



Comparison of Standardization of Ash Content of Butterfly Pea Simplicia (*Clitoria ternatea L.*): A Systematic Literature Review

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ABSTRACT

Butterfly pea flower (*Clitoria ternatea L.*) has been used extensively in traditional medicine due to its various health benefits. The ash content in the butterfly pea simplicia can provide important information about the mineral content and residues present in the material. This study aimed to carry out a systematic review in order to explore a comparison of the standardization of ash content of the butterfly pea flower simplicia. The literature search process was carried out on various databases (PubMed, Web of Sciences, EMBASE, Cochrane Libraries, and Google Scholar) regarding the comparison of standardization of ash content of *Clitoria ternatea*. This study follows the preferred reporting items for systematic reviews and meta-analysis (PRISMA) recommendations. Several studies have shown variations in the ash content of butterfly pea flowers (*Clitoria ternatea L.*). The ash content of the butterfly pea flower (*Clitoria ternatea L.*) is in the range of 3.8 ± 0.42 mg/100 gram dry weight to 10.93 ± 0.29 mg/100 gram dry weight. Each plant has unique chemical characteristics, including different mineral content. Therefore, the ash content may vary between different plant species.

1. Introduction

The butterfly pea flower, also known as *Clitoria ternatea*, is a plant that has economic value and is widely used in the food, pharmaceutical, and cosmetic industries. Standardization of ash content is a process to determine the amount of ash contained in a sample of butterfly pea flowers. Ash is the remains obtained after the sample is burned at high temperatures. The ash content in butterfly pea flowers can come from minerals, inorganic elements, and organic materials that are not burnt.¹⁻³

Determining the ash content in butterfly pea flowers is important for several reasons. First, the ash content can provide information about the purity of raw materials. The lower the ash content, the better

the quality of the butterfly pea flower. Second, the ash content can also affect the quality of products that use butterfly pea flowers as raw material. For example, in the food industry, high ash content can reduce sensory qualities such as taste, aroma, and texture of the final product. Standardization of the ash content of butterfly pea flowers is usually carried out by the burning method. The butterfly pea flower sample will be burned in a muffle furnace at a high temperature so that the organic residues are burned, and only ashes are left. The ash is then weighed, and its percentage is calculated against the initial sample weight. The results of measuring the ash content can be compared with predetermined standards to

determine whether the butterfly pea flower meets the desired quality criteria.^{4,5}

In the industry, standardizing the ash content of butterfly pea flowers can help maintain product consistency and reliability. By knowing the proper ash content, manufacturers can exercise effective quality control and ensure that the butterfly pea used in their products meets the specified requirements.⁶⁻⁸ This study aimed to carry out a systematic review in order to explore a comparison of the standardization of ash content of the butterfly pea simplicia.

2. Methods

The literature search process was carried out on various databases (PubMed, Web of Sciences, EMBASE, Cochrane Libraries, and Google Scholar) regarding the comparison of standardization of ash content of *Clitoria ternatea*. The search was performed using the terms: (1) "ash content" OR

"standardization" OR "quality test" OR "*Clitoria ternatea*" AND (2) "non-specific standardization". The literature is limited to preclinical studies and published in English. The literature selection criteria are articles published in the form of original articles, an experimental study about the comparison of standardization of ash content of *Clitoria ternatea*, the control group only received liquid without therapeutic effect or no treatment, studies were conducted in a timeframe from 2000-2023, and the main outcome was a comparison of standardization of ash content of *Clitoria ternatea*. Meanwhile, the exclusion criteria were animal models that were not related to the comparison of standardization of ash content of *Clitoria ternatea*, the absence of a control group, and duplication of publications. This study follows the preferred reporting items for systematic reviews and meta-analysis (PRISMA) recommendations.

