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Preparation of Wood-Apple Pickle

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ABSTRACT

Wood apple is a minor fruit crop of India with good nutritional quality for which people have not yet popularized the consumption aspect. There are several value-added products prepared from this fruit, but pickle is among the most favored and time-honored in India. The present study conducted at Department of Horticulture, College of Agriculture, RVSKVV, Gwalior, MP during 2019-20 and 2020-21 attempts to evaluate nutrient profile, chemical properties, and sensory attributes of wood apple (Limonia acidissima L.) pickle and study its Nutra-chemical changes in pickle at different storage periods. The standard methodology has been adopted to prepare wood apple pickle, which has then gone through nutrient and chemical analysis during the storage period to check its self-life and utility. The left fresh wood apple has a protein-rich nutrient property, and its pickle was found to be more nutritious with 3.20 g and 3.43 g crude protein, 1.43 g and 1.53 g crude fiber, 7.03 g and 7.37 g crude fats, 20.33 g and 19.00 g carbohydrates, 1.90 and 1.97 total minerals, 253 mg and 256 mg calcium, and 107 mg and 103 mg phosphorous for 100 g of pickle in the first and second year, respectively. From the sensory evaluation, it was found that color, taste, flavor were affected after 90 days of storage. In fact, better shelf life was retained up to 90 days of storage. Moisture and pH and ascorbic acid were decreased while titratable acidity and total sugars increased during 0, 30, 60, and 90 days of the storage period.A native fruit crop of India which cannot really be called a commercial fruit crop, as it has not been popularized in the direction of consumption. Value addition in the form of processing Really helps increase.

Keywords: Woodapple Pulp,Mustard Oil,Red Chili Powder,Turmeric,Salt,Coriander Powder,Jeear Powder,Jaggery Powder,Garlic,Hing,Fennal Seed,Pickle Mix,Vinegar

INTRODUCTION

wood-apple pickle or bael ka achar, it is a well-known and loved condiment in many places around South Asia. This pickle is made from the wood-apple tree (Limonia acidissima) and has a complex flavor profile that is sharp and slightly astringent from the wood-apple and aromatic spices. The process of making wood-apple pickle typically involves carefully extracting the fruit's pulp and combining it with spices like mustard seeds, fenugreek, turmeric, and chili powder. The mixture is then preserved in oil, which allows the flavors to deepen over time. Known for its vibrant and bold flavor profile, wood-apple pickle pairs excellently with rice, flatbreads, and a variety of Indian and Sri Lankan dishes. In addition to its culinary appeal, wood-apple is valued for its health benefits, including aiding digestion and boosting immunity, making this pickle a delicious and nutritious addition to meals.

The only species of the genus Limonia acidissima (Wood Apple) situated in the family Rutaceae and has a chromosome number 2n=18. It is endemic to the interior dry regions of India, Pakistan and Sri Lanka where it is found unfettered as well as planted and reared along the roads, at the peripheries of cultivated lands and even sown occasionally in orchards. Wood apple in English is referred to as elephant apple while in Hindi it is known as kavtha or kutbel and in Bengali, Oriya, and Assamese as kaith bel. It has been observed that the plant is found across the entire subtropical and tropical regions of the world with more concentration in countries such as India, Bangladesh, shrilanka, Malaysia, Myanmar, Thailand, Indonesia, Laos, Cambodia, Vietnam, the small islands in the Indian ocean, Northern Australia, Central African Countries, Pakistan and Nepal.. However, in the last few years, it has gained more significance and appreciated for the reason that it can be grown as a horticulture plant for reclaiming the soil and the most drought resistant plant as it can be grown in arid

and semi-arid regions. The plants bear fruits that are consumable, and the mesocarp of the fruit is sweet and acidic with a gritty, seedy and fibrous consistency. INTRODUCTION wood-apple pickle or bael ka achar, it is a well-known and loved condiment in many places around South Asia. This pickle is made from the wood-apple tree (Limonia acidissima) and has a complex flavor profile that is sharp and slightly astringent from the wood-apple and aromatic spices. The process of making wood-apple pickle typically involves carefully extracting the fruit's pulp and combining it with spices like mustard seeds, fenugreek, turmeric, and chili powder. The mixture is then preserved in oil, which allows the flavors to deepen over time. Known for its vibrant and bold flavor profile, wood-apple pickle pairs excellently with rice, flatbreads, and a variety of Indian and Sri Lankan dishes. In addition to its culinary appeal, wood-apple is valued for its health benefits, including aiding digestion and boosting immunity, making this pickle a delicious and nutritious addition to meals.

