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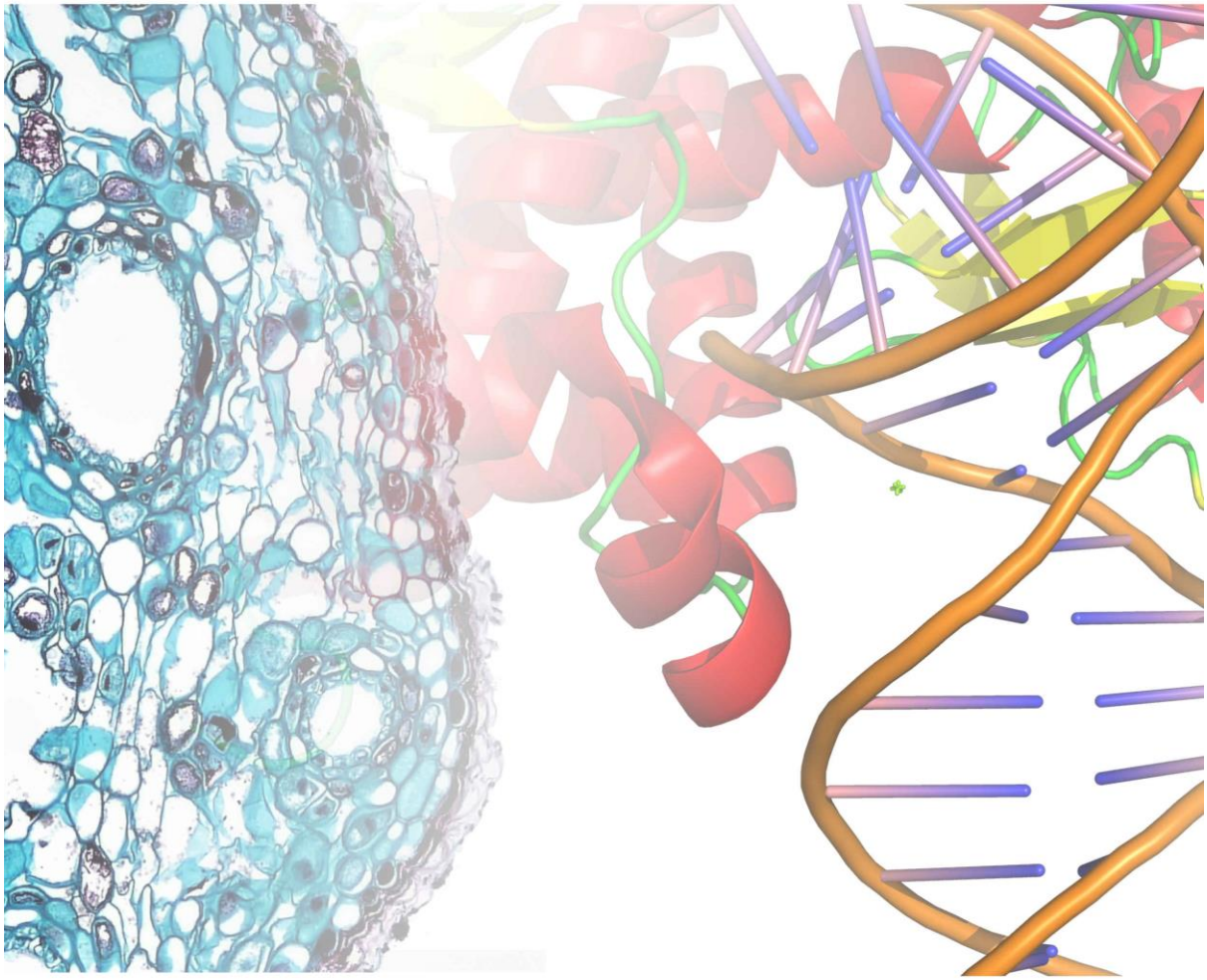

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ORIGINAL RESEARCH ARTICLE

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Luteolin, a flavonoid from *Syzygium myrtifolium* Walp.

