UNIVERSITI TEKNOLOGI MARA

EFFECT OF PROCESSING PARAMETER ON CHEMICAL COMPOSITION OF *CLITORIA TERNATEA* EXTRACT

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Abstract

Clitoria Ternatea is an herbaceous plant that contain many bioactive compounds for the health benefits. The processing parameter in extraction method is crucial to obtain its bioactive compound which contribute to its antioxidant properties. Therefore, this study was conducted to determine the effect of different processing parameter on the chemical composition which is the total antioxidant compounds. Three different processing parameters were investigated which are different temperature of oven drying (40°C, 50°C, 60°C, 70°C) and the detection method (GCMS, HPLC, UHPLC, FCR); different drying method (oven, microwave, air, freeze) and the determination method (GCMS, HPLC, FTIR, LCMS); and different types of solvent (methanol, ethanol, hexane, acetone) and the detection method (HPLC, GCMS, UHPLC, LCMS). This study was carried out by using Taguchi method in Minitab software 14. The results were measured by observing the signal to noise ratios to obtain which processing parameter is significant to the total antioxidant compounds. Other than that, by considering the P-value and the delta value the most significant effect can be determined. The results indicate that the temperature of oven drying is more significant than its detection method towards the total antioxidant. The optimum temperature of oven-drying for the extraction of *C. Ternatea* flower obtained is at 70°C. Furthermore, the effect of different drying method gives more impact on the antioxidant activity especially air drying. The different uses of solvent give a significant effect that can influence the antioxidant activity during extraction. Using methanol as a solvent will preserve the bioactive compound in *C. Ternatea* extract. In a nutshell, the processing parameters which are temperature, drying method, and solvent will affect the total antioxidant compounds of the *C. Ternatea* extract.

Keywords: *Clitoria Ternatea*, Temperature, Drying Method, Solvent, Total Antioxidant

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1.0 Introduction

1.1 Background of study

Clitoria Ternatea which commonly known as butterfly pea or telang (Malaysia) originates from the Fabaceae family. It is a perennial herbaceous plant that grows as a vine and grows well in moist and neutral soil. *C. Ternatea* has solitary flowers with a vivid deep blue with light-yellow markings. The flowers are commonly used as a natural colourant, ranging from beverages to the food industry, and are sensitive to changes in temperature and pH. Besides that, the blue colour from nasi kerabu is from the flower itself. Moreover, because of the flavour and nutritional value it has, this plant may serve as a food source for livestock.

Parts of the plant are thought to possess sought-after therapeutic values such as analgesic, antipyretic and anti-inflammatory properties in its leaves, flowers, and roots. From previous studies, many bioactive compounds such as total antioxidant can be found in the extract. In Butterfly Pea flowers, flavonoids, anthocyanins, and phenolic compounds stimulate antioxidant function, which helps minimize oxidative stress induced by disease-causing and free radical ageing.

1.2 Problem statement

There are many ways to study the antioxidant activity in the *C. Ternatea* extract. Previous related research and journal have been studied to obtain information regarding the effect of processing parameters on the chemical composition of *C. Ternatea* extract. Most of the findings had a different type of procedure and also processing parameters, for example, the temperature differences, types of solvent used, and more. With that, all the total antioxidants extracted are differ from one another. Therefore, this study is conducted to analyze the effect of processing parameters on the total antioxidant compounds in the *C. Ternatea* extract including the best parameter that gives the highest total antioxidant value.

1.3 Objectives

1. To identify whether the temperature differences of oven drying effect the extraction yield of *C. Ternatea*.
2. To determine the effect of using different drying method towards the extraction yield of *C. Ternatea*.
3. To study the effect of using different types of solvent towards the extraction yield of *C. Ternatea*.

2.0 Methodology

2.1 Methodology student 1 (Nur Lina Syahirah binti Mustapa)

Taguchi method

In this research, Minitab software 14 is used by performing the Taguchi method. This method is used to optimize the performance characteristics with a combination of design parameters. Taguchi method applies a special design of orthogonal array to learn the whole parameters space with just a limited number of experiments (Das *et al.*, 2010). Based on the orthogonal array, the experiments that may increase the cost and time can be reduced. In this study, the L_{16} orthogonal array with four levels was selected to obtain the most significant factor towards the response. The factors selected are

temperature at 40°C, 50°C, 60°C, 70°C and detection method on total antioxidant of *C. Ternatea* extract includes GCMS, HPLC, UHPLC, FCR (Table 1). These data are extracted from some journals including the response which is the amount of total antioxidant components. Table 2 shows the design matrix of the experiment given by the Minitab software 14. Figure 1 provides a description of the Taguchi method. In this method, the response quality, which is the amount of total antioxidant is measured by the uniformity of its performance (Syed Hassan *et al.*, 2016).

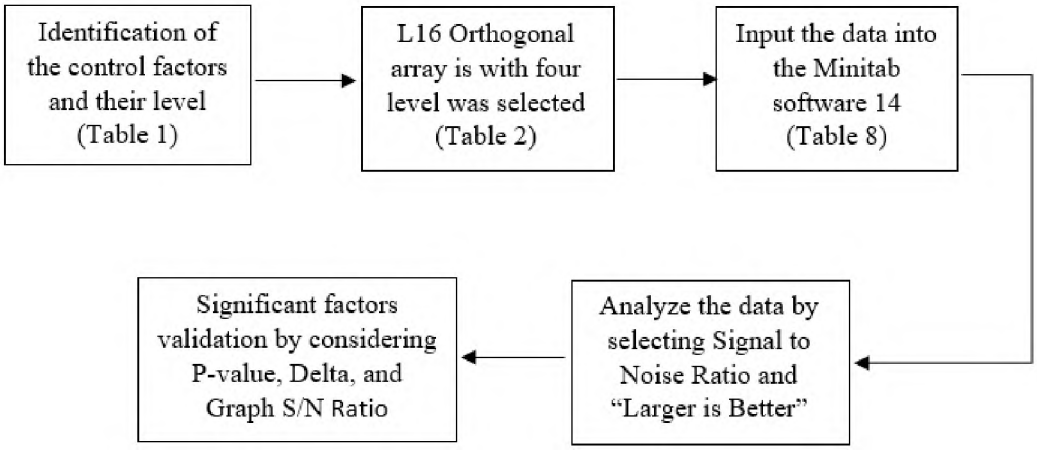

Figure 1. The description of Taguchi method.

Table 1. Control factors and their levels.

Control factors	Level 1	Level 2	Level 3	Level 4
Temperature (°C)	40	50	60	70
Detection Method	GCMS	HPLC	UHPLC	FCR

Table 2. Design matrix of experiments.

	Control factors	
No	Temperature (°C)	Detection Method
1	40	GCMS
2	40	HPLC
3	40	FCR
4	40	UHPLC
5	50	GCMS
6	50	HPLC
7	50	FCR
8	50	UHPLC
9	60	GCMS
10	60	HPLC
11	60	FCR
12	60	UHPLC
13	70	GCMS