BIOLOGICAL STUDY OF CARICA PAPAYA AND FORMULATION & EVALUATION OF HERBAL PAPAYA SOAP

Pallavi Abhay Gosavi[1], Vaibhav A. Jadhav[2], Vikas B. Wamane[3]

[1]Student at Pratibhatai Pawar College of Pharmacy.
[2]Assistant Professor at Pratibhatai Pawar College of Pharmacy.
[3]Assistant Professor at Pratibhatai Pawar College of Pharmacy.

ABSTRACT: Papaya, sometimes known as carica papaya, is a member of the caricaceae family. For a very long time, ayurvedic medications have contained carica papaya. It functions as an anti-inflammatory, antioxidant, diuretic, antibacterial, abortifacient, vermifuge, hypoglycaemic, antihelmenthic, and immunomodulatory, among other things. Scientific data points to their adaptable biological role, which supports their conventional use in treating many ailments. According to phytochemical investigations, the carica papaya plant primarily includes the alkaloids carpaine and pseudocarpaine, as well as sugars, tannins, flavonoids, carcin, and gamma terpenes. Effective pharmacological properties of the plant include anti-inflammatory, antioxidant, diuretic, antibacterial, abortifacient, hypoglycaemia, antifungal, anti-helmenthic and immunomodulatory, hepatoprotective and anticonvulsant action. Papaya (Carica Papaya Linn) is well-known for its exceptional nutritional and medicinal benefits around the world. Since ancient times, the entire papaya plant including the leaves, seeds, ripe and unripe fruits, and their juice has been used as a source of traditional medicine. The fruit has an oval form, a yellowish-green surface, and flesh that is yellow.

KEYWORDS: Carica Papaya Linn., caricaceae, pharmacological activity, solid soap, morphology, cultivation, chemical constituents, formulation & evaluation.

INTRODUCTION-

The Indian medical system known as Ayurveda is extremely well-known and well-liked throughout the world. Ayurveda's disease-prevention and health-promotional primitive approach, which addresses the maintenance and promotion of health while taking into account the entire body, mind, and spirit, is now gaining acceptance.[1] To prevent ageing and rejuvenate the entire functioning dynamics of the body's organs, Ayurveda had created a number of nutritional and therapeutic strategies. The "Rasayanachikitsa" is a term used to describe this regeneration and renewal. [2] A global "herbal renaissance" is taking place as herbs make a comeback. In contrast to synthetic products, which are seen to be hazardous to both humans and the environment, herbal products today stand for safety. Although herbs have been valued for their therapeutic, flavourful, and aromatic properties for millennia, the modern era's synthetic products temporarily overshadowed their significance. However, people are going back to natural products in the hopes of finding safety and security since their naïve reliance on synthetics has ended.[3] Numerous herbal medications with alleged psychotropic properties have been documented in ancient pharmacopoeias from various parts of the world. These provide a wide repertoire of possible compounds that could be turned into cutting-edge psychiatric medicines. Many valuable psychoactive compounds, including yohimbine, ephedrine, tubocurarine, and galantamine, were found through the study of traditional remedies; in fact, approximately 25% of today's conventional pharmaceuticals have a plant origin.[4]

SYNONYMS FOR CARICA PAPAYA:

1. Indian synonyms for Carica papaya Linn.

Language	Names
1. Hindi	Papaya, Papita
2. Bengali	Papaya, Pepe, Papita
3. Malayalam	Omakai
4. Panjabi	Papita
5. Marathi	Papai
6. Tamil	Pappali
7. Gujarati	Papaya
8. Kannada	Pharangi
9. Rajasthani	Eerankari

2. International synonyms for Carica papaya Linn.

Country	Names
1. India	Papita
2. Holland	Tree melon
3. France	Papaya
4. Australia	Pawpaw
5. Brazil	Mamao
6. UK	Papaya, Pawpaw

MORPHOLOGY: -

The papaya is actually an herb, but one with a distinct structure and more of a tree-like appearance. The most common name for C. papaya is papaya. Papayas, unlike trees, are herbaceous rather than woody-looking and stand upright.[46] The leaves have a palm-shaped morphology with an average diameter of between 50 and 70 centimetres. The papaya blossom is frequently dioecious. The subsequent fruit can have a variety of forms depending on the flower. The usual male bloom is straw coloured. The corolla tube is a cylindrical structure with a 2-centimetre diameter. It uses the female flower's racemose shape. The fruit is 5 to 30 centimetres long and yellowish-orange in colour. This fruit's pulp, which is excellent and has a lot of black seeds, cannot be eaten. [47,48]

A polygamous species, papayas. The plants can be divided into three main sex types: male(staminate), female (bisexual), and hermaphroditic (pistillate). Additionally, some plants have the capacity to create multiple bloom types simultaneously. [5]

