



## Research Article

# STUDIES ON ANALYZING THE SHELF LIFE OF PANCHAGAVYA WITH DIFFERENT ALTERNATIVES FOR GHEE

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**Abstract:** The study was conducted to find the shelf life of panchagavya using groundnut oil cake and sesame oil instead of ghee as it is costly. Samples were collected one month after adding the ingredients and six months after the addition of ingredients. Extract was prepared and were analysed in GCMS for various biochemical properties. Derivatives of phenols, alcohols, esters and fatty acids were present in all the formulations of Panchagavya. The presence of vitamin E and gamma tocopherol in panchagavya produced with groundnut oil cake was responsible for the hindering of the rancidity of the organic product. But, fatty acids present in panchagavya prepared with sesame oil was responsible for rancidity thereby decreasing the shelf life of panchagavya.

**Keywords:** Rancidity, Fatty acids, Vitamin-E, Shelf life

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## Introduction

Organic farming is based on the system-oriented approach and the use of organic liquid product like Panchagavya resulted in higher growth, yield and quality of crops and hence there had been an increasing interest in the use of liquid formulations. The liquid formulations such as panchagavya, jeevamruth and beejamruth were eco-friendly organic preparations made from products of cow. Among these, panchagavya is one of the widely used traditional liquid organic formulations, which is a fermented product made from five ingredients obtained from cow, such as milk, urine, dung, curd and clarified butter [1]. The shelf life of liquid organic formulations is an important criterion. Nevertheless, in Tamil Nadu, the studies on the shelf lives of the liquid formulations were infrequent. Further studies are essential to improve the shelf life of organic liquid formulations to enhance their effectiveness on plant growth. The present study was carried out to validate the shelf life of panchagavya and jeevamruth by screening scientifically under in vivo condition using maize (*Zea mays*) [2,3].

## Materials and methods

### Preparation of liquid organic inputs

The liquid organic inputs such as panchagavya, panchagavya + ground nut oil cake, and panchagavya + sesame oil was prepared in the Department of Environmental Sciences, TNAU, Coimbatore. The main objective of this study was to find an alternative for ghee in panchagavya as the cost is comparatively higher and also to find the shelflife of the prepared products. So, alternative inputs were used instead of ghee and panchagavya was produced and their properties were studied. Three types of panchagavya was prepared using the following ingredients as listed in [Table-1]. The cow dung and ghee, groundnut cake and sesame oil were mixed separately and thoroughly mixed both in morning and evening hours and keep for 3 days. After 3 days cow urine and other ingredients were added and the whole solution will be mixed both in morning and evening hours regularly every day. Panchagavya will be ready after 30 days. The panchagavya prepared in these three methods were analysed in GCMS for finding their biochemical properties and the results are furnished below.

### Extract preparation for GCMS analysis

The liquid organic inputs such as panchagavya, panchagavya (ground nut oil cake), panchagavya (sesame oil) and jeevamruth were freshly prepared and they were collected freshly after preparation (one month) and at final (six months) for processing of GCMS. The liquid sample of 500 ml was taken in a separating funnel (1 liter). Sodium chloride of 150 g was added and shaken well to get dissolved. 75 ml of diethyl ether was added and shaken well and the pressure released intermittently (shaken until complete pressure goes up). It was allowed for 10 to 15 minutes. The organic layer was decanted into a round bottom flask by passing through early down Na<sub>2</sub> SO<sub>4</sub>. Diethyl ether of 50 ml was added and shaken well and the pressure was released intermittently (shaken until complete pressure goes up). It was again allowed for 10 to 15 minutes. The procedure was repeated and the filtrate was concentrated to drying by using Rotary vacuum evaporator and then 5 ml of methanol was added and dried again. Methanol of 2 ml of (HPLC grade) was added and transferred to vial for GC-MS analysis. GC-MS analysis was carried out on thermo GC- trace ultra-version 5.0.

