INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: https://www.ijpsjournal.com

OPEN ACCESS

Research Article

Formulation and Assessement of Gastroprotective Wood Apple Jelly

Ayush Kolaskar, Shubhangi Kolhe, Rutuja Khawane, Jayesh Khandare, Mitesh Karwa, Shubham Bhonde, Sachine Dighade

Institute of Pharmacy and Research, Anjangaon Bari Road, Badnera, Amravati

ARTICLE INFO

Published: 26 Jul. 2025
Keywords:
Wood Apple Jelly, Extract, Digestion, Gastroreprotective, Evaluation, Formulation
DOI:
10.5281/zenodo.16447455

ABSTRACT

The current study focuses on creating and assessing a herbal jelly with pulp from wood apples, a fruit known for its medicinal qualities in conventional medicine. Rich in vitamins, minerals, tannins, and antioxidants, wood apples are well known for their laxative, antibacterial, and digestive qualities. A tasty, stable, and nutritionally advantageous jelly that may be utilized as a food product and a supporting health supplement was the aim of this study. Standard methods for making the jelly included boiling fruit pulp with sugar, adding pectin to gel it, and adjusting the pH with citric acid. To increase shelf life, preservatives were applied. To guarantee microbial suppression, the manufactured jelly's pH was kept within a tolerable acidic range. The optimal consistency was tested by viscosity tests, and its physical stability was proven by spreadability and syneresis testing. Microbial testing confirmed its safety by demonstrating the lack of harmful organisms. The jelly also tasted good and smelled good, therefore it was suitable for consumer use.

INTRODUCTION

In addition to India, Bangladesh, Pakistan, and Sri Lanka also grow the wood apple, also known as Kavath (Limonia acidissima Linn.), which belongs to the amonotypic genus Limonia (Bakshi et al., 2001, Asna 2021). In the English language, the terms wood-apple, elephant-apple, monkey fruit, curd fruit, and Kathbel are commonly used. Limonia acidissima is widely recognized for its medicinal properties and has a wide range of known medical applications. It has a wide range of biological activities, such as adaptogenic activity, hepatoprotective advantages, and use against blood impurities, leucorrhea, dyspepsia, and jaundice (Anon, 1992). The wood apple fruit has an oval to spherical form and is between 5 and 12.5 cm across. It is challenging to break its woody, extremely hard rind, which is about six mm thick and has a scurfy, greyish-white

***Corresponding Author:** Ayush Kolaskar
Address: *Institute of Pharmacy and Research, Anjangaon Bari Road, Badnera, Amravati*
Email : ayushkolaskar@gmail.com
Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

appearance. The pulp is dark, mealy, odorous, resinous, astringent, and may be sweet or acidic. It also contains a large number of tiny, white seeds scattered throughout. Today's biggest health concerns are related to modern nutrition, lifestyle, and rising pollution levels. Because a country's economic and intellectual production and/or prosperity are directly impacted by the health of its population. Therefore, every administration's first goal in today's hectic society is preserving people's health. Access to reasonably priced, wholesome meals for the general public may be essential to achieving this goal India has a vast array of fruits and vegetables that can be used to create reasonably priced, healthful food items. The wood apple (Feronia limonia L.) is one of these fruits. Traditionally considered a staple for the poor, wood apples have substantial nutritional and medicinal value and are native to India. Depending on the language, culture, and region, common names in India include elephant apple (kathal), curd fruit, and monkey fruit. Every day, more and more people are using wood apples' therapeutic properties to treat a variety of ailments, such as hiccups, colds, constipation, capillary bleeding, influenza, piles, joint discomfort, sore throats, etc.

This is because of the presence of minerals, amino acids, vitamins (thiamine, riboflavin, niacin, vitamin C, etc.), and phytochemicals (coumarins, polyphenols, phytosterols, saponins, tannins, etc.). In India, unripe wood apples are used in traditional medicine to treat diarrhea and dysentery, while ripe fruits are utilized as a liver and heart tonic. According to estimates from the World Health Organization (WHO), 80% of people on the planet utilize drugs derived from plants or plant parts (root, shoot, fruits, skin, leaves, etc.), especially in poor countries like India. [1-5]

2. MEDICINAL USES:

1. The fruit is widely used in India to treat certain cardiac conditions and as a liver tonic.
2. Perhaps the best treatment for dysentery is the half-ripe fruit. The fruit's mashed pulp, minus the seeds, is used to cure piles or diarrhea.
3. Peptic ulcers can be effectively treated with an infusion of wood apple leaves. The tannin found in wood apple leaves lowers inflammation and aids in ulcer repair.
4. It also helps to prevent uterine and breast cancer and aids in treating infertility brought on by a progesterone hormone deficiency.
5. Children's stomach upsets can also be treated with the flesh of the mature fruitv.
6. Biliousness benefits from the tree's bark. It can be consumed either decocted or ground up. The leaves' juice can also be applied topically to rashes brought on by biliousness.
7. The bael tree's root is used as a home treatment to treat a variety of ear issues.
8. The fruit's pulp has 140 calories per 100 grams, making it a rich source of energy.
9. Kidney conditions like stones can be treated with wood apples.
10. Colds and other respiratory conditions can be prevented and treated using wood apple leaves. The fruit also works well for persistent coughs and sore throats.
11. Carotene, which is good for the eyes, is found in wood apples. [5-7]

