsii* showed that with three different concentrations (3, 4 and 5 ppm), Eusiderin I was a potent biofungicide because it had a strong activity in inhibiting the Sclerotium *rolfsii* growth. The 5 days incubation test result showed that 4 ppm Eusiderin I could inhibit the *Sclerotium rolfsii* colony growth. The 5 ppm Eusiderin I gave the most effective inhibition precentage because it could inhibit the *Sclerotium rolfsii* colony growth (= 49.5%).

Keyword: *Eusideroxylon zwagery*, *Sclerotium rolfsii*, Eusiderin I, biostatic activity

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INTRODUCTION

Bulian wood (*Eusideroxylon zwagery*) known as iron wood, is one of Lauraceae popular as furnished and kitchenettes wood. It was known as wood source which fungi and insect resistant. Its fruits used as antiinflammatory agent. These effects were interconnected with secondary metabolites contained within (Heyne, 1987; Martawijaya, 1989).

There are four big metabolites group produced by *Eusideroxylon zwagery*. They are alkaloid, steroid, terpenoid and phenolic compounds (Hobbs, 1960). Among all that, Stilbene derivative phenolic compounds have fungicide and insecticide activity (Miles, 1985). It was estimated that these compounds can protect bulian wood from insect and wood decay fungi (Blanchette, 1991; Boddy, 1991; Moore, 1996).

Earlier research found that *Eusideroxylon zwagery* have five pure compounds, three of them are neolignan and two are aporphin alkaloid and phenantrene. One of neolignan indentified as Eusiderin I (Harizon, 2001; Merlini, 1975).

METHODS

Materials

Eusideroxylon zwagery wood was collected from Senami forest Jambi – Indonesia in May 2005. Other materials used in these experiments are *Sclerotium rolfsii* fungi, PDA, chemicals used for Eusiderin I isolation and chemicals for biostatic activity test.

Extraction and Partition of *Eusideroxylon zwagery* wood powder

10 Kg of *Eusideroxylon zwagery* wood powder was macerated with methanol and fractinated with n-Hexane, dichloro methane, ethyl acetate. The n-Hexane fraction was applied to Vacuum Column Chromatography, then Column Chromatography and Thin Layer Chromatography. The structure analysis was conducted by UV and IR Spectroscopy.

Biostatic Activity Investigation

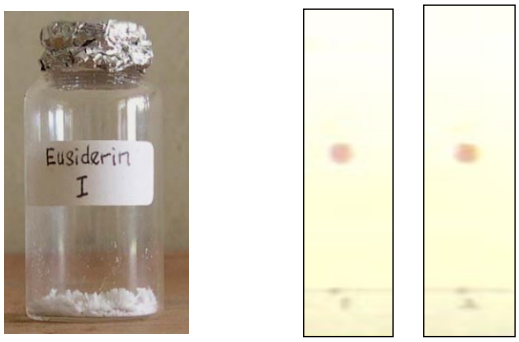
Biostatic Activity Investigation was conducted with *Sclerotium rolfsii* as pathogen fungi using Well Method (Pegg, 1987; Priyono, 2004). Pure compound of Eusiderin I was used in 3, 4 and 5 ppm concentrations. All assays were made in triplicate. The investigation were conducted by measuring colony growth diameter of *Sclerotium rolfsii*.

RESULTS AND DISCUSSIONS

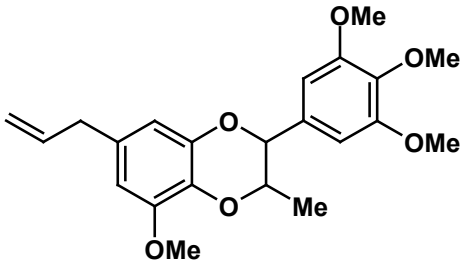
Extraction and Partition of *Eusideroxylon zwagery* wood powder

The maceration gave 1,75 kg concentrate extract. The fractination then were applied into this extract and gave. Eusiderin I as white crystalline (Figure 1.a) with melting point of 99-100 ºC. TLC spot supported this purity by giving only one spot as shown in Figure 1.b and Eusiderin I structure exhibited in Figure 1.c.

The UV spectra in $CHCl_3$ showed absorbance at λ_{maks} (log ε) 241 (4,99) and 273 (4,83). Absorbance at λ_{maks} 241 commonly are given by the unsaturated chromophor from substituted alkene while at λ_{maks} 273 commonly are given by the chromophor from oxygenated aromatic system. UV Spectra from Eusiderin I exhibited in Figure 2.a.



