

"AN EXPERIMENTAL STUDY TO EVALUATE THE EFFECT OF HERBAL SOLUTION AS AN ALTERNATIVE FOR PLANT PRESERVATION IN COMPARISON TO FORMALIN"

Dr. Jyoti^{1*} and Dr. Anitha H.²

¹PG Scholar, Department of RSBK, Parul Institute of Ayurveda, Vadodara-390019, Gujarat, India.

²Professor & HOD Department of RSBK, Parul Institute of Ayurveda Vadodara, -390019, Gujarat, India.

*Corresponding Author: Dr. Jyoti

PG Scholar, Department of RSBK, Parul Institute of Ayurveda, Vadodara-390019, Gujarat, India.

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ABSTRACT

In ancient Indian culture, various formulas were explained and used to preserve plant parts, and later, new methods utilising formalin-based decomposition solutions were invented. Formalin is well known to be used in the fixing process. Since its beginning, formalin has been linked to a variety of poisonous and irritating side effects, as well as being harmful to the environment. The current study will endeavour to discover a possible herbal remedy to replace formalin. **Aim:** - The goal of this research is to create a new herbal remedy that is less dangerous than formalin. **Material and Methods:** - Preparation of Herbal solution extract of Guava and Lemon by using Distillation techniques. **Result:** Over the course of the six-month trial, the samples of Tulsi stem parts in glass jar were checked every 15 days to assess their consistency, colour, solution odour, and structural integrity. **Conclusion:** The results of this study, which support further research on the preservation of other plant components and prolonged periods, address the study's limitations.

KEYWORDS: Preservation, formalin, Plant parts, extract.

INTRODUCTION

Most plants start to lose their quality after two or three days. Museums have been able to preserve complete specimens since the 17th century by immersing them in liquid chemicals and keeping them there. A fluid-preserved specimen is made up of three parts: the container, the fluid preserver, and the fixed specimen. Even though the fixative and fluid preservation processes change the specimen chemically and can cause discoloration, shrinkage, and curling of the specimens, these collections can last for hundreds of years. The chemicals that make up fluid preserved collections are what pose the biggest risks.^[1] A buildup of gases will enhance the likelihood of a fire. When submerging the sample at first, formaldehyde or formalin may be exposed. Lower quantities may irritate the eyes and skin, while greater concentrations may result in more severe symptoms like pneumonia and pulmonary edema. Distillation (*Arka*) dosage form was chosen for museum use since it produced a translucent solution after preparation. The herbal solution that contains guava leaf extract and lemon juice extract solution is what the present invention is primarily focused on in order to gradually sustain a plant without losing its natural leaf structure or color and not "bleed" through the plant's leaves.

This study will attempt to provide a feasible herbal treatment that can replace formalin by combining Guava and lemon with distilled water extract formulation. Guava and lemon are phenolic-rich plants with antimicrobial, antifungal, and antibacterial properties.^[2] These natural Ayurvedic ingredients are less hazardous and less expensive than formalin. According to the hypothesis of this experiment, a natural preservative solution could be produced. This research will provide an understanding of herbs for preservation.

In botanical departmental, museum is its most important asset. The museum has many ways of preserving and classifying specimens. It includes specimens of uncommon species and plants native to the Himalayas that were gathered across the nation. Another preservation technique is using herbarium sheets. In the department, there is also a reference museum containing useful plant parts and all the details. In order to identify the species and comprehend the morphological classification of medicinal plants, the students are encouraged to make use of the departmental herbal garden.

AIM: - To develop a technique and material for plant preservation that keeps the plant's shape and colour while preserving it.

MATERIALS AND METHODS

It is classified into the following divisions: -

1. Collection of raw drugs
2. Preparation of solution
3. Preparation of sample
4. Analytical study

Collection of Raw Drug

Guava leaves and Tulsi stems were collected in March 2022 at the Parul University botanical park in Waghodia, Gujarat. The leaves were then cleaned with sterile water. The raw medicine will be tested for effectiveness by the Dravya Guna Department of Parul University in Waghodia, Gujarat. Identification and verification in accordance with API guidelines^[7] (Ayurvedic Pharmacopoeia of India).