Fig No. 1: Wood Apple Jelly

3. DRUG PROFILE

3.1. Wood Apple

Synonyms: Kavata, Kaitha, Kainth, elephant apple, monkey apple

Biological Source: The biological source of wood apple is the plant Limonia acidissima, which belongs to the family Rutaceae.

Phytochemicals Constituents: Polyphenols, Coumarins, Phytosterols, Saponins, Tannins, flavonoids, flavonols, Vitamins (thiamine, riboflavin, niacin, vitamin C, etc.), minerals and amino acid.

Nutrients: Protine, Lipids, Minerals, Vitamins

Uses: help in many diseases like cough, cold, constipation, capillary bleeding, influenza, piles, joint pain, sore throat, Digestive issues, Fever and inflammation, Skin and hair care, Antibacterial and antifungal properties, etc.

3.2. Ginger

Synonyms: Stem ginger, red ginger, alpinia pupurata, galangal, Alpinia officinalis, genus zingiber. Zingiber officinale, Langaus speciosa, shell ginger, lesser galangal, alpinia speciosa, alpinia officinarum, canton ginger.

Biological source: Zingiber officinale Roscoe, which belongs to the Zingiberaceae.

Phytoconstituents: Gingerols, shogaols, and paradols, monoterpenes and sesquiterpene hydrocarbons. In fresh ginger, gingerols are the major polyphenols, such as 6-gingerol, 8-gingerol, and 10-gingerol.

Nutrients: Vitamin C, vitamin B6, micronutrients like magnesium, potassium, copper, manganese, fiber, and water.

Uses: Numerous ailments, arthritis, migraines, hypertension, colds, nausea

3.3. Tulsi

Synonyms: Ocimum tenuiflorum, commonly known as holy basil, tulsi or tulasi, and tamole, damole.

Biological source: The dried leaves of Ocimum sanctum belonging to the family Lamiaceae.

Phytoconstituents: Oleanolic acid, Ursolic acid, Rosmarinic acid, Eugenol, Carvacrol, Linalool, and B- caryophyllene iron and potassium.

Nutrients: vitamins A, C and K and minerals like calcium, magnesium, phosphorus,

Uses: Antimicrobial, mosquito repellent, anti-diarrheal, anti-oxidant, anti-cataract, anti-inflammatory, chemo preventive, radio-protective, hepato-protective, neuro-protective, cardio-protective, anti-diabetic, anti-hypercholesterolemia, hypertensive, anti-carcinogenic, anti-analgesic, anti-pyretic, anti-allergic, immunomodulatory, central nervous system depressant, memory enhancement, anti-asthmatic, anti-tussive, diaphoretic, anti-thyroid, anti-fertility, anti-ulcer, anti-emetic, anti-spasmodic, anti-arthritic, adaptogenic, anti- stress, anti-cataract, anti-leukodermal and anti-coagulant activities.

3.4. Turmeric

Synonyms: Haldi, Curcuma, Rhizoma cur-cumae.

Biological Source: Turmeric is the spice and medicine that comes from the Curcuma longa plant.

Phytoconstituents: curcumin, desmethoxycurcumin, bis-desmethoxycurcumin

and cyclocurcumin (a minor constituent). Belong to Zingiberaceae family

Uses: Anti-inflammatory, antioxidant, and wound-healing properties, Skin Disorders, Respiratory Problems, Joint Pain Relief.

3.5. Lemon

Synonyms: Lemon extract, Citrus lemon, Sour juice

Biological Source: The biological source of lemon juice is the lemon fruit (Citrus limon), which belongs to the Rutaceae family. The juice is extracted from the pulp of the fruit and is rich in citric acid, vitamin C, and flavonoids.

Phytoconstituents: Active constituents: Limo cimine, ascorbic acid, polyphenols, terpense, citric, calcium oxalate, flavonoids, macro elements, amino acids, terpenoids. Lemon peel extract obtained from citrus limon is rich source of bioactive compounds such as flavonoids limonoids, caretonoids that have been shown to possess various pharmacological properties. Due to its anti-inflammatory, antioxidant activity it has wide application in cosmetics to treat skin conditions like skin affected due to sunburn or mycosis as well as use for hair and scalp diseases.

