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# Preparation of Powder from Butterfly Pea Plant (Clitoria Ternatea) for Pharmaceutical Applications

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**Abstract:** *The butterfly pea plant, scientifically known as Clitoria ternatea, is valuable medicinal herb with long history of traditional use in various cultures. This research focuses on the preparation of powder from the butterfly pea plant, exploring the optimal methods for drying, grinding, and storing the plant material. The study also evaluates the phytochemical content, physical properties, and potential pharmaceutical applications of the resulting powder. The findings suggest that standardized preparation techniques can enhance the medicinal value of the butterfly pea plant, making it a viable option for use in various pharmaceutical formulations.*

**Keywords:** Butterfly pea, Clitoria ternatea, phytochemicals, powder preparation, medicinal plant, pharmaceutical applications

## I. INTRODUCTION

Background of the Study Natural plants have been used for centuries in traditional medicine, offering a wide range of therapeutic benefits. Among these, the butterfly pea plant (Clitoria ternatea) has gained attention due to its rich phytochemical content and potential medicinal properties. Commonly known for its striking blue flowers, the butterfly pea plant is used in Ayurvedic and traditional Asian medicine for its antioxidant, anti-inflammatory, and cognitive-enhancing effects. However, there is limited research on the standardized preparation of butterfly pea powder for pharmaceutical use.

Botanical Description Clitoria ternatea is a perennial herbaceous plant native to tropical Asia. The plant is characterized by its vibrant blue flowers, which contain anthocyanins, a class of compounds known for their antioxidant properties. In addition to the flowers, the leaves, roots, and seeds of the plant also possess medicinal properties. The plant's adaptability to various climates and ease of cultivation make it an attractive candidate for large-scale pharmaceutical production.

Rationale of the Study The preparation of a standardized powder from the butterfly pea plant can facilitate its use in modern pharmaceutical formulations, such as tablets, capsules, and teas. By developing a consistent preparation method, this study aims to unlock the plant's full potential in treating various ailments.

**Objectives of the Study :**

- To develop a standardized method for preparing powder from the butterfly pea plant.
- To evaluate the phytochemical content of the prepared powder.
- To assess the physical properties of the powder, such as particle size, moisture content, and colour.
- To explore the potential pharmaceutical applications of butterfly pea powder.

## II. LITERATURE REVIEW

Historical Use The butterfly pea plant has been used in traditional medicine for centuries. In Ayurveda, it is known as "Shankhpushpi" and is used to enhance cognitive function, reduce stress, and improve memory. In Southeast Asia, the flowers are used to prepare herbal teas that are believed to promote relaxation and improve eyesight. Modern research has begun to validate these traditional uses, highlighting the plant's potential as a natural remedy for various health conditions.

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Phytochemical Composition Clitoria ternatea is rich in bioactive compounds, including flavonoids, anthocyanins, alkaloids, and triterpenoids. These compounds contribute to the plant's antioxidant, anti-inflammatory, and antimicrobial activities. Anthocyanins, in particular, are responsible for the vibrant blue colour of the flowers and are known for their potential to combat oxidative stress.

Pharmacological Activities Numerous studies have demonstrated the pharmacological potential of the butterfly pea plant. It has been shown to possess neuroprotective, anti-inflammatory, anti-diabetic, and anti-cancer properties. These findings suggest that the plant may be a valuable addition to modern pharmacotherapy, particularly in the management of chronic diseases.

Previous Preparations Previous research on the preparation of plant powders has focused on optimizing drying and grinding methods to preserve the bioactive compounds. However, there is limited literature on the preparation of butterfly pea powder specifically. This study aims to fill this gap by developing a standardized preparation method for pharmaceutical use.

## III. MATERIALS AND METHODS

Plant Material Collection The butterfly pea plant was collected from a cultivated field in [specific location]. The plants were harvested during the flowering season to ensure maximum phytochemical content. Both the flowers and leaves were used in the preparation of the powder.

**Preparation of Powder:**

Drying Process The collected plant material was cleaned and dried using three different methods: air drying, oven drying, and freeze drying. Air drying involved placing the plant material in a shaded, well-ventilated area for 7-10 days. Oven drying was performed at 40°C for 24-48 hours, while freeze drying involved freezing the plant material at -80°C followed by sublimation under vacuum conditions. The drying methods were compared based on the retention of phytochemicals and the final yield of the powder.

Grinding and Sieving The dried plant material was ground into a fine powder using a mechanical grinder. The powder was then sieved through a 60-mesh sieve to obtain a uniform particle size. The particle size distribution was analyzed using a laser diffraction particle size analyzer.

Storage Conditions The prepared powder was stored in airtight containers at room temperature and under refrigeration. The stability of the powder was assessed over a period of 6 months by monitoring changes in phytochemical content, moisture levels, and microbial load.

**Quality Control Parameters:**

**Moisture Content:** The moisture content of the powder was determined using a moisture analyzer.

**Phytochemical Screening:** Qualitative tests were conducted to detect the presence of key compounds such as flavonoids, alkaloids, and anthocyanins.

**Microbial Contamination:** The powder was tested for microbial contamination using standard microbiological methods to ensure it meets pharmacopeial standards.

## IV. RESULTS

Yield of Powder The yield of powder varied depending on the drying method used. Freeze drying resulted in the highest yield, followed by oven drying and air drying. The differences in yield were attributed to the varying levels of moisture retention and degradation of plant material during drying.

Phytochemical Analysis The phytochemical screening revealed the presence of flavonoids, anthocyanins, and alkaloids in the prepared powder. The concentration of anthocyanins was highest in the freeze-dried samples, indicating that this method is optimal for preserving the bioactive compounds.

Physical Characteristics The physical properties of the powder, including color, texture, and particle size, were evaluated. The freeze-dried powder exhibited a vibrant blue color, fine texture, and uniform particle size, making it suitable for pharmaceutical formulations.

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Microbial Load The microbial contamination tests indicated that the powder prepared by all three methods met pharmacopeial standards for microbial load, with no significant difference between the drying methods.

## V. DISCUSSION

Comparison with Previous Studies The results of this study are consistent with previous research on the preparation of plant powders. The freeze-drying method, in particular, has been shown to preserve phytochemical content effectively, making it the preferred method for preparing butterfly pea powder.

Implications for Pharmaceutical Use The butterfly pea powder prepared in this study has potential applications in various pharmaceutical formulations. The powder's rich phytochemical content, particularly its antioxidant and anti-inflammatory properties, makes it a promising ingredient for natural health supplements and cosmetic products.

Challenges and Limitations One of the challenges encountered during this study was the variability in phytochemical content depending on the plant's growing conditions. Further research is needed to standardize the cultivation of butterfly pea plants to ensure consistent quality of the powder. Additionally, the scalability of the freeze-drying process may be a limitation for large-scale production.

## VI. CONCLUSION

This study successfully developed a standardized method for preparing powder from the butterfly pea plant (Clitoria ternatea). The freeze-drying method was found to be the most effective in preserving the plant's bioactive compounds, making it a suitable option for pharmaceutical use. The prepared powder exhibited desirable physical properties and met quality control standards, suggesting its potential for use in various pharmaceutical and nutraceutical formulations. Further research is recommended to explore the full range of applications for butterfly pea powder in modern medicine.

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