Preparation of solution

The extracts were prepared in the Parul Ayurveda pharmacy, Parul University, Vadodara. 100g of fresh,

green guava leaves were collected from the Parul University campus. Guava leaves were prepared using a 1:10 (drug: water) ratio and volume/volume (v/v) measurement under aseptic conditions. Initial preparation involved placing the specified quantity of chopped guava leaves in a flask with a spherical bottom, soaking them overnight in 300ml of water—just enough to cover the drug. The remaining water (400ml) was added the following morning, and the distillation equipment (*Arka yantra*) was set up and the heating process began. When the process began, a temperature gradient between 40- and 60-degrees Fahrenheit was maintained. Initially, 60 degrees of heat was applied. Initial guava leaf *arka* distillation was carried out until 60% of the distillate was recovered after the first few drops were discarded since they might not have included potentially important ingredients.

To prepare lemon extract, use a similar method. Lemons were collected at the Vadodara neighbourhood market. Manually pressing lemons to extract the juice, followed by using a distillation device called an *arka yantra* to extract the juice in a 1:10 (drug: water) ratio and volume/volume (v/v) measurement.



(Fig- 1. Guava Leaves)



(Fig- 2. Lemons)



(Fig.3 - Distillation Method)

Preparation of sample: - In 2022, the experiment was carried out at Parul University's Parul Institute of Ayurveda in Vadodara, Gujarat. Guava leaf extract and lemon extract (GLE 40% + LE 20%) were also taken. In

a 200 ml beaker, 60 ml of lemon extract or 120 ml of raw guava leaf extract were used to make the solution. Following that, *tulsi* stem was added to the beaker of fluid.



(Fig- 4. Herbal solution sample)

Analytical study^[6]

- The samples were analysed every month of the following parameters.
- Organoleptic characters -Consistency, colour, odour.
 - Physico- chemical parameters- pH, Specific gravity, viscosity, total suspended solids, refractive index,

volatile oil estimation. The above-mentioned analytical parameters were carried out for three times and the average reading or value was taken as a result.

OBSERVATIONS AND RESULTS**Table 1: Observations during preparation of Herbal Solution.**

Sr. No.	Parameters	Guava Leaf Extract	Lemon Extract
1.	Drug quantity (v/v)	100gm	100ml
2.	Water	1000ml	1000ml
3.	Proportion (drug: water)	1:10	1:10
4.	Initial temperature	40° C	50° C
5.	Maintained temperature gradient	40° C- 60° C	50° C-60° C
6.	Starting time	9.18 AM	1.25 M
7.	Ending time	12.05 PM	4.25 PM
8.	% Distillate obtained	60%	60%

Table 2: Analytical parameters of prepared herbal solution.

Sr. No.	Particulars	Herbal Solution
1.	Appearance	Liquid containing an extra layer of volatile ingredients
2.	Colour	Transparent liquid
3.	Odor	Characteristic odour
4.	Taste	<i>Amla rasa pradhana</i> with strong tingling sensation
5.	pH	6
6.	Specific gravity	0.8990
7.	TSS (Total Suspended Solids) mg/l	0.1

DISCUSSION

Research has shown that guava leaf extract from distilled water indicated the presence of all Phyto-chemicals like tannins, phenols, flavonoids, saponins, terpenoids, and glycosides as compared to methanol, ethanol, and n-hexane extract. In addition to preventing protein synthesis by attaching to proline-rich proteins, tannins have been demonstrated to have antimicrobial activity. Flavonoids are hydroxylated polyphenolic chemicals that are known to be formed by plants in response to microbial infections; this phenomenon has been thoroughly investigated and confirmed to have antibacterial activity. Glycosides called saponins have been found to have inhibitory effects on *S. aureus*, a gram-positive bacterium. Although terpenoids are mostly employed for their fragrance properties, they may also be effective antibacterial agents. Citrus limonum L., which has a higher concentration of phenolic compounds and ascorbic acids, has various antioxidant effects.

CONCLUSION

According to this investigation, the herbal solution extract, which was added in a concentration of 10%, demonstrated preservation effect for 6 months in Tulsi stem without any microbiological contamination. The study has found that the anti-microbial and anti-oxidant capabilities of herbal solution among other properties that it possesses have been beneficial.

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