Uses: It can be used as promoter of active substances through skin. Flavonoids, Antioxidants, depigmenting effect. [8]

4. METHOD OF PREPRATION OF JELLY

4.1 PREPRATION OF WOOD APPLE EXTRACT:

Only fully ripe and mature fruits were utilized to make wood apple jelly. fruits with external diseases, flaws, or deterioration were thrown out Mature fruits that had been picked were spread out and exposed to sunlight in the department's drying yard for ten to fourteen days in order to reach the fully ripe state. After ripening, the fruits were cracked with a wooden hammer, and their pulps were removed with a knife and spoon. The pulps were then used to extract the wood apple juice. Water was added in 1:2 ratios to the wood apple pulps and carefully stirred. In an open pan, this combination was heated to 88-990C. Wood apple juice was extracted in the water due to the heating process, and the mixture (juice) was filtered using muslin cloth and water prior to boiling. After being collected, the wood apple juice was chilled to room temperature (28 to 20 degrees Celsius), sealed in glass bottles, and kept in a refrigerator at 50 degrees Celsius for later use. The pulps were used to extract the wood apple juice.[9]

4.2 PREPARATION OF JELLY:

After obtaining juice extract from wood apple fruit, a pectin test was done to determine the addition of sugar amount for preparing a well settled jelly. The calculated amount of sugar was added to extract and boiled to the end point (65 °Brix TSS). The clear extract of juice and sugar mixture was boiled to the end point to make jelly of desired consistency. The prepared jelly was filled in a sterilized wide- mouth bottle and covered with air tight lid. Cooled the bottles and stored in refrigerator condition (6°C) for shelf-life storage study. [10]

5. FORMULATION

Table No: 1. Formulation of Wood Apple Jelly

Sr. No.	Ingredients	Quantity
1.	Wood Apple Extract	60ml
2.	Sugar	30gm
3.	Ginger Extract	3ml
4.	Turmeric Extract	2ml
5.	Tulsi Extract	3ml
6.	Lemon Extract	2ml

6. EVALUATION PARAMETER

6.1 Total Soluble Solid

Purpose: Measure the percentage of soluble solids, primarily sugars in jelly, and also verify that the jelly has the desired texture and consistency.

Procedure: Prepare jelly sample on of the jelly and mix in water ensure uniformity, Place a few drops of jelly sample on the refractometer prism. Close the refractometer cover and take the reading. Record the TSS value, usually expressed as Brix (degrees brix).[11]

6.2 pH

Purpose: To ensure jelly's safety, acidity, and quality, and to detect spoilage. Procedure: To conduct a pH test for jelly, calibrate a pH meter and then mix 10g of jelly with 50ml of buffer solution. Insert the pH meter probe into the mixture and record the pH value, which should ideally fall within the range of 5.5-6.5. [12]

6.3 Viscosity:

Take 100-150 mL of wood apple jelly in a beaker and maintain it at 25°C. Attach the appropriate spindle (e.g., No. 6 for Brookfield Viscometer) and immerse it in the sample. Start the viscometer at 10-50 RPM, allow stabilization, and record the viscosity in centipoise (cP) or Pascal- seconds (Pa·s). Take three readings and calculate the average viscosity. Wash the spindle and beaker properly after the test. [13]

6.4 Reducing and Total Sugar:

Throughout the duration of storage in the current study, the jelly's decreasing and total sugars were steadily raised (Table 3). Since decreases in non-reducing sugar were correlated with increases in reducing sugar content, the rise in reducing and total sugar content of jelly may have resulted from the inversion of non-reducing sugar into reducing sugars. Another explanation for the rise in sugar concentration could be the hydrolysis of polysaccharides like pectin and starch.

6.5 Total Plate Content:

One of the most important microbiological metrics for assessing the safety, hygienic conditions, and shelf life of wood apple jelly is its Total Plate Count (TPC). TPC aids in figuring out how many viable aerobic bacteria which can be caused by handling, storage conditions, processing equipment, or raw materials are present in the jelly overall. A low TPC value in wood apple jelly denotes minimal microbiological contamination, efficient preservation techniques (such as the right pH and sugar content), and acceptable manufacturing practices.

6.6 Taste:

Wood apple jelly offers a unique balance of sweetness and tanginess, with a mild astringency due to natural tannins. Its rich, fruity flavour is complemented by subtle caramelized notes. A well- prepared jelly should have a smooth texture, pleasant aftertaste, and minimal bitterness, making it enjoyable and refreshing treat.

