

Determination of Rutin Compound Content of *Moringa Folium* (*Moringa oleifera*) using Several Extraction Methods

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Article info	Abstract
History Submission: 17-11-2023 Review: 23-11-2023 Accepted: 03-12-2023 *Email: hasnaeni.hasnaeni@umi.ac.id DOI: 10.33096/jffi.v10i3.1106 Keywords: <i>Microwave-Assisted Extraction (MAE); Ultrasound-Assisted Extraction (UAE) and Reflux Extraction (RE); moringa folium</i>	<i>Extraction has been carried out from Moringa folium using the Microwave-Assisted Extraction (MAE), Ultrasound-Assisted Extraction (UAE) and Reflux Extraction (RE) methods. Moringa Folium has many uses, including as a chemopreventive agent. In this research, identification was carried out to determine the compounds in Moringa folium. Extraction uses the MAE, UAE and Reflux methods. The of chemical compound content was determined using HPLC and standardized of rutin. The identification results showed that the Moringa folium spectra were similar to the rutin spectra.</i>

I. Introduction

Moringa oleifera which belongs to the Moringaceae family, is one of the popular plants in Indonesia. *Moringa Folium* has many uses, including as a chemopreventive agent (Bichi, 2013). The aim of this study was to identify secondary metabolites from *A. moringa folium* and determine the levels of rutin standardized compounds. Other names such as limaran, moringa, ben-oil, drumstick, horseradish tree, and malunggay in the Philippines (Razis, Ibrahim and Kntayya, 2014). It is a plant native to the sub-Himalayan tracts of India, Pakistan, Bangladesh, and Afghanistan (Oyeyinka and Oyeyinka, 2018). There are several extraction methods that can be used to obtain chemical compounds from plants (Moyo *et al.*, 2011). The choice of extraction method depends on the nature of the source material as well as the target compounds (Sarker and Nahar, 2012). The nature of the material and target compound influences the choice of extraction method. The target compound needs to be known before choosing an extraction method. The compound content of plants can be influenced by the extraction method used.

II. Research Method

II.1 Materials and methods

The sample used was *Moringa Folium* and Alcohol Solvent 70 %. The sample weight of dry is

1 gram. Condition of Dependent variables; Duplicate/duplo; Condition of Independent variables. The leaves of *M. oleifera* samples, weighed 1 gram, were extracted with a variety of (samples: solvents) as follows: a. 1 : 10 W/V; b.1:20 W/V; c. 1:30 W/V. Using extraction time: 30 minute, 60 minutes, 90 minutes, and Temperature extraction: 50°C. The extraction method uses the Ultrasonic Assisted Extraction (UAE), Microwave Assisted Extraction (MAE) and Reflux Extraction methods.

II.2 Experimental Prosedure Ultrasonik Assisted Extraction

Weigh 1 g sample into a 50 mL falcon tube, Add solvent according to the ratio sample : volume. Insert the filled falcon tube to the UAE where the temperature 50. Run the extraction process according to the specified time variable. Pipette 1-2 mL of extract into a microtube. Filter with 0,2 um and put it in a new microtube. Perform HPLC analysis of all treatment result.

II.3 Experimental procedure MAE

Weigh 1 g sample into a 250 mL Erlenmeyer/ flat bottom flask. Add 10 mL solvent. Insert the microwave and connect the condenser, tighten with rotary evaporator clamps. Run the extraction process according to the specified



condition. Pipette 1-2 mL of extract into a microtube. Filter with 0,2 µm and put it in a new microtube. Perform HPLC analysis of all treatment result.

II.4 Experimental procedure Reflux Extraction

Weigh 1 g sample into a 100 mL flat bottom flask. Add etanol 70% solvent according the specified ratio. Run the extraction process according to the specified condition. Pipette 1-2 mL of extract into a microtube. Filter with 0,2 µm and put it in a new microtube. Perform HPLC analysis of all treatment result.

III. Results and Discussion

The extraction process of dried simplicia Moringa leaves has been carried out using 3 types of methods.

The extraction methods chosen were Microwave-Assisted Extraction (MAE), Ultrasound-Assisted Extraction (UAE) and Reflux Extraction (RE) respectively. Microwave-Assisted Extraction (MAE) is an extraction method as an up grade from the reflux method (Mandal, Mohan and Hemalatha, 2007; Rocha and Noreña, 2020). The working principle of MAE is that microwaves help break down the simplicia cell walls. Microwaves surround the sample so that the cell walls break and the active substance comes out and is drawn in by the solvent. MAE is a modern extraction method

with a very short extraction time. As well as, the Ultrasound-Assisted Extraction (UAE) extraction method is a modern extraction method. The UAE method is up grade for the maceration method. In the UAE, the longer the extraction time, the higher the yield, the greater the solvent volume, the more active substances are extracted. UAE is suitable for thermolabile active substances. The working principle of UAE is to speed up the extraction process with the help of ultrasonic waves. Ultrasonic waves provide pressure (cavitation) so that cell walls break quickly. Cavitation is a bubble that causes cell walls to break down. Reflux extraction (RE) is a conventional extraction method (Dewick, 2009).