Raden Herni Kusriani[a,*], Shinta Maulida Rosandhy[a], and Elfahmi[b]

[a]Bandung School of Pharmacy, Bandung, Indonesia
[b]School of Pharmacy, Institut Teknologi Bandung, Bandung, Indonesia 40132

ABSTRACT

A flavonoid, luteolin, was isolated from the leaves of *Syzygium myrtifolium*. The compound was purified using vacuum liquid chromatography with the help of a specific guidance for the flavonoid isolation. The chemical structure of this compound was determined based on measurements of UV, IR and NMR spectroscopic data. The occurrence of luteolin in *S. myrtifolium* is firstly reported from this study.

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Phytochemical screening was performed for alkaloid, flavonoids, quinone, saponin, tannin, and triterpenoid according to the method described in Harbone (1986).

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The dried leaves of *S. myrtifolium* (500 g) were extracted 3x24 hours with 2 L of ethanol 96%. The extract was concentrated with rotary evaporator to yield 62.65 g of a

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Fractionation was started by re-dissolving the methanol extract in methanol-water (8:2, v/v), following by liquid-liquid extraction with hexane and ethyl acetate. The evaporation resulted in 5.25 g of ethyl acetate fraction which was then subjected to a vacuum liquid column chromatography containing silica 60 H and eluted using gradient hexane, ethyl acetate and methanol. Of the 20 fractions collected, the 13rd fraction (0.92 g) was positively confirmed to contain flavonoids. This fraction was then subjected to a column chromatography over silica gel and eluted with chloroform-methanol (9:2, v/v), resulting in 38 fractions. Of them, the 5th fraction yielded yellow crystals. Final purification has obtained about 10 mg of the pure compound.

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Spectroscopy analysis was done by UV, IR and NMR. Spectral data were analysed and compared with the literature.

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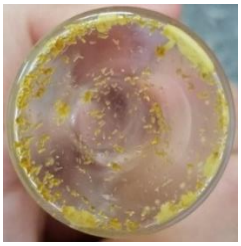

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2	163.0	-		167.6	164.0
3	104.6	5.18 (1H, d, J=6.5 Hz)		101.8	
4	179.4	-		181.0	181.8
5	163.0	-		161.3	157.6
6	99.9	6.20 (1H, d, J=1.5 Hz)	C-7, C-5, C-10, C-8	99.6	99.2
7	166.1	-		163.6	164.3
8	94.7	6.39 (1H, d, J=2Hz)	C-7, C-9, C-10, C-6	94.3	94.7
9	158.4	-		157.5	162.1
10	105.6	-		102.3	103.8
1’	145.9	-		119.8	119.0
2’	117.4	7.74 (1H, d, *J*=2.2 Hz)	C-1’, C-3’, C-6’, C-4’	112.2	113.2
3’	149.9	-		146.4	146.0
4’	158.7	-		152.0	149.7
5’	116.1	6.87 (1H, d, *J*=8.5 Hz	C-1’, C-3’, C-6’	115.8	116.8
6’	123.0	7.57 (1H, dd, *J*=2.2, 8.4 Hz)	C-3’, C-2’	118.9	120.8

To confirm the exact structure of the isolated flavonoid, data from ^{1}H and ^{13}C-NMR spectra were analysed (Table 2). The ^{1}H-NMR spectrum showed 6 methine signals. One proton of vinylic group was located downfield at 5.13 ppm. Meanwhile, five methines were further located downfield at range of 6.20 to 7.70 ppm, indicating typical of aromatic proton.

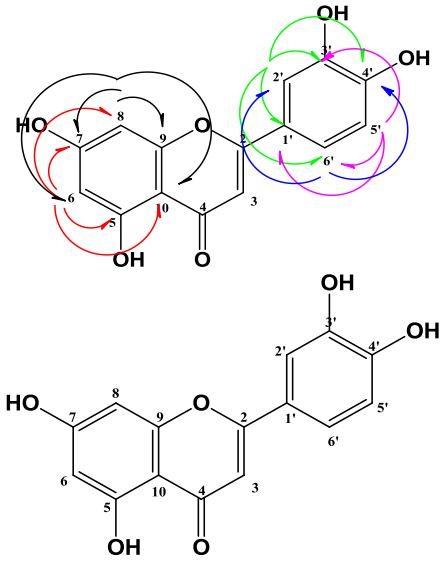

Fig. 2. Selected of the important HMBC correlations ($^{1}H \leftrightarrow ^{13}C$) (left) and the structure of the isolate (right).