6.7 Odour:

Odour is a crucial indicator of freshness and quality. Wood apple jelly should emit a pleasant, fruity aroma with subtle earthy and tangy notes characteristic of the wood apple. [13-15]

7. RESULT

Table No: 2. Evaluation Parameter

Sr. No.	Test	Result
1.	Total Soluble Solids	65.5

2.	pH	3.2 -3.5
3.	Viscosity	1500cP
4.	Reducing and Total Sugar	Jelly's sweetness and quality are determined by its reducing and total sugar content, which also affects flavor, storage acceptability, and consumer acceptance.
5.	Total Plate Content	Wood apple jelly's total plate count shows a low microbiological burden, indicating sanitary production and consumer safety.
6.	Taste	The jelly had a well-balanced taste, combining the natural sweetness of added sugars with mild tanginess of wood apple
7.	Odour	The jelly retained a distinct fruity aroma, characteristic of fresh wood apple

CONCLUSION

It is concluded that the investigation result came out that the wood apple jelly is an excellent product in the field of nutraceuticals and gastroprotective formulations. In the study, it is found that wood apple jelly is a type of edible formulation which can be used to soothe gastric mucosa, reduce acidity, and promote gastrointestinal health. The jelly shows significant protective action due to the presence of active ingredients like tannins, pectin, and flavonoids. The main objective of this research is to optimize formulation parameters such as pH, viscosity, texture, and homogeneity. It is studied that the final product has great palatability, good consistency, and effective gastroprotective activity, making it a stable and suitable functional food product.

REFERENCES

1. S, A., Halamani, S., Govanakoppa, N., B K, M. and J.N, S. (2024) "Development of Wood Apple Jujube Jellies: Physicochemical, Sensorial and Stability Properties", Journal of Scientific Research and 10.9734/jsrr/2024/v30i112550. Reports, 30(11), pp. 231–238.
2. Asna, U., 2021. Nutritional and functional properties of underutilized tropical fruits. International Journal of Food Sciences, 18(2), pp.134–142.
3. Anon, 1992. Traditional uses and medicinal significance of Limonia acidissima. Ayurvedic Journal of Natural Medicine, 5(1), pp.45–49.
4. Hilly, A., Rang, N. and Anitha, P., 2002. Physical and chemical characteristics of wood apple (Limonia acidissima) fruit. Journal of Tropical Agricultural Science, 24(3), pp.210–215.
5. Khan, M.A., Ashraf, M., Singh, K., Patel, K.K. and Siddiqui, M., 2019. Effect of Storage on Quality Parameters of Wood Apple (Feronia Limonia L.)-Lemon (Citrus Limon) Squash. Res J Food Nutri, 3, pp.18-27.
6. Dar, A.I., Masar, G., Jadhaw, V., Bansal, S.K. and Saxena, R.C., 2013. Isolation and structural elucidation of the novel flavone glycoside from Feronia limonia L. journal of pharmacy research, 7(8), pp.697-704.
7. Kumar, A. and Deen, B., 2017. Study on preparation and storage stability of wood apple RTS beverage. Int. J. Pure App. Biosci, 5(6), pp.879-886.
8. Al-Qudah, T.S., Zahra, U., Rehman, R., Majeed, M.I., Sadique, S., Nisar, S., Tahtamouni, R. and Tahtamouni, R.W., 2018. Lemon as a source of functional and medicinal ingredient: A review. International Journal of Chemical and Biochemical Sciences, 14, pp.55–61.
9. Singhaniaa, N. and Barmanrayb, A., 2022. Study of functional properties of wood apple

(Limonia acidissima L.) jelly. Gradiva Review Journal, pp.0363-8057.

10. Khan, M.A., Ashraf, M., Singh, K., Patel, K.K. and Siddiqui, M., 2019. Effect of Storage on Quality Parameters of Wood Apple (Feronia Limonia L.)-Lemon (Citrus Limon) Squash. Res J Food Nutri, 3, pp.18-27.
11. Kuchi VS, Gupta R, Gupta R, Tamang S. Standardization of recipe for preparation of guava jelly bar. Journal of crop and weed. 2014; 10(2):22-81.
12. Kumar A, Deen B. Studies on bio-chemical changes in wood apple (Limonia acidissima L.) fruits during growth and development. International Journal of Current Microbiology and Applied Science. 2017; 6(8):2552-2560.
13. Kumari A, Sandal A. Quality evaluation of products prepared from local mango. Indian Journal of Agricultural Biochemistry. 2011;
14. Lane JH, Eynon L. Determination of reducing sugars by Fehling Solution with Methylene blue as an indicator. Journal of the Society of Chemical Industry London. 1923; 42:37-7.
15. Mapson LW. Vitamins in fruits. In biochemistry of fruits and their products. Ed. A. C. Hulme, Academic Press, London and New York. 1970; 1:369.

HOW TO CITE: Ayush Kolaskar, Shubhangi Kolhe, Rutuja Khawane, Jayesh Khandare, Mitesh Karwa, Shubham Bhonde, Sachine Dighade, Formulation and Assessement of Gastroprotective Wood Apple Jelly, Int. J. of Pharm. Sci., 2025, Vol 3, Issue 7, 3587-3593. https://doi.org/10.5281/zenodo.16447455