MATERIALS AND METHODOLOGY

Raw Material

1. WOODAPPLE PULP
2. MUSTARD OIL
3. RED CHILI POWDER
4. TURMERIC
5. SALT
6. CORIANDER POWDER
7. JEEAR POWDER
8. JAGGERY POWDERGARLIC
9. HING
10. FENNAL SEED
11. PICKLE MIX
12. VINEGAR

WOOD-APPLE

The wood apple which bears the scientific name Limonia acidissima is a tropical fruit which originates from South as well as South-East Asia. The fruit is widely known by different vernaculars such as ‘bael‘, ‘kaitha’, and ‘bale’. The fruit grows from a small-medium-sized tree which is classified under the Rutaceae family and many cultures appreciate this tree product for the medicine and taste it brings to cuisines. Features of Wood Apples:- Physical characteristics: The fruit is encased in a hard wood brown to grey usually shell. The in most cases placental pulp is the sweet smelling fibrous part that is found inside the shell. The pulp’s color is normally a mixture of orange and brown in color, with many seeds found inside the pulp. Flavor: The wood apple is widely known for its sweet sour and astringent taste at the same time.

MUSTARD OIL

Mustard oil is made from mustard seed (Brassica campestral). it has done with mechanical process mustard seed are pressed oil comes out from seed it called oil then it is safe in drum, Filtering Process started removed waste article it husk is using for cattle food and oil sealed in drum kept dry and cool place. The term "mustard oil" can also refer to the pressed oil that is used in cooking in addition to the volatile mustard oil. The essential oil is produced by distilling the volatile oil that is produced when the mustard seeds are ground up and mixed with water. Mustard oil actually using in Indian cooking, which produce from the mustard plant it is common components in Indian cookery. In many regions of the globe, particularly India & Bangladesh & it are frequently utilized for frying & stirring-frying vegetable due to its potent flavor, powerful flavor, and exceptionally high flame temperature. It is additionally possible and authorized to utilize as a flavoring in mustard essential oil is a kind of aromatic oil made from mustard seeds by using a steam distilling procedure.

RED CHILI POWDER

Increases Your Energy Levels Chilli (Capsicum annuum L.) is a vegetable that belongs to the Solanaceae family. Chilies come in over 400 different varieties and are known by common names such as chillies, chile, chilli peppers, bell peppers, red peppers, pod peppers, cayenne peppers, paprika, pimento, and capsicum in various parts of the world. Among the spices, dried chilli accounts for the bulk of intake. The dye ‘capsanthin' is responsible for the red colour of chilies. The alkaloid ‘capsaicin' contained in the pericarp and placenta of chilies gives them their biting pungency. Vitamins (especially A and C), potassium, magnesium, and iron are all abundant in chilies. Chilies are used to alleviate discomfort and have the capacity to raise the immune system, reduce cholesterol, and assist in the removal of gut parasites.Chillies are grown in all Asian countries, as well as large parts of Africa, the United States, and Southern Europe. In India Andhra Pradesh, Maharashtra, Karnataka, and Tamil Nadu are the most significant chilli-growing states. Tamil Nadu, Maharashtra, Orissa, and Karnataka are the top producers of dry chillies. Chillies are commonly used in three forms: fresh green chillies, red chilli powder, and raw red chillies. Chilli powder is prepared from ripe chilli. It is an important spice used as flavorings or condiments, in the tropics and subtropics and an indispensable item in the kitchen for everyday cooking in Bangladesh. Chilli is dried to make chilli powder and to store for both short and longterm storage. Chilli powder is made from ripe chilli peppers. In the tropics and subtropics, it's a common spice for flavorings and condiments, and in India, it's a must-have in the kitchen foreveryday cooking. Chillies are dried to make chilli powder and to store for both short and longperiods of time.