In this study, rutin measurement of standardized compound levels determined compound levels by creating a regression equation for AUC measurements from HPLC. The results can be seen in in Table 1. In MAE extraction, the concentration of solvent used and the extraction time are varied. In the UAE and RE methods the extraction time is varied. The extraction results can be seen in Table 2. The results of measuring levels using HPLC show that the percentages are not much different. The chromatogram results can be seen in Figure 1. The results of the HPLC chromatogram of Moringa folium extract showed that there were the same compounds as rutin compounds.

Table 1. Linearity of rutin compounds

Concentration	Replication	AUC	Average
15.625	1	63202.23	59373.41
	2	55544.59	
31.25	1	113901.51	115613.5205
	2	117325.531	
62.5	1	247378.751	246537.595
	2	245696.439	
125	1	537176.113	545026.4335
	2	552876.754	
250	1	1151276.755	1196864.631
	2	124252.507	
500	1	2592238.93	2583802.48
	2	2575366.029	
Regression equation Y= 5242.1X - 68837		Linear Concentration 15.625 – 500	R² 0.9984

Tabel 2. Results of rutin level measurement

Sample	Extraction Methods	Treatment	Rutin Levels (mg/ml)	Rutin Levels (%)
Moringa Folium	Ultrasound-Assisted Extraction (UAE)	Time Extraction (minutes)		
		30	0.57	0.06
		60	0.59	0.06
		90	0.57	0.06
		Solvent Volume (mL)		
		10	0.57	0.06
	20	0.64	0.06	
	30	0.87	0.09	
		Microwave-Assisted extraction (MAE)	Water	Type of Solvent 0.34

	Alkohol 80%	0.44	0.04
	Alkohol 60%	0.64	0.06
	Alkohol 40%	0.54	0.05
	Alkohol 20%	0.41	0.04
Refluks Extraction (RE)	30	0.60	0.06
	60	0.64	0.06
	90	0.28	0.02

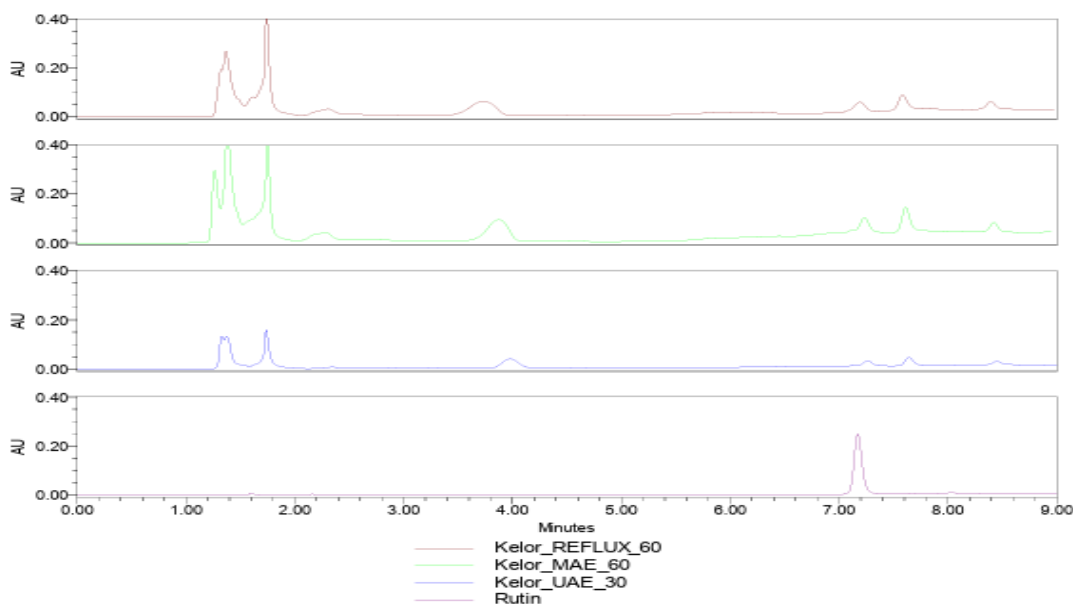


Figure 2. Rutin compound chromatogram on Moringa sample from several extraction methods

IV. Conclusions

The results of the HPLC chromatogram of Moringa folium extract showed that there were the same compounds as rutin compounds.

V. Acknowledgment

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