The ^{13}C-NMR spectra showed 15 signals, observing between 94.7 to 166.1 ppm. Fourteen carbons of the aromatic benzene located at 94.7 to 166.1 ppm and one carbonyl at 176.5 ppm. The spectrum has aromatic protons (6.20 and 6.39) on 2 shielded aromatic carbons at 94.7 (C-8) and 99.9 ppm (C-6), implying the typical skeleton of flavonoids (rings A and B).

Further evidences for the structure were obtained by multiple-bonds correlations found in the HMBC spectra as shown in Fig. 2. After comparing their physicochemical and spectrometric data with those reported in literatures (Liu et al. 2010; Sai et al. 2013), the isolate identified as a known compound and confirmed as luteolin (Fig. 2). Luteolin was reported to have multiple pharmacological effects, such as anti-oxidant, anti-inflammatory, anti-allergy, and anti-cancer (Lin et al. 2008). Although the isolated flavonoid were known compound and has been found to occur in various species of plants, to our knowledge, no report regarding its presence and isolation from *S. myrtifolium*. This might be the first report of luteolin isolated from leaves of *S. myrtifolium*. A study from de Freitas et al. (2019) has reported the presence of luteolin in *Syzygium* sp. using MALDI-TOF spectroscopy. They also found that this compound might be responsible for α-amylase inhibitory activity of *Syzygium* sp. extract. However, which species of *Syzygium* plant they used was not clearly described.

Conclusion

A flavone, luteolin was successfully purified from leaves of S. myrtifolium using a specific guidance extraction for flavonoids.

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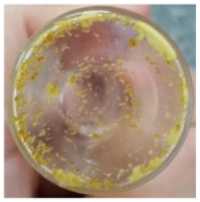

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To confirm the exact structure of the isolated flavonoid, data from ^{1}H and ^{13}C-NMR spectra were analysed (Table 2). The ^{1}H-NMR spectrum showed 6 methine signals. One proton of vinylic group was located downfield at 5.13 ppm. Meanwhile, five methines were further located downfield at range of 6.20 to 7.70 ppm, indicating typical of aromatic proton.

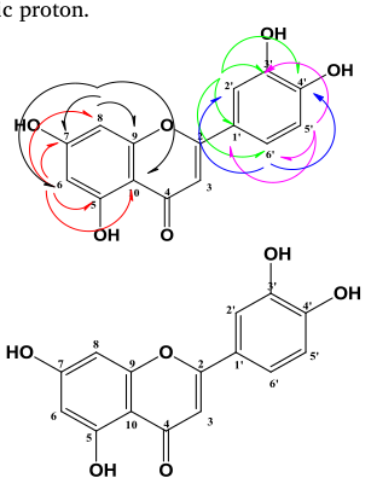

Fig. 2. Selected of the important HMBC correlations (^{1}H↔^{13}C) (left) and the structure of the isolate (right).

The ^{13}C-NMR spectra showed 15 signals, observing between 94.7 to 166.1 ppm. Fourteen carbons of the aromatic benzene located at 94.7 to 166.1 ppm and one carbonyl at 176.5 ppm. The spectrum has aromatic protons (6.20 and 6.39) on 2 shielded aromatic carbons at 94.7 (C-8) and 99.9 ppm (C-6), implying the typical skeleton of flavonoids (rings A and B).

Further evidences for the structure were obtained by multiple-bonds correlations found in the HMBC spectra as shown in Fig. 2. After comparing their physicochemical and spectrometric data with those reported in literatures (Liu et al. 2010; Sai et al. 2013), the isolate identified as a known compound and confirmed as luteolin (Fig. 2). Luteolin was reported to have multiple pharmacological effects, such as anti-oxidant, anti-inflammatory, anti-allergy, and anti-cancer (Lin et al. 2008). Although the isolated flavonoid were known compound and has been found to occur in various species of plants, to our knowledge, no report regarding its presence and isolation from *S. myrtifolium*. This might be the first report of luteolin isolated from leaves of *S. myrtifolium*. A study from de Freitas et al. (2019) has reported the presence of luteolin in *Syzygium* sp. using MALDI-TOF spectroscopy. They also found that this compound might be responsible for α-amylase inhibitory activity of *Syzygium* sp. extract. However, which species of *Syzygium* plant they used was not clearly described.

Conclusion

A flavone, luteolin was successfully purified from leaves of S. myrtifolium using a specific guidance extraction for flavonoids.

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