TURMERIC

Turmeric is an ancient spice, a native of South East Asia, used from antiquity as dye and a condiment. It is cultivated primarily in Bengal, China, Taiwan, Sri Lanka, Java. Peru. Australia and the West Indies. It is still used in rituals of the Hindu religion, and as a dye for holy robes, being natural, synthesized and cheap. Turmeric is in fact one of the cheapest spices. Although as a dye it is used similarly to saffron, the culinary uses of the two spices should not be confused and should never replace saffron in food dishes. Its use dates back nearly 4000 years, to the Vedic culture in India where it was used as a culinary spice and had some religious significance. The name derives from the Latin terra merita “meritorious earth” referring to the colour of ground turmeric which resembles a mineral pigment. Turmeric (Curcuma longa) has been used for 4,000 years to treat a variety of ailments. Several research studies have found that turmeric may, in fact, help treat a number of illnesses. However, it is important to remember several facts when you hear news reports about turmeric's medicinal properties. First, many studies have taken place in test tubes and animals, and the herb may not work as well in humans. Second, some studies have used an injectable form of curcumin (the active substance in turmeric). Finally, some of the studies show conflicting evidence. Nevertheless, turmeric may have promise for fighting infections and some cancers, reducing inflammation, and treating digestive problems. Turmeric is widely used as a food coloring and gives Indian curry its distinctive flavor and yellow color.

GARLIC

Grew out of the garlicky Allium sativum L., the plant from the Alliaceae family, very much the spice, and forages that have been known to remedy most ailments and physiological disorders. Garlic is derived from the Celtic word 'all' which used to mean pungent, as it is believed. Its cultivation is almost in every part of the world and believed to have originated from central Asia spreading to China, the Near East, Mediterranean Resorts, then westward to Central and Southern Europe, Northern Africa (Egypt) and Mexico (1). Since 5000 years ago, the garlic spice was at the use of medicine. Records in Sanskrit note about its use in medicines about 5000 years ago, and it has been in use at least for 3000 years in Chinese medicine. Egyptians, Babylonians, Greeks, and Romans consumed garlic for healing. Pasteur demonstrated the antibacterial infection of garlic in 1858, and he himself used the same as an antiseptic against gangrene during the two World Wars. The most significant contemporary medicinal applications of garlic include prevention and management of cardiovascular ailments through blood pressure lowering, cholesterol control, as an antimicrobial and anticancer agent. The active principles are several complex sulfurcontaining compounds, which are rapidly absorbed, transformed and disposed of metabolically. Collated findings from multiple randomized trials indicate a reduction in total cholesterol levels

due to garlic by approximately 10% and an influence on HDL/LDL ratios in a beneficial manner. Randomized trials further validate garlic's relative efficacy as a mild antihypertensive.

GINGER

Ginger (Zingiber officinale) is a flowering plant whose rhizome, ginger root or ginger, is widely used as a spice and a folk medicine. It is an herbaceous perennial that grows annual pseudo stems (false stems made of the rolled bases of leaves) about one meter tall, bearing narrow leaf blades. The inflorescences bear flowers having pale yellow petals with purple edges, and arise directly from the rhizome on separate shoots. Ginger is in the family Zingiberaceae, which also includes turmeric (Curcuma longa), It was transported with them throughout the Indo-Pacific during the Austronesian expansion (c. 5,000 BP), reaching as far as Hawaii. Ginger is one of the first spices to have been exported from Asia, arriving in Europe with the spice trade, and was used by ancient Greeks and Romans. The distantly related dicots in the genus Asarum are commonly called wild ginger because of their similar taste. There is no good evidence that ginger helps alleviate nausea and vomiting associated with pregnancy or chemotherapy, and its safety has not been demonstrated.It remains uncertain whether ginger is effective for treating any disease, and use of ginger as a drug has not been approved by the FDA. In 2020, world production of ginger was 4.3 million tonnes , led by India with 43% of the world total.

SALT

Even though salt is a mineral formed mostly from sodium chloride, in normal parlance, it is termed salt. When applied to food, especially by way of grains, it is known more formally as table salt. In its form as a natural crystalline mineral, salt is also termed as rock salt or halite. Life itself is dependent on salt in general (being the source of sodium and chlorine, both of which are essential dietary minerals), and the human taste of saltiness is subjective; it is one of the four basic human tastes. Salt is said to have improved food taste sensation, especially in foods that are otherwise tasteless but there may also be a level beyond which saltiness does not add taste in food.Salt wars have been caused by its scarcity and universal need, so countries have gone to war over it as well as imposed taxes on it. Salt is used for religious ceremonies and also serves other cultural and traditional purposes.Salt is mined, generated through evaporation of seawater, or spring water having minerals evaporated in shallow pools. The largest single use of salt (sodium chloride) is as a raw material for producing chemicals. It is used to produce caustic soda and chlorine and as a manufacturing feedstock for products such as polyvinyl chloride, plastics, and paper pulp. Little of the approximately three hundred million tonnes produced annually worldwide is consumed directly by humans; the rest is used in water conditioning processes, de-icing of highways, and in agriculture. Edible salt includes examples like sea salt and table salt, which is usually mixed with anti-caking agents and iodised to prevent deficiency of iodine. Besides cooking or table use and is present in many processed foods. Sodium is important for the human body because electrolytes and osmotic solutes are involved.

