INTRODUCTION

Madhuca longifolia belongs to family Sapotaceae and is also called Mahua [1]. The term Madhuca is derived from “Madhu” (Sanskrit word) which means honey. It is also known as Indian butter tree. Mahua is a deciduous and medium-sized tree found in India, Nepal, and Sri Lanka [2]. All the parts of Mahua possess many medicinal qualities. Fruits - refrigerant, aphrodisiac, tonic, and antitumor. Leaf - wound healing, antihemorrhagic, emollient, and rheumatism. Flower - refrigerant, liquid, increase milk production in woman, diuretics, antihelmintic, hepatoprotective. Bark - tansilids, stomachache, antiepileptic, and snake poison. Oil - laxative, hemorrhoids, piles [3]. It is composed of various phytoconstituents which include flavonoids, triterpenoids, glycosides, saponins, and steroids [4]. M. longifolia can produce about 20-200 kg of seeds/year [5]. The tree of Madhuca longifolia is represented in Fig. 1. The leaves and fruits of Madhuca longifolia are represented in Fig. 2. The flowers of Madhuca longifolia is represented in Fig. 3.

Geographical Source: Mahua is mostly found in the Central and North Indian plains and forests and also in some parts of Eastern India such as West Bengal, Bihar, and Jharkhand [5].

Taxonomical classification [5,6]

| Kingdom     | Plantae       |
|-------------|---------------|
| Division    | Magnoliophyta |
| Class       | Magnolinosida |
| Order       | Ericales      |
| Family      | Sapotaceae    |
| Genus       | Madhuca       |
| Species     | Longifolia    |

Synonyms [6]

| Sanskrit          | Atavimaduka   |
|-------------------|---------------|
| Hindi             | Mohua, Mungli |
| Telugu            | Ipua, Madhukamu |
| Tamil             | Iluppi, Kattilupi |
| Odia              | Mohuka, Molulo |
| Malayalam         | Ilkppa, Irupappu |
| Kannada           | Dodippana, Halippa |
| Urdu              | Mahuva         |
| Marathi           | Moha, Mhowra   |
| Gujarati          | Mahudu         |
| Bengali           | Mahula, Kochna |

Medicinal uses

Its flower is widely used for making local liquor and leaves are used in headache and seed oil for cooking food. The leaf and bark are used for the treatment of skin diseases, rheumatism, and stomachache. Wounds can be treated by applying flower paste [7]. Mahua oil is used for the preparation of detergents, soap, fuel oil, and vegetable butter [2].

Macroscopic characters

The leaves are simple, alternate, and symmetrical. The apex is acuminate whereas the base is decurrent. Its texture is glabrous [8].

METHODS

The leaves of M. longifolia were collected from Guttmal and Company, Shivaji Marg, Bareilly, Uttar Pradesh, India, and identified by Prof. A.K. Jaitly, HOD, Department of Plant Science, Mahatma Jyotiba Phule Rohilkhand University, Bareilly, Uttar Pradesh.
Powdered drug was used for moisture content, ash values, swelling index, and fluorescence studies were carried out by treating 0.5 g of powdered drug with different reagents and observation in color was made in visible light, UV light of short (254 nm) and long wavelength (365 nm) under UV chamber. Photomicrography was done by using Olympus C7070 camera [9].

RESULTS AND DISCUSSION

Microscopical examination of leaf
Parenchyma cells form the upper epidermis. The spongy and parenchymatous cells form the mesophyll layer. Vascular bundle was present in the center of the midrib. Xylem was surrounded by phloem. Calcium oxalate crystals were observed in cortex. The T.S. of leaf of Madhuca longifolia is represented in Fig. 4.

Powder study of leaf of M. longifolia
The leaf powder was examined under microscope and crystals, epidermal cells were observed.

Pharmacognostic evaluation of the plant: The plant material was used for quantitative determination of physicochemical values. Ash values, loss on drying, and extractive values were estimated.

Phytochemical Screening: The dried leaves were powdered and extracted with petroleum ether, chloroform, ethanol and water in soxhlet apparatus. The percentage yield was analyzed. The phytochemical tests were performed for the estimation of alkaloids, glycosides, flavonoids, and tannins in various plant extracts and resulted in the presence of carbohydrates, gums, proteins, alkaloid, saponins, flavonoids and tannins; results are given in Table 1.

Fluorescent studies of powder drugs: The fluorescence characteristics of leaf powder were studied both in visible light and UV light (254 and 365 nm) after treatment with various reagents and is represented in Table 2 [10-12].

The physiochemical parameters of leaf of *M. longifolia* are tabulated in Table 3. The loss on drying at 105°C in leaf was found to be 8.5±0.5%. Total ash value of leaf represents minerals and earthy materials attached in the plant material. It was reported that the total ash value was 5.5±0.2%. The acid insoluble ash value was 0.6±0.02%. The water-soluble ash value represents the presence of acids, sugar, and inorganic compounds and was found to be 0.74±0.025%. The results are given in Table 4.

The extractive values of *M. longifolia* in water, ethanol, chloroform, petroleum ether, and methanol were found to be 25.9±0.51% w/w, 28.1±1.38% w/w, 1.73±0.20% w/w, 0.83±0.20% w/w, and 25.5±2.29% w/w, respectively.

CONCLUSIONS

Preliminary phytochemical and physicochemical investigations of *M. longifolia* were performed in this study. These parameters are necessary for the identification of drugs and investigation of the bioactive constituents in medicinal herbs [13]. The presence of various chemical constituents in *M. longifolia* may be a potential cause of treatment of various disorders. The quality of the plant
can be estimated by determining the physical parameters. These investigations are of great importance for carrying out the revalidation and estimation of its other pharmacological activities. It was concluded from the phytochemical study that the ethanolic extract contains flavonoids, glycosides, carbohydrates, tannins which are responsible for various pharmacological activities such as anti-inflammatory, chemo-protective activity, antioxidant, anti-diabetic, antianxiety, and antidepressant.

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### Table 3: Physiochemical parameters

| S. No. | Parameters                | Values (% w/w) | Values (% w/w) | Values (% w/w) | Mean±SD (% w/w) |
|--------|---------------------------|----------------|----------------|----------------|----------------|
| 1      | Total ash value           | 5.50           | 5.4            | 5.8            | 5.56±0.2       |
| 2      | Water-insoluble ash value | 0.45           | 0.47           | 0.5            | 0.47±0.025     |
| 3      | Water-soluble ash value   | 0.75           | 0.77           | 0.72           | 0.74±0.025     |
| 4      | Acid-insoluble ash value  | 0.60           | 0.65           | 0.62           | 0.62±0.025     |
| 5      | Loss on drying            | 9.0            | 8              | 8.5            | 8.5±0.5        |

SD: Standard deviation

### Table 4: Extractive values of *Madhuca longifolia* L.

| S. No. | Solvent          | Extractive value (% w/w) | Extractive value (% w/w) | Extractive value (% w/w) | Mean±SD (% w/w) |
|--------|------------------|--------------------------|--------------------------|--------------------------|----------------|
| 1      | Water            | 25.5                     | 26.5                     | 25.8                     | 25.9±0.51       |
| 2      | Ethanol          | 28.8                     | 29                       | 26.5                     | 28.1±1.38       |
| 3      | Chloroform       | 1.8                      | 1.5                      | 1.9                      | 1.73±0.20       |
| 4      | Petroleum-ether  | 0.9                      | 1                        | 0.6                      | 0.83±0.20       |
| 5      | Methanol         | 26.0                     | 23                       | 27.5                     | 25.5±2.29       |