## Results and discussion

The biochemical compounds from GCMS analysis found were given here. All these derivatives of phenols, alkanes, alcohols, esters and fatty acids were present in all the formulations of panchagavya. The aldehyde D-Xylose was present in panchagavya formulation. The xylans were typical plant xylans<sup>3</sup> in that they consisted essentially of linear chains of 3-1,4-linked D-xylopyranosyl residues with L-arabinosyl and D-glucuronosyl residues attached. Immature corn cobs contain enzymes which catalyze the epimerization of UDP-D-xylose-C'4 to UDP-L-arabinose-C4 and the transfer of the sugars from both of these sugar nucleotides to polysaccharide. Indirect evidences strongly suggested that UDP-D-xylose and UDP L-arabinose were glycosyl sources in the synthesis of the xylan fractions of plant hemicellulose [2]. Hence the spraying of panchagavya induces the xylene activity of maize crop which was experimented. The biochemical compounds that were recorded in panchagavya + ground nut oil cake sample were, methyl palmitate, gallic acid, Campesterol, p-chlorophenyl methano-bis (4-biphenyl),

Table-1 Preparation of Panchagavya

SN	Ingredients	Panchagavya (with ghee)	Panchagavya (with groundnut)	Panchagavya (with sesame oil)
		Quantity added		
1	Fresh cow dung	5 kg	5 kg	5 kg
2	Cow urine	3 litres	3litres	3litres
3	Cow milk	2 litres	2 litres	2 litres
4	Curd	2 litres	2 litres	2 litres
5	Cow Ghee	1 litres	-	-
6	Sesame oil	-	-	1litre
7	Ground nut oil cake	-	1 kg	-
8	Sugarcane juice	3 litres	3 litres	3 litres
9	Ripened poovan banana	1 kg	1 kg	1 kg

dasycarpidan-1-methanol,acetate (ester) heptasiloxane, 2,2,3,5,5-pentachloro-7,7-bis (chloromethyl)-1-dichloromethyl, pleiocar -pamine, sphinganine methanboronate, 4-hydroxymethyl-2-methoxy-4- methyl tetra hydro -uran, 1-acetoxy-4-(tetrahydropyran-2-yloxy)but-2-yne, ceanothine C , N-[3-[N aziridyl] propy -lidene] tetrahydrofurfurylamine, butyl hydroxy toluene, trans-13-docosenamide, phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl- and butyl hydroxy toluene respectively. The presence of vitamin E and gamma tocopherol, a compound which was responsible for synthesis of vitamin E in panchagavya produced with ground nut oil cake were responsible for the hindering of the rancidity of the organic product. Similarly, it has an antioxidant function which is being the most important and best known. Vitamin E also protects lipids and prevents the oxidation of polyunsaturated fatty acids (PUFAs). This can affect levels of other forms of vitamin E, e.g., reducing serum gamma- and delta-tocopherol concentrations [4].



Fig-1 Ingredients of Panchagavya (with Ghee)



Fig-2 Ingredients of Panchagavya (Groundnut oil cake instead of ghee)



Fig-3 Ingredients of Panchagavya (Sesame oil instead of ghee)

Most of the biochemical compounds that were present in the composition of panchagavya + sesame oil formulation consisted of fatty acids that were responsible for rancidity, thereby decreasing the shelf life of the product. The fatty acid, petrospongiolide hyatolite produced a signalling pathway of lipid fatty acids. The presence of Squalene and Alcholesterol acted in synthesis of the cholesterol compound, in which the some compounds oxidised the cholesterol fatty acids and delta- tocopherol, cis-vaccenic acid of poly unsaturated fatty acids caused rancidity of the organic product leading to decreased shelf life of

panchagavya + sesame oil formulation. Similar results of fatty acids oxidation were reported by Xianglong, 2006. Such that the lipid degradation compounds present in panchagavya and panchagavya + ground nut oil cake formulation did not produce any fatty acids that were responsible for rancidity of the products and there were no biochemical changes in the shelf life of panchagavya and panchagavya + ground nut oil cake formulations prepared.

### Conclusion

The study on shelf life has been shown to have broad spectrum among the liquid formulations. Among the liquid formulations, panchagavya is one of the most important liquid formulations to be considered for the study of shelf life as it not only proves to be most effective for crop growth but also widely used by the farmers. Further studies are essential to improve the shelf life of panchagavya to enhance their effectiveness on plant growth.

**Application of research:** The study was conducted on shelf life of panchagavya by using the alternatives such as ground nut oil cake and sesame oil instead of cow ghee as it poses a minor difficulty to farming community (expensive and solidification of ghee due to seasonal factors).

**Research Category:** Organic Agriculture

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**Sample Collection:** Department of Environmental Sciences, TNAU, Coimbatore

**Ethical approval:** This article does not contain any studies with human participants or animals performed by any of the authors.

Ethical Committee Approval Number: Nil

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