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PHYSICOCHEMICAL STANDARDIZATION AND METAL ANALYSIS OF SYZYGIUM CUMINI (JAMUN) PLANT

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ABSTRACT

Syzygium cumini, known as jamun / jambul, is an evergreen tropical tree in the flowering plant family Myrtaceae. Traditionally the jambul fruits, leaves, seeds and bark are all used in ayurvedic medicine. The bark contains tannins and carbohydrates, accounting for its long- term use as an astringent. Its seed has conventionally been used in India for the management of different diseases. The seeds are claimed to contain alkaloid, jambosine, and glycoside jambolin or antimellin, which halts the diastatic conversion of starch into sugar. The plant is rich in compounds containing anthocyanins, glucoside, ellagic acid, isoquercetin, kaemferol and myrecetin. Physicochemical parameters in plants give valuable information and help to access quality of the sample. Metals are a matter of concern in the herbal drugs, especially as certain plants have the tendency of storing metals from the soil, polluted water and atmosphere. The presence of metals was thus carried out using Atomic Absorption Spectroscopy (AAS).

KEYWORDS: *Syzygium cumini*, Physicochemical standardisation, Metal content, Atomic Absorption Spectroscopy.

1. INTRODUCTION

Syzygium cumini popularly called as Jambul (Marathi) & Java Plum (in English) is native to India and indigenous part of Indian folk remedies. It is slow growing tree, medium to large sized up to height of 30mt. Leaves are like turpentine and have soothing aroma. Young pinkish leaves are changing into leathery, glossy and dark green with a yellow coloured midrib. Jamun fruit is oval in shape. In immature stage, the fruit is green in colour and it changes to crimson black with ripening. During storage, proper ventilation, humidity control,

suitable temperature and light conditions should be ensured to maintain their original pharmacological action.

2. MATERIALS AND METHOD

2.1 COLLECTION OF PLANT

The plant was collected in Dadar, Mumbai, Maharashtra, India in the month of May. The plant was authenticated and voucher specimen no. TKC-1 was deposited in The Botanical Survey of India, Pune, India.

2.2 PREPARATION OF PLANT MATERIAL

The plant was washed thoroughly with tap water. Later on it was dried using a paper to remove excess of water and then kept in a shade room at normal room temperature to avoid loss of phytoconstituents from direct exposure to sunlight. The shade dried material was powdered using grinder and sieved through an ASTM 80 mesh. It was then homogenized to fine powder and stored in an air-tight container for further analysis.

2.3 ASH CONTENT

2.3.1 Total ash content

Dried powder was accurately weighed (2.0 g) in a tarred Silica dish and incinerated completely in a muffle furnace at 700° C till ash became grey in colour (i.e. Carbon free ash). Ash was cooled in desiccators and weighed. The process was repeated (ignition, cooling and weighing) for constant weight.

2.3.2 Acid insoluble ash

Dried powder was accurately weighed (2.0 g) in a tarred Silica dish and incinerated completely in a muffle furnace at 700° C till ash became grey in colour (i.e. Carbon free ash). After cooling, 25mL of 2M HCl was added, and was covered with watch glass and boiled on a water bath for 5 minutes. It was allowed to cool, and was filtered through Whatman filter paper No.41. The residue was then washed with hot water till washings were free from chloride (no white ppt with AgNO3 solution). The filter paper and the residue were put in a dish and incinerated in a muffle furnace at 700°C for 1 hour. The process was repeated (ignition, cooling and weighing) for constant weight.

2.3.3 Water soluble ash

25 mL of distilled water was added in a Silica dish containing the total ash and boiled for 10 minutes. The insoluble matter was collected on an ash less filter paper. The residue was washed with hot water and ignited in a Silica crucible for 1 hour at 700°C. The water soluble ash was calculated by difference in weight of this residue and that of the total ash.

2.4 LOSS ON DRYING

5.0 grams of powder sample was weighed in a wide mouth Stoppered weighing bottle. The bottle was placed (with lid open) in an air oven maintained at 100± 20°C for 2 hrs. The bottle was then transferred (with lid closed) to desiccator. The bottle was cooled to room temperature and weighed.