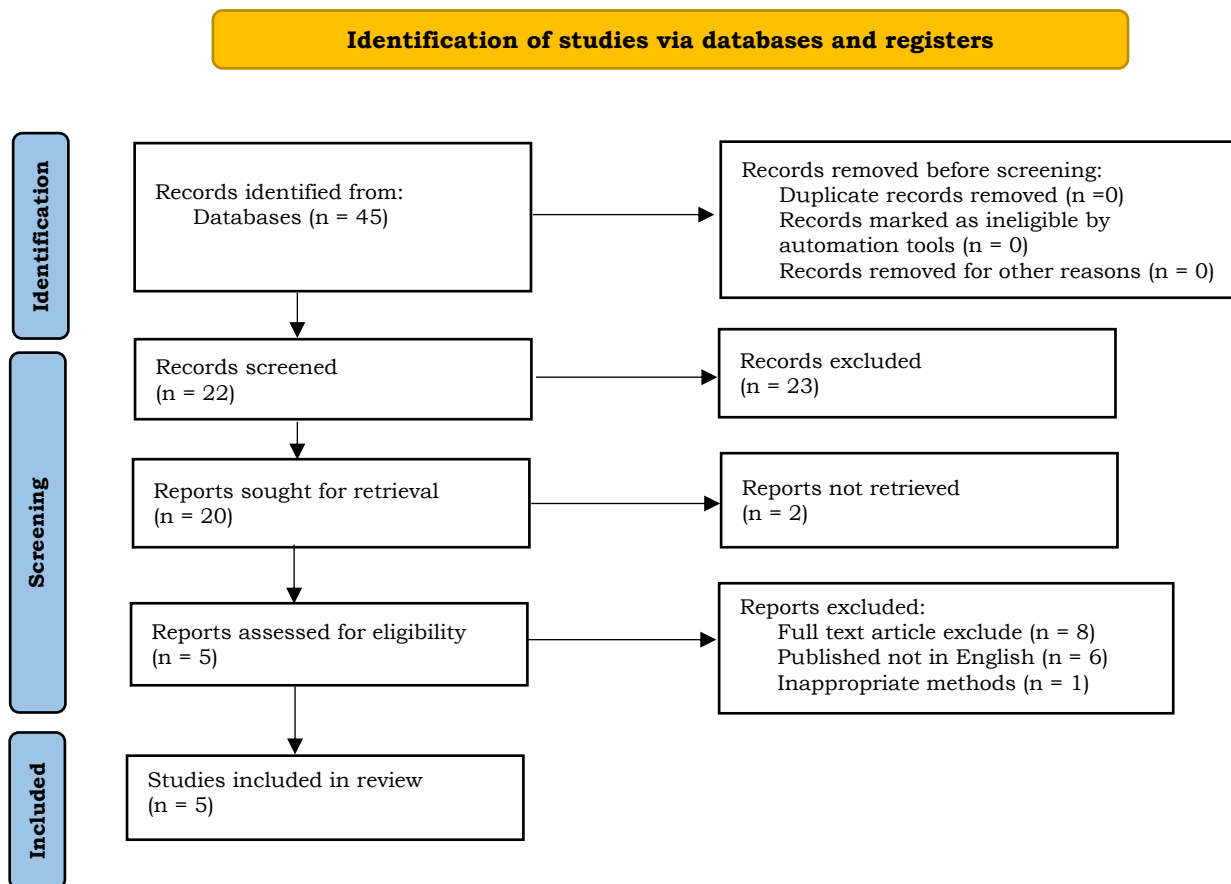


Figure 1. Research PRISMA diagram.

3. Results and Discussion

Ash content of butterfly pea flower (*Clitoria ternatea L.*)

Ash content refers to the amount of residual solids that remain after the organic matter has burned. It is often used in the context of chemical analysis or testing to measure the amount of solid minerals and metals present in a sample. Ash content can be expressed as a percentage by weight, which indicates the amount of ash produced compared to the total weight of the samples analyzed. Ash content can be used in various fields, such as the food industry, fuel analysis, and the waste treatment industry. For example, in the food industry, the ash content of a food can provide information about the amount of minerals and salts it contains. Ash content measurement is done by burning the sample at a high temperature so that the organic matter is burned while the ash remains. The ash is then weighed and compared to the initial sample weight to calculate the ash content.^{9,10}

Ash content can be used to evaluate the quality of a product. For example, in the food industry, ash content can give an indication of unwanted mineral contamination or additives used in the production process. Ash content can be used in scientific research to study the chemical composition of a sample. Information about the minerals and metals contained in the ash can provide insight into natural resources, the environment, or geology. In the sewage treatment industry, ash content can be used to monitor and measure the effectiveness of waste treatment processes. High ash content in the waste can indicate success in removing contaminants or unwanted substances. Several industrial sectors have regulatory standards related to ash content in certain products or materials. Ash content testing is used to ensure regulatory compliance and ensure the desired quality.¹¹⁻¹³

High ash content can indicate that the material contains a lot of minerals or inorganic substances. This mineral content can come from the soil where the plant grows or from the parts of the plant used that are naturally rich in minerals. High ash content can

also indicate contamination or impurities in the material. Contamination can occur during the process of collecting, storing, or processing plant materials, either intentionally or unintentionally. In some cases, a high ash content may indicate a low quality of the plant material or simplicia. For example, in the pharmaceutical or food supplement industry, a high ash content in a raw plant material can be considered an indicator of poor quality because it increases the content of unwanted non-active substances.¹⁴⁻¹⁶

Several studies have shown variations in the ash content of butterfly pea flowers (*Clitoria ternatea L.*). The ash content of butterfly pea flower (*Clitoria ternatea L.*) is in the range of 3.8 ± 0.42 mg/100 gram dry weight to 10.93 ± 0.29 mg/100 gram dry weight. Each plant has unique chemical characteristics, including different mineral content. Therefore, the ash content may vary between different plant species. Plant parts used in simplicia, such as roots, leaves, stems, or flowers, can have different mineral compositions. Some parts of the plant may be rich in certain minerals, which may result in higher ash content. The simplicia drying method can affect the ash content. If the drying process is not optimal or if there is exposure to excessive heat, water loss, and mineral concentrations may increase, thereby increasing the ash content. Soil conditions where plants grow can affect the mineral content in simplicia. Soils that are rich in minerals can produce plants with higher ash content. Improper storage of simplicia can cause changes in chemical composition, including mineral content. In the event of contamination or exposure to excessive moisture, this may affect the ash content.¹⁷⁻²⁰

4. Conclusion

The ash content of butterfly pea flower (*Clitoria ternatea L.*) is in the range of 3.8 ± 0.42 mg/100 gram dry weight to 10.93 ± 0.29 mg/100 gram dry weight.

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