At high temperatures, there seems to be an increase in the propensity to create male flowers. Because fruit from bisexual plants is favored in particular markets and male trees do not bear fruit, it is crucial to choose seeds that will result in the desired type of fruitful trees. By knowing the type of bloom and the source of the pollen, one can fairly forecast the progeny. The fruit was produced by pistillate flowers that were pollinated by staminate flowers, pistillate flowers that were pollinated by pollen from bisexual flowers, and bisexual flowers that were either self-pollinated or crossed-pollinated with other bisexuals, which resulted in a ratio of one female to two bisexuals. Equal numbers of female, male, and bisexual offspring result from the pollination of bisexual flowers by staminate ones. It is obvious that the second and third combinations will result in the greatest number of plants that bear fruit.[6]

Roots: The early roots of papaya plants contain separate layers of endodermis, epidermis, and cortex. These are nonaxis, thick layers.[49]

Stem: The stem has a soft, hollow, cylindrical trunk that is 30 cm in diameter that extends from the base to the crown. Papaya trees typically have a single trunk and a canopy of large palmate leaves growing from the tip of the trunk, but if they are damaged, they may have multiple trunks.

Leaves: The width of the leaf's ranges from 50 to 70 centimeters. The plant's most distinctive characteristic is a large palmate leaf with 5–9 pinnated lobes that is 40–60 cm wide. In the branches of mature trees, the leaves are arranged spirally and grouped together.[50] The abundance of starch endodermis in the leaf's dorsiventrally situated endodermis, which ranges in length from 30 cm to 105 cm, may be crucial to the position and length of the leaf's dorsiventral region when cavitation occurs. Palisade parenchyma and the leaf's epidermis, on the other hand, are made up of a single layer of cells, while squishy mesophyll is made up of 4-6 cell layers. The leaves are covered in dreary grains and reflective granules (calcium oxalate crystals). The stomata at the base of papaya leaves are particularly important. Anisocytic stomata or a lack of subsidiary cells can be found on papaya leaves' bottom stomata. [51,52] Water, temperature, and light are examples of external elements that can change the stomatal density of 400/mm sq. The sun is illuminating the leaves. The leaf's xylem and phloem were discovered to be there, but the pith was absent, according to a microscopic analysis of the leaf.

Flowers: The term "trioecious Ness" refers to the ability of different plants to produce either male, female, or bisexual blooms in the C. papaya flower. The bisexual papaya's tubular blossoms and the male papaya's long stalks sustain little blooms, while the female papaya's flowers, when closed, have a pear shape. Generally speaking, bisexual plants are more desirable and of higher quality than male or female plants. The actinomorphic, bracteolate, stationary flowers in the cluster are arranged along just one central axis of the cluster. The androecium, which is epipetalous (on the petals or corolla), is composed of ten stamens arranged in two whorls. It has antrorse and bilocular anthers.[53] The calyx (gamopetalous) has five petals in the corolla, five of which are long and yellow in color, and five of which are little and connected (gamosepalous). Only the ovary and stigma are present in female flowers, which lack the androecium. Bracteolate petals are found on male or pistillate flowers. The androecium is absent from pistillate flowers, and the gynoecium is sessile. The superior ovary bears an infinite number of seeds, a short style, and a stigma with five lobes. [54,55]

Fruits: Because: of their melon-like shape and the presence of a seed cavity in the centre, large, oval plant fruits are sometimes referred to as "pepo-like berries." Fruit is borne axillary on the main stem and is typically borne singly, though clusters are occasionally seen. Fruit pulp has a wide spectrum of chemical, nutritional, and digestive characteristics in addition to flavour, colour, and aroma. Plant fruits mature in 5 to 9 months, depending on the cultivator and climate. It is green until it is fully ripe, at which point it becomes yellow or red-orange. When fully ripe, the fruit flesh is yellow-orange to pinkish orange.[56] Fruits are berries with seeds inside the fruit cavity and can be spherical or oval in shape. According to the study, the unripe fruit contained a thick cuticle, laticifers, epicarp parenchyma, mesocarp endocarp, and calcium oxalate crystals that could be seen under a microscope.[57]
Seeds: Papaya plants are frequently multiplied by the use of seeds. Plant seeds have flat, oval cotyledons that range in colour from black to brown. Many black seeds are covered in a mucilaginous substance that is present in the fruit's interior chamber. The seeds have a spicy flavour, are edible, and have antibacterial properties that assist avoid renal failure brought on by the toxin.[58]

Taxonomical classification –

Domain	**:** Flowering plant
Kingdom	**:** Plantae
Subkingdom	**:** Tracheobionta
Class	**:** Magnoliospida
Subclass	**:** Dilleniidae
Superdivision	**:** Magnoliophyta
Phyllum	**:** Steptophyta
Order	**:** Brassicales
Family	**:** Caricaceae
Genus	**:** Carica
Species	**:** Carica papaya Linn.

