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ISOLATION AND CHARACTERIZATION OF MUCILAGE FROM *AEGLE MARMELLOS* LINN. FRUIT PULP

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ABSTRACT

Mucilages are the byproduct of metabolism, originated and stored in the plant as a part of the plant cell. Mucilages are polysaccharide complexes formed from sugar and uronic acid units. Mucilages form slimy masses in water, are typically heterogeneous in composition. The seeds of *Aegle marmelos* Linn. contain a high proportion of mucilage and it also being used for different therapeutic purposes. Recent trends toward the use of the vegetable and nontoxic products demand the replacement of synthetic excipients with natural ones. Like other natural products application of mucilage is increasing in industry due to non toxic character, low cost, easily availability and appropriate quality. Now, it has necessary to explore the newer source of plant mucilage for industrial demand. Hence, the present study is planned to isolated and characterize for its morphological characteristics, Solubility, melting range, pH, Swelling index, foaming index, Ash values, presence of foreign organic matter, Loss on drying, angle of repose, Density and compressibility index etc. Phytochemical and Physiochemical characteristics of mucilage were studied which confirmed the mucilage nature.

INTRODUCTION:

Aegle marmelos Linn. is a tree with thorns, possesses leaves with 3-5 leaflets, Flowers are 2-5 cm across, greenish white and sweet scented. Produce attractive edible fruits. Leaves and fruits are aromatic, widely distributed in tropical and subtropical area of India. It is native to Indo-Malayan region¹.

Mucilage is most commonly used as adjuvant in the manufacturing of different pharmaceutical dosage forms. They possess a variety of pharmaceutical properties, which include binding, disintegrating, suspending, emulsifying and sustaining properties at different proportion in different pharmaceutical dosage forms². Natural mucilages are preferred over semi-synthetic and synthetic materials due to their non-toxic, low cost, free availability, bioacceptable, renewable source, environmental-friendly processing, better patient tolerance as well as public acceptance, emollient and non-irritating nature, etc⁴.

In general excipients for oral use in tablets and capsules etc. the options are limited. The prospects of natural polymers are brighter but even here extensive testing will be required. Mucilages are polysaccharide

complexes formed from sugar and uronic acid units. Mucilages form slimy masses in water, are typically heterogeneous in composition. Upon hydrolysis, arabinose, galactose, glucose, mannose, xylose and various uronic acids are the most frequently observed components. Mucilages are obtained mainly from fruit pulp, seeds or other plant parts. Some are obtained from marine algae, and from selected microorganisms⁵. In present study the fruit pulp of *Aegle marmelos* Linn. were selected for the isolation of mucilage.

The dried fruit pulp consists of irregularly shaped orange brown, hard, stone like masses. The outer convex surface is rough and difficult to break. On the inner surface it shows longitudinal centered axis and reminiscent of locules in which mucilaginous pulp has dried; white rounded seeds are also seen embedded (fig.no.1).The fruit pulp of *Aegle marmelos* Linn. contain a high proportion of mucilage and it also being used for different therapeutic purposes. Fresh half-ripe Bael fruit is mildly astringent and is used in India for dysentery and diarrhoea; the pulp may be eaten or the decoction administered. It is said to cure without creating any tendency to constipation⁶. Also used as digestive and

stomachic. However there are no reports on isolation and characterization of mucilage of *Aegle marmelos*. Hence, the present study is planned to isolate and characterize mucilage of *Aegle marmelos* Linn. this further can be used as an excipients in different pharmaceutical dosage forms.

MATERIAL AND METHOD:

Isolation of Mucilage:

The mucilage of plant *Aegle marmelos* Linn. was collected from fruit pulp. *Aegle marmelos* Linn was procured from local area in the form of fruit. Mucilage was extracted by soaking the fruit pulp of *Aegle marmelos* with 10 times its weight of distilled water and kept for 24 Hrs. The viscous solution obtained was passed through the muslin cloth. The mucilage was precipitated out by addition of 95% methanol in the ratio of 1:1 by continuous stirring. The coagulated mass was dried in oven at 40 – 45⁰C, powdered by passing through sieve and stored in an airtight container (yield – 12% w/w).