VINEGAR

There are several vincal types owing to the source materials from which they are made. Hence, it is now a culinary ingredient used in cooking for acidic flavour, or it has now found some uses in pickling. Types of vinegar used in this manner are as garnishing or condiments, for example, balsamic vinegar and malt vinegar.Thus, by virtue of the fact that it is a mild acid which is able to manufacture most easily, it finds extensive application in industries and homes-both as household cleaner. Chilli vinegar is a form of malt vinegar laced with pepped figures like either chopped or complete chilli peppers, which is a delicacy in the capital city, london, of the United Kingdom. Chilli vinegar is largely associated with Cockney fare-from pie and mash to jellied eels. In fact, a large number of The 1845 volumes on Modern Cookery for Private Families by Eliza Acton include that type of delicacy in the recipes.

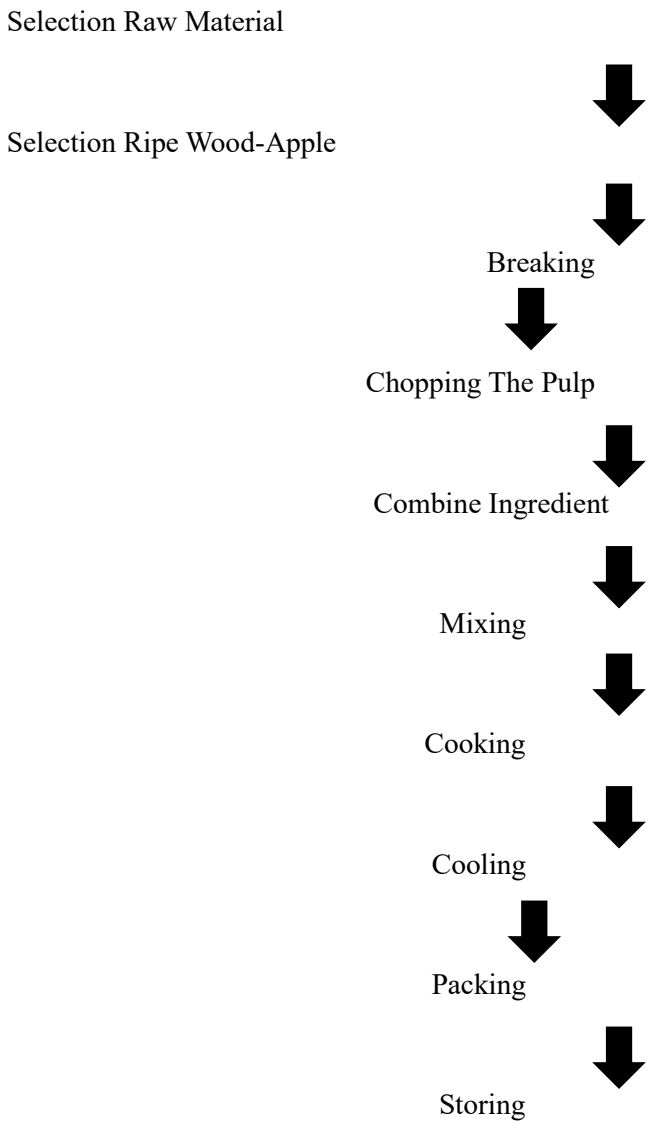
JAGGERY

Jaggery, also known as "gur," is an unrefined, whole sugar with a rich history, especially in the Indian subcontinent, Southeast Asia, Africa, and parts of the Americas. It's made from concentrated sugarcane juice, or sometimes from date

or palm sap, without separating the molasses and crystals. This lack of processing gives jaggery a distinct nutritional profile and a unique flavor.