[45]

GEOGRAPHICAL DISTRIBUTION, CULTIVATION & DESCRIPTION:

The papaya is now grown in most tropical nations, having formerly only been native to southern Mexico (especially Chiapas and Veracruz), Central America, and northern South America. When grown, it expands quickly and bears fruit in three years. However, due to its extreme sensitivity to frost, only tropical regions can support its production. Low temperatures, below 29 degrees Fahrenheit, can be lethal. Growth in Florida is typically restricted to the state's southern regions. Additionally, it favours sandy, well-drained soil because standing water will quickly destroy the plant.[7] The papaya's reproductive system is moderately complex. The plants might be male, female, or hermaphrodite.[8] The male trees are rare, although they occasionally appear when homeowners gather their own seeds. Commercially, hermaphrodite trees are the norm; their fruit is formed like a pear. Self-pollination occurs in these plants.[9]

Except when the apical meristem is destroyed or injured, papaya exhibits great apical dominance and rarely branches. Although some variations in the form and arrangement of leaves have been documented with Malaysian cultivars, palmately lobed, typically big leaves are grouped spirally and clustered at the crown.[10] Papaya cultivars are often distinguished by the number of leaf main veins, the quantity of lobes at the leaf margins, the form of the leaf, the kind of stomata, the presence of waxy substances on the surface of the leaf, and the colour of the leaf petiole. Both female and hermaphrodite papaya trees can produce fruit, however the fruit's form varies. Round fruits come from female trees, but elongated fruits come from hermaphrodite trees. Berries make up the fruit, which can range in size from 5 cm in diameter and 50 g in weight to 50 cm or longer and 10 kg or more.[11] When ripe, the smooth, thin green skin of papaya fruits turns yellow or crimson. The flesh is delicious and comes in a variety of colours and textures, including yellow, orange, and red.

CHEMICAL CONSTITUENTS / ACTIVE COMPOUNDS:

The C. papaya plant has useful components in varying amounts in the fruits, leaves, and seeds, among other plant parts. The leaves' phytochemical examination revealed that they contain alkaloids, cardiac glycosides, and saponins but lacking tannin.[12] A significant study indicated that the primary chemical in the leaves of C. papaya was phenolic acid, while chlorogenic acid was only present in minimal amounts when compared to the flavonoids and coumarin compounds.[13] Flavonoids, numerous other minerals, and key vitamin kinds can all be found in fruits. According to reports, the ripe fruit is a significant source of calcium and vitamins

A and C. [14] The amount of vitamin C in pawpaw varies depending on the stage of development. [15-16] Papayas with red and yellow flesh have different constituents. According to a previous study, papayas with red flesh had a much higher total lycopene concentration than those with yellow flesh.[17] Important types of elements found in papaya seeds play a part in the prevention and treatment of disease. An significant study found that seeds contain appreciable amounts of calcium and phosphorus and proved that they are a rich source of proteins, lipids, and crude fibre. However, it also found that toxicants such glycosylates were present in the seeds.[18]

FRUITS:

Fruits contain a variety of nutrients, including protein, fat, fibre, carbohydrates, minerals such as calcium, phosphorus, iron, vitamin C, thiamine, riboflavin, and niacin, amino acids, citric and malic acids (for green fruits), and volatile compounds such as linalool, benzyl isothiocyanate, cis and trans 2, 6-dimethyl-3,6 epoxy-7 octen-2-ol, alkaloid, 2-phenylethyl -β-D- glucoside, 4-hydroxy-phenyl-2 ethyl- β-D-glucoside and four isomeric malonate benzyl-β-D-glucosides, benzyl-β-D glucoside.[19-20]

SEEDS:

In addition to fatty acids, crude protein, crude fibre, papaya oil, sinigrin, Carpaine, benzyl isothiocyanate, benzyl glucosinolate, glucotropacolin, benzyl thiourea, hentriacontane, β-sitosterol, carissin, and an enzyme called myosin, there are also alkaloids, flavonoids, saponins, tannin.[20]