Characterization of Mucilage:

The separated mucilage was evaluated for its physicochemical characteristics such as its morphological characteristics, identification by chemical tests, Solubility, melting range, pH, Swelling index, foaming index, Ash values, presence of foreign organic matter,

Loss on drying, Density, compressibility index and angle of repose etc. (table 1,2 and 3) The evaluation was carried out as per procedures describe in official books⁷⁻¹¹.

RESULT AND DISCUSSION:

The mucilage is isolated by dissolving in water and precipitating in 90% alcohol and dried at room temperature, total yield of mucilage by alcohol precipitation was found to be 12% w/w.

The morphological and physical evaluation of isolated mucilage shows, it is brownish white powder, with characteristic odour and lustrous in nature. When dissolved in water, it gives neutral, colloidal solution; it is soluble in lukewarm water and chloroform, practically insoluble in ethanol. Moisture content of mucilage was found to be 4.67 % was found to be within official limit. Mucilage decomposes above 200⁰c, which is a characteristic of most of the polysaccharide. The foreign matter in this mucilage was found to be not more than 0.1%. The swelling index and foaming index was found to be 10 and 111.11 respectively. Ash values as total ash, acid insoluble ash and sulphated ash 2.0%, 0% and 4.0% respectively, the 0% of acid insoluble ash value indicates the absence of sandy material.

The isolated mucilage were studied for its physiological parameters such as angle of repose, bulk density, tapped density, Compressibility Index. The angle of repose ($38^{\circ} 23'$) indicated that the powder was having passable flow. The bulk density, tapped density and Compressibility Index of mucilage was found to be 0.67 gm/cc, 0.83 gm/cc and 19.28% respectively. The result of chemical test shows presence of carbohydrate, saponin which are general constituent of mucilage. While the absence

of Tannins, chloride and sulphate, Shows the purity of mucilage.

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Figure No.1.



Table No.1. Physicochemical Characteristics of mucilage from fruit pulp of *Aegle marmelos* Linn.⁶⁻¹¹

| Sr. No. | Tests | Observations |
|---------|--|--|
| 1 | Description | Brownish white powder |
| 2 | Solubility | Forms colloidal solution, soluble in lukewarm water, Practically insoluble in ethanol, soluble in chloroform |
| 3 | Odour | Characteristic. |
| 4 | Appearance | Lustrous. |
| 5 | Identification : a) Mounted in 96% ethanol | Transparent angular masses. |

| | | |
|----|--|-------------------------------------|
| | b) Mounted in water | Particles swell |
| 6 | Melting range | Decomposes above 200 ⁰ c |
| 7 | PH (1% w/v) | Neutral. |
| 8 | Loss on drying | 4.67% |
| 9 | Ash value | 2.0% w/w |
| 10 | Acid insoluble ash. | 0% |
| 11 | Swelling index | 10 |
| 12 | Foaming index | 111.11 |
| 13 | Test for Carbohydrate (Mollish test) | + |
| 14 | Test for Tannins (Ferric chloride test) | - |
| 15 | Test for chloride (Silver-nitrate test) | - |
| 16 | Test for Sulphate (Bariumchloride test) | - |
| 17 | Test for Saponin | + |
| 18 | Test for steroid | + |
| 19 | Test for foreign matter | NMT 0.1 % |
| 20 | Percentage Yield | 12% W/W |

+ Present. – Absent

Table No.2. Data showing the different ash values of fruit pulp of *Aegle marmelos* Linn.⁶⁻¹¹

| Sr .No. | Types of Ash | Ash Value in %w/w |
|---------|--------------------|-------------------------------|
| 1 | Total ash | 2.0% |
| 2 | Acid insoluble ash | 0% (absence of sandy matter.) |
| 3 | Water soluble ash | 1.0% w/w |
| 4 | Sulphated ash | 4% |

Table No. 3. Pharmaceutical characteristics of mucilage of fruit pulp of *Aegle marmelos* Linn.⁶⁻¹¹

| Sr. No. | Parameter | Result s |
|---------|-----------------------|---------------------|
| 1 | Loss on drying | 4.67% |
| 2 | Angle of repose | 38 ⁰ 23' |
| 3 | Tapped density | 0.83 gm/cc |
| 4 | Bulk density | 0.67 gm/cc |
| 5 | Compressibility Index | 19.28 |

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