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# PHYSICOCHEMICAL STANDARDIZATION OF *JAMBU* FLOWERS (*SYZYGIUM CUMINI)* (L) SKEELS

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## ABSTRACT

**Introduction-** Standardization of herbal raw materials is essential to ensure their identity, purity, safety, and quality. *Syzygium cumini* (L) Skeels belongs to family Myrtaceae, commonly known as *Jambu*, possesses significant medicinal value. However, systematic physicochemical evaluation of its flowers is limited. The present study aims to establish baseline quality control parameters for *Jambu* flowers. **Methods-** Dried flower powder of *Syzygium cumini* (L) Skeels was subjected to standard pharmacognostic evaluation. Physicochemical parameters including moisture content, total ash, acid-insoluble ash, water soluble ash, extractive values (water and alcohol soluble), pH, swelling index, foaming index, and fluorescence characteristics were determined according to established procedures. **Results-** The analysis revealed acceptable moisture content and low total ash and acid insoluble ash values, indicating minimal inorganic contamination and good quality raw material. Water-soluble extractive values were higher than alcohol soluble extractives, suggesting the predominance of polar phytoconstituents. The fluorescence analysis showed characteristic color changes under visible and ultraviolet light, supporting authentication of the crude drug. **Discussion-** The findings provide important baseline physicochemical standards for identification and quality assessment of *Jambu* flowers. These parameters can serve as reference data for quality control, standardization, and future phytochemical and pharmacological investigations of *Syzygium cumini* (L) Skeels.

**KEYWORDS:** *Jambu* flower, physicochemical analysis, pharmacognosy, standardization, *Syzygium cumini* (L) Skeels.

## INTRODUCTION

Herbal drugs continue to play a significant role in traditional and complementary medicine systems worldwide. Ensuring quality, safety and reproducibility of plant based materials requires proper standardization. Physicochemical evaluation is a fundamental step in the authentication of crude drugs and detection of adulteration. *Jambu*, botanically identified as *Syzygium cumini* (L) Skeels belongs to the genus *Syzygium* of the family Myrtaceae. The plant is widely cultivated in tropical regions and is known for its antioxidant, antimicrobial and astringent properties. While fruits and leaves of *Syzygium cumini* (L) Skeels have been extensively investigated limited scientific data are available regarding the standardization of its flowers. The present study was undertaken to establish physicochemical standards for *Jambu* flowers to support their identification and quality assessment in herbal formulations.

## MATERIALS AND METHODS

### Plant Material Collection and Authentication

- Fresh flowers of *Syzygium cumini* (L) Skeels were collected from mature tree and authenticated by a Department of Dravyaguna Vigyan. The flowers were shade dried, pulverized to coarse powder and stored in airtight containers for analysis.

### Physicochemical Analysis

- All determinations and analysis were carried out in triplicate using standard pharmacopoeial methods.

### Determination of Moisture Content or Loss on Drying

- Approximately 3grms of powdered material was dried at 105°C in a hot air oven until constant weight was achieved. Percentage loss on drying was calculated.

### Determination of Ash Values

- **Total Ash-** Powdered sample was incinerated at 450$^{o}$ to 600°C until carbon free ash was obtained.
- **Acid Insoluble Ash-** Total ash was treated with dilute hydrochloric acid; the insoluble residue was collected, ignited and weighed.
- **Water Soluble Ash-** Total ash was boiled with distilled water; insoluble matter was filtered and weighed.

### Extractive Values

- **Alcohol Soluble Extractive-** 5 grms of powdered drug was macerated with ethanol for 24 hours with intermittent shaking. An aliquot of the filtrate was evaporated to dryness and weighed.
- **Water Soluble Extractive-** Same procedure was followed using distilled water.

### pH Determination

- A 1% aqueous solution of the powdered drug was prepared and pH was measured using a calibrated digital pH meter.

### Swelling Index

- One gram of powdered material was mixed with 25 ml of water in a graduated cylinder and allowed to stand for 24 hours. The increase in volume was recorded.

**Foaming Index**

- One gram of powder was boiled with 100 ml of water and filtered.
- Serial dilutions were prepared and shaken in graduated cylinders.
- Foam height after 15 minutes was measured.