2.5 PERCENTAGE MOISTURE CONTENT Karl-Fisher Titrimetric Method

100 mg of powder was weighed and transferred to the titration vessel and the titration was allowed to go for completion.

2.6 ATOMIC ABSORPTION SPECTROSCOPY:

Atomic absorption spectroscopy (AAS) is a spectroanalytical procedure for the quantitative determination of chemical elements employing the absorption of optical radiation (light) by free atoms in the gaseous state.

2.6.1 Sample Preparation

One gram air dried powder was placed in different beakers. 5 ml of concentrated nitric acid was added to it and kept overnight. The solution was evaporated to dryness on sand bath. Then 1 ml perchloric acid was added to it, evaporated to dryness and allowed to cool. Distilled water was added and filtered through Whatmann filter paper no. 41 into a volumetric flask and made up the volume to 25 ml with distilled water.

2.6.2 Metal Analysis

Analysis of the metals in selected plant samples were performed on Shimadzu AA7000F atomic absorption spectrophotometer (AAS). Measurements were made using a BGCD2 lamp mode for cadmium, chromium, copper, iron and manganese at wavelengths of 228.8 nm, 357.9 nm, 324.8 nm, 248.3 nm and 279.5 nm respectively. For each of the selected metals a standard linear calibration curve of various concentrations was analysed by AAS.

3. RESULTS AND DISCUSSION

Physicochemical investigations

The powdered plant of Syzygium cumini was subjected to evaluate its total ash, acid-insoluble ash, water-soluble ash value, water and ethanol soluble extractive values, loss on drying and moisture content. Total ash content was found (4.07%) indicates that the plant has moderate mineral elements. Acid insoluble ash was 0.95% respectively. Water soluble was 1.1% respectively. Ethanol and water soluble extractive value was 8.98% and 16% respectively. Loss on drying was 9.72% respectively. The air dried powder contains 6.47% moisture respectively.

Table No. 1: Physicochemical analysis of Syzygium cumini.

Parameter	% Content
Total Ash	4.07
Acid Insoluble Ash	0.95
Water Soluble Ash	1.1
Ethanol Soluble Extractive	8.98
Water Soluble Extractive	16
Loss on Drying	9.72
Moisture Content	6.47

Metal Analysis

The AAS parameters were optimized by considering the wavelength, fuel gas as well supporting gas flow. The wavelength for cadmium (228.8 nm), chromium (357.9 nm), copper (324.8 nm), iron (248.3 nm) and manganese (279.5 nm) was found to be suitable for the detection of metals. The calibration curve was plotted with absorbance vs concentration. No spectral peaks of Cadmium and Chromium were observed in the present study. The concentration of micronutrients Copper, Iron and Magnesium was 0.112 ppm, 1.17 ppm and 0.403 ppm. Copper plays an important role in carbohydrate and nitrogen metabolism in plants. Iron is also a vital component of various enzymes which is associated with energy transfer, nitrogen reduction and fixation. Manganese also plays role in photosynthesis and to form other compounds required for plant metabolism.

Table No. 2: Concentration of metals in Syzygium cumini.

Metal	Concentration (ppm)
Cadmium (Cd)	BDL
Chromium (Cr)	BDL
Copper (Cu)	0.112
Iron (Fe)	1.17
Manganese (Mn)	0.403

*** BDL: below detection limit**

4. CONCLUSION

Present work is taken up in the view to standardize the plant of Syzygium cumini in accordance to parameters of World Health Organization (WHO) Guidelines. In the present study S. cumini was investigated for its physicochemical characters and metal content to analyze their quality, safety and standardization for their safe use. The results revealed that the content of heavy metals; cadmium and chromium was within the permissible levels and hence the plant is safe to be used in herbal drug formulations. The generated information of the present study provides data which is helpful in the correct identification and authentication of this medicinal plant and may help in preventing its adulteration.

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