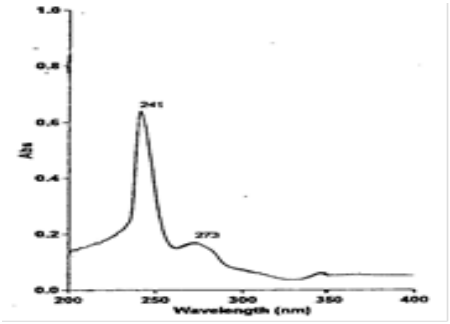
(a) (b)



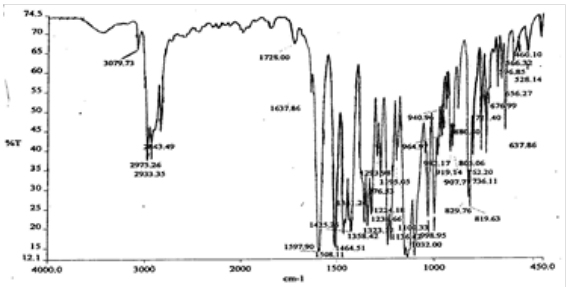
(c)

Figure 1. (a) Eusiderin I Crystal, (b) TLC Spot of Eusiderin I, (c) Eusiderin I structure

The UV spectra in $CHCl_3$ showed absorbance at λ_{maks} (log ε) 241 (4,99) and 273 (4,83). Absorbance at λ_{maks} 241 commonly are given by the unsaturated chromophor from substituted alkene while at λ_{maks} 273 commonly are given by the chromophor from oxygenated aromatic system. UV Spectra from Eusiderin I exhibited in Figure 2.a.



(a)



(b)

Figure 2. (a) UV Spectra of Eusiderin I, (b) IR Spectra of Eusiderin I

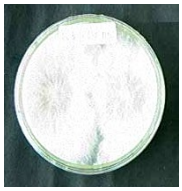
The infra-red spectra of this compound showed the sharp aromatic C-H stretching vibration at 3079 cm^{-1}, aliphatic C-H stretching vibration at 2975 and 2933 cm^{-1}, aromatic C-H bending vibration also shown in finger print 998, 829 and 637 cm^{-1}. These vibration regions also indicate the substituted aromatic system. The sharp aromatic C=C stretching vibration also shown in 1597 and 1508 cm^{-1}. Peak with wave number of 1358-1136 cm^{-1} was C-O-C groups. The IR Spectra of Eusiderin I exhibited in Figure 2.b.

Based on melting point, TLC spot, UV and IR spectra, compared to literature it is concluded that the isolated Bulian wood powder (*Eusideroxylon zwagery*) was truly Eusiderin I.

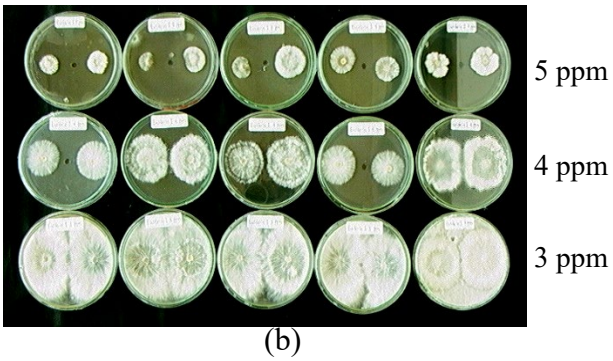
Biostatic Activity of Eusiderin I from *Eusideroxylon zwagery*

The biostatic activity test of Eusiderin I from Bulian wood (*Eusideroxylon zwagery*) to phatogen fungi *Sclerotium rolfsii* showed that with three different concentrations (3, 4 and 5 ppm), Eusiderin I was a potent biofungicide because it had a strong activity in inhibiting the *Sclerotium rolfsii* growth. The 5 days incubation test result showed that 4 ppm Eusiderin I could inhibit the *Sclerotium rolfsii* colony growth. The 5 ppm Eusiderin I gave the most effective inhibition precentage because it could inhibit the *Sclerotium rolfsii* colony growth (= 49.5%).

The results of biostatic activity test of Eusiderin I from Bulian wood (*Eusideroxylon zwagery*) exhibited in Figure 3.



(a)



(b)

Figure 3. (a) Biostatic activity test of solvent (chloroform) as control into *Sclerotium rolfsii* after 5 days of incubations, (b) Biostatic activity test of Eusiderin I from Bulian wood (*Eusideroxylon zwagery*) into *Sclerotium rolfsii* after 5 days of incubations

The inhibitory effect into colony growth of *Sclerotium rolfsii* caused by Eusiderin I in triplicate (n = 3) shown in Table 1. It can be concluded that Eusiderin I in 5 ppm had the most effective inhibitory precentage against *Sclerotium rolfsii* colony (= 49.5%).

Table 1. Precentage of Colony Inhibitory Effect of Eusiderin I against *Sclerotium rolfsii*

Compound	**Mean of Percentage of Colony Inhibitory Effect from Eusiderin I against *Sclerotium rolfsii* (r (%), n = 3) Concentration (ppm)**		
	3	4	5
Eusiderin I	7.1	21.5	49.5
	7	22	50
	7.5	21	49
Mean	**7.2**	**21.5**	**49.5**

CONCLUSION

The research had successfully isolated Eusiderin I from Bulian wood powder (*Eusideroxylon zwagery*). TLC spot, UV and IR spectra proved this conclusion. The 5 ppm Eusiderin I gave the most effective inhibition precentage because it could inhibit the *Sclerotium rolfsii* colony growth (= 49.5%).

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