Despite its nutritional advantages over refined sugar, jaggery is still a form of sugar and is high in calories. Therefore, it should be consumed in moderation, especially by individuals with diabetes or those trying to manage their weight. Overconsumption can lead to increased blood sugar levels and may contribute to weight gain

FLOW-CHART PREPARATION OF WOOD-APPLE PICKLE



PREPARATION OF WOOD-APPLE PICKLE

1. Select raw materials for making pickle

2. Select wood-apple fresh and ripe

3. Chopping wood-apple into small pieces

4. Heating oil a pan and add mustard dal

5. Add ginger garlic paste

6. Add red chili powder, turmeric powder, salt, coriander powder, Jeera powder, jaggery powder, Hing and pickle masala and mixed

7. Add wood-apple pulp

8. Mixing and cooking

9. Cooling and store in airtight jars.

RESULTS AND DISCUSSIONS

ASH CONTENT :

Total Ash value: 3gm of the Wood-apple pickle bar sample was taken to burn the sample after charring the crucible and was placed in a muffle furnace for ignition at 550 °C for 4 hours. The crucible was taken outside and cooled in a desiccator. The sample was ignited again after every half an hour until a constant weight was obtained accepted by the difference of 0.10.

Ash %= Weight of the crucible with sample after ignition -Weight of empty crucible. Weight of sample x 100

MOISTURE CONTENT:

From above sample Sensory 5 is better in all overall product 3gm of the Wood-apple pickle sample was taken in petri plate and the weight was measured, the petri plates with samples are placed in hot-air oven for drying that with at temperature 105 degree Celsius after three hours the sample was taken out and cooled in desicator weight was taken and again place in the hot air oven to retrieve the sample and rewed after half an hour until the constant weight was obtained for last three readings.

Moisture Content % = (W1-W2)×100 W1

Where: W1= Weight (g) of the sample before Drying

W2= Weight (G) of the sample after Drying

CRUDE FAT CONTENT:

A 5-gram sample was weighed and placed in a thimble for Soxhlet extraction using 250 ml of petroleum ether at 60°C, with a drop rate of 150 drops per minute. The extraction ran for 6-12 hours until the petroleum ether appeared clear. The solvent was then recovered via downward distillation. The round bottom flask with the extracted fat was dried at 105°C in a hot air oven, cooled in a desiccator, and weighed repeatedly until weight differences were less than 0.001 grams. The ash of the sample was treated with dilute HCL, filtered, washed, dried, and ignited at 550°C before weighing[AOAC (1995)].

Fat % = Weight of Fat

Weight of sample x100

PROTEIN CONTENT:

The crude protein content of the sample was determined using the Kjeldahl method (AOAC 2001.11) in three steps: digestion, distillation, and titration. First, a 1-gram sample was digested with 2 grams of a catalyst mixture and 20 ml of sulfuric acid (H_2SO_4) at 100°C for 2-3 hours until it turned light green. The digested sample was then distilled, with the ammonia (NH_3) collected in 30 ml of 4% boric acid after adding 60 ml of distilled water and 50 ml of 40% sodium hydroxide (NaOH). Finally, the ammonia-boric acid solution was titrated with 0.1 N hydrochloric acid (HCl) using methyl red and bromocresol green indicators until it changed from blue to red/pink. The burette reading was used to calculate the protein nitrogen content, thereby determining the crude protein content of the sample.