## RESULTS

The physicochemical parameters obtained are tabulated below;

**Table 1.**

| SL NO | PARAMETER | OBSERVED VALUE |
|---|---|---|
| **1.** | Moisture Content | 7.8 % |
| **2.** | Total Ash | 6.4 % |
| **3.** | Acid-Insoluble Ash | 1.5 % |
| **4.** | Water-Soluble Ash | 3.1 % |
| **5.** | Alcohol-Soluble Extractive | 12.6 % |
| **6.** | Water-Soluble Extractive | 17.9 % |
| **7.** | pH (1% solution) | 6.1 |
| **8.** | Swelling Index | 1.4 ml |
| **9.** | Foaming Index | Less than 100 |

## DISCUSSION

The evaluated physicochemical parameters provide important information regarding the identity, purity and quality of the crude drug sample.

**Moisture Content (7.8%)-** The moisture content of the sample was found to be 7.8% which is within acceptable pharmacopoeial limits for most crude drugs. Low moisture content is desirable because, It prevents microbial growth (bacteria and fungi). It reduces enzymatic degradation. It increases shelf life and storage stability. Since the value is below 10%, the sample is considered adequately dried and suitable for long term storage.

**Total Ash (6.4%) -** The total ash value (6.4%) indicates the total amount of inorganic material present after incineration. This includes physiological ash (natural mineral content of the plant) Non physiological ash (extraneous matter such as sand or soil). A moderate total ash value suggests that the drug contains a normal amount of inorganic constituents and is relatively free from excessive adulteration.

**Acid Insoluble Ash (1.5%)-** The acid insoluble ash (1.5%) represents mainly silica and siliceous earth. A low value indicates minimal contamination with sand or soil. It reflects good cleaning and processing of the crude drug. Thus, the sample shows minimal earthy impurities.

**Water Soluble Ash (3.1%)-** The water soluble ash value (3.1%) indicates the amount of inorganic constituents soluble in water. It helps determine the presence of water soluble minerals. The difference between total ash and water soluble ash can indicate water insoluble inorganic matter. The observed value suggests a moderate presence of water soluble inorganic salts.

**Alcohol Soluble Extractive (12.6%)-** The alcohol soluble extractive value (12.6%) indicates the presence of alcohol-soluble phyto constituents such as; Alkaloids**,** Glycosides**,** Flavonoids**,** Resins**,** Tannins**.** The alcohol extractive value suggests the presence of significant secondary metabolites that may contribute to the therapeutic activity of the drug.

**Water Soluble Extractive (17.9%)-** The water soluble extractive value (17.9%) is higher than the alcohol soluble extractive value. This indicates; abundant water soluble constituents such as sugars, tannins, glycosides, mucilage and phenolic compounds. The drug may be more suitable for aqueous preparations like decoctions and infusions.The higher water extractive value suggests better solubility of active principles in water.

**pH (1% Solution) (6.1)-** The pH of the 1% solution was found to be 6.1 indicating a slightly acidic nature. This pH is close to neutral and generally safe for internal consumption. Slight acidity may be due to the presence of organic acids or phenolic compounds. The pH value suggests good compatibility for oral formulations.

**Swelling Index(1.4 ml)-** The swelling index of 1.4 ml indicates the presence of mucilage or gum content. Swelling capacity reflects water absorbing properties. Moderate swelling suggests the drug may possess demulcent or bulk-forming properties. However, since the value is not very high, mucilage content appears moderate.

**Foaming Index (Less than 100) -** The foaming index was found to be less than 100, which indicates, low Saponin content. Minimal foam forming constituents.

## CONCLUSION

The present physicochemical evaluation of the flowers of *Syzygium cumini* (L) Skeels establishes essential baseline parameters for their identification, standardization, and quality assessment. The findings indicate that the crude drug sample is adequately dried, stable, and contains acceptable levels of inorganic matter with minimal siliceous contamination. The extractive values reveal a substantial presence of water soluble and alcohol soluble phytoconstituents, suggesting the richness of bioactive compounds. Furthermore, the moderate mucilage content and low saponin content contribute to understanding the plant's therapeutic potential and formulation characteristics. Overall, the evaluated physicochemical parameters confirm that the crude drug meets acceptable pharmacognostic standards of quality and purity. These results provide reliable reference data for quality control, authentication, and future phytochemical and pharmacological investigations. The standardization of *Jambu* flowers will help ensure the safety, efficacy, and consistency of herbal formulations derived from this plant, thereby supporting their medicinal application and further formulation development.

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