$$\text{Crude Protein \%} = \frac{(A-B) \times N \times 14.01 \times 6.25}{W}$$

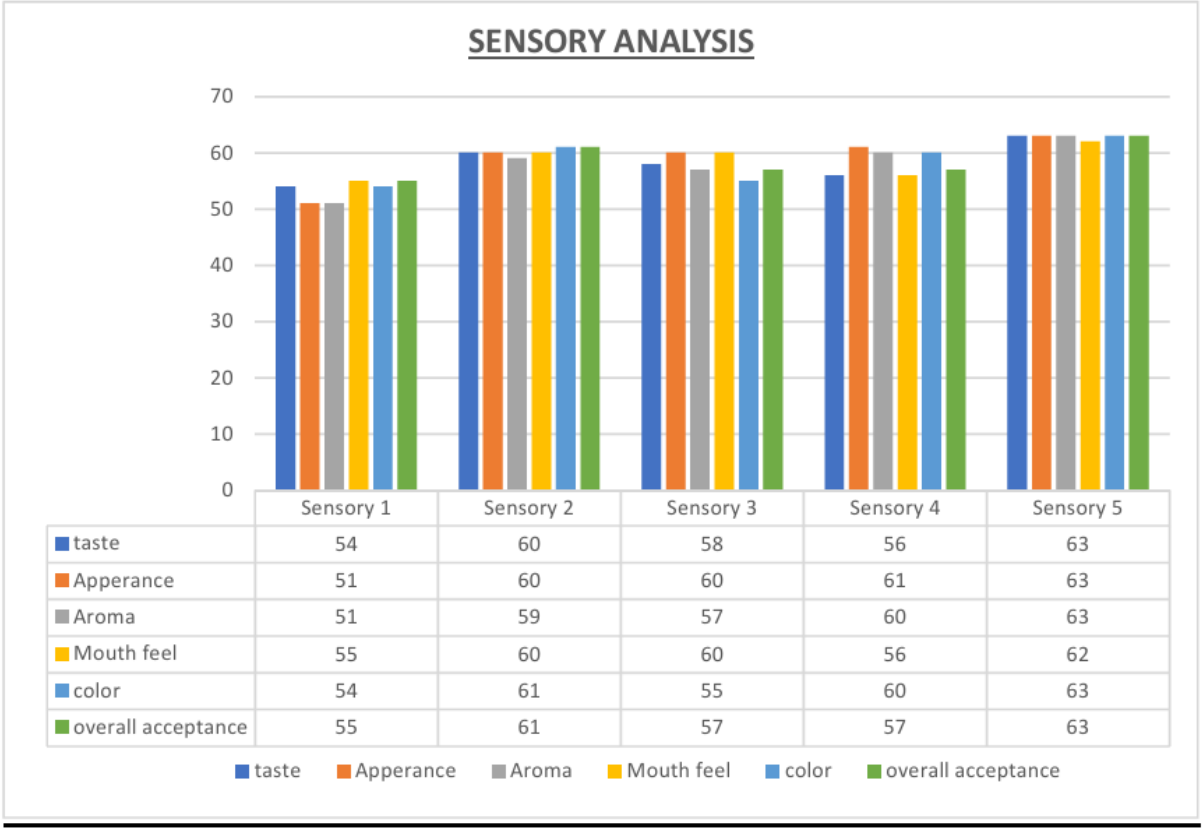
MICROBIAL ANALYSIS:

We have performed a microbial analysis of our product. Sattu bites have undergone thorough microbial testing, and the results are negative for harmful microorganisms. This confirms that our product is safe for consumption, adhering to stringent quality and safety standards. Consumers can enjoy our Sattu bites with confidence, knowing it is free from microbial contamination and crafted with the highest levels of hygiene and care.

Parameters	Results
Ash content	0.10%
Moisture content	2.96%
Fat content	19.62%
Protein content	4.28%
Fiber content	5.73%

FINAL PRODUCT

SENSORY ANALYSIS OF PREPARED PRODUCT



	Sensory 1	Sensory 2	Sensory 3	Sensory 4	Sensory 5
taste	54	60	58	56	63
Apperance	51	60	60	61	63
Aroma	51	59	57	60	63
Mouth feel	55	60	60	56	62
color	54	61	55	60	63
overall acceptance	55	61	57	57	63

CONCLUSION

Wood apple pickle, made from the (kavath) fruit, is a nutritious and flavorful condiment that offers numerous health benefits. Rich in antioxidants, vitamins, and minerals, woodapple pickle can aid digestion, boost immunity, and provide anti-inflammatory propertie.The ingredients used in woodapple pickle, such as ginger, garlic, and turmeric, add to its medicinal value. The pickle's tangy and slightly sweet flavor makes it a great accompaniment to various Indian dishes However, it's essential to note that the quality of woodapple pickle can vary depending on factors like the freshness of ingredients, production processes, and storage conditions.the benefits of woodapple pickle, it's recommended to:Consume it in moderation due to its high calorie and oil content.Choose a reputable brand or prepare it at home using fresh ingredients.Store it properly in a cool, dry place to maintain its quality. In conclusion, woodapple pickle is a nutritious and flavorful addition to a healthy diet. With its numerous health benefits and culinary uses, it's an excellent condiment to explore

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