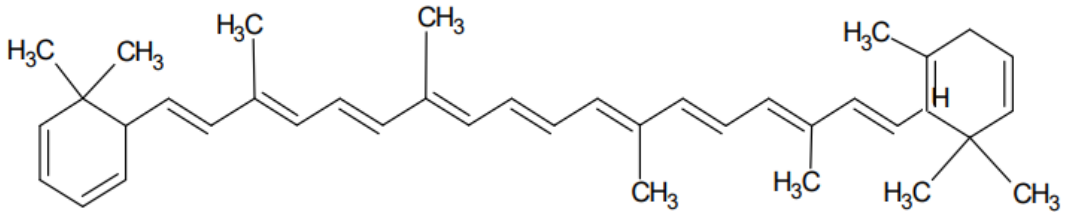


Figure No. 2 Beta Carotene

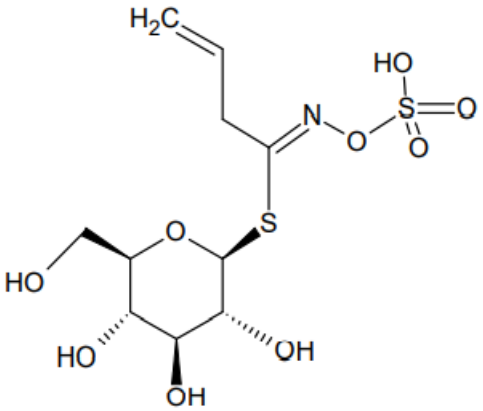


Figure No. 3 Sinigrin

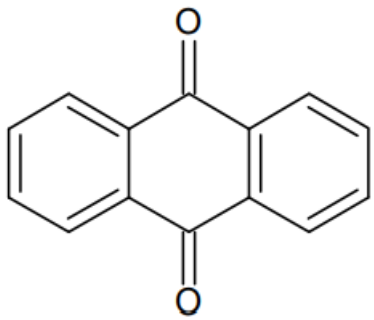


Figure No.4 Anthraquinone

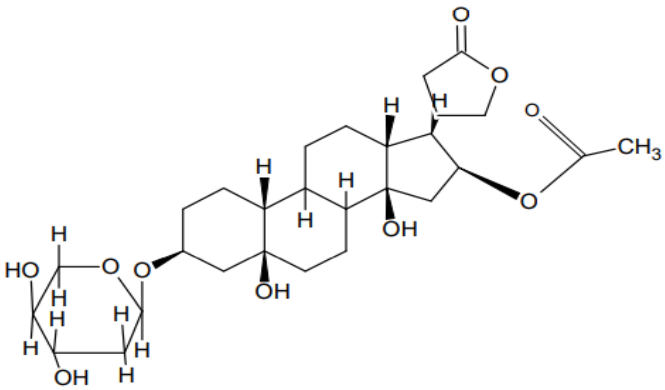


Figure No. 5 Cardiac Glycoside

JUICE:

Juice contains lipids such as myristic, palmitic, stearic, linoleic, linolenic, and cis-vaccenic acids as well as n-butyric, n-hexanoic, and n-octanoic acids.[20]

BARK:

Sitosterol, glucose, fructose, sucrose, galactose, and xylitol are present in the bark.

ROOTS:
Myosin enzyme and carbazide form the root.
LEAVES:
Carpaine, pseudocarpaine, and dehydrocarpaine I and II, choline, carposide, and vitamins C and E are all found in leaves
LATEX:
Latex Papain and chymopapain, glutamine cyclotransferase, chymopapains A, B, and C, peptidases A and B, and lysozymes are

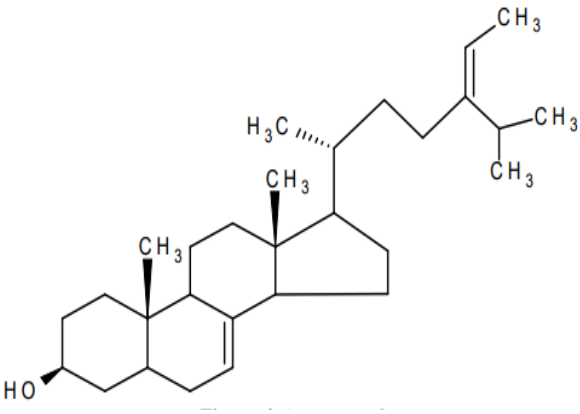


Figure No. 6 Avenasterol

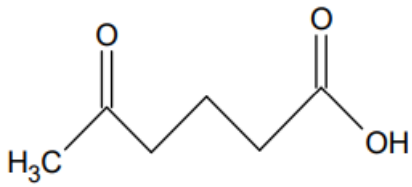


Figure No. 7 Glutaric Acid

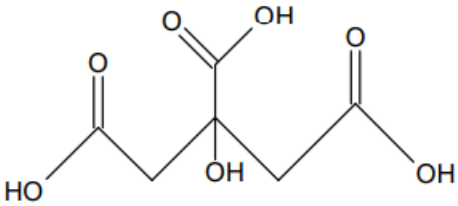


Figure No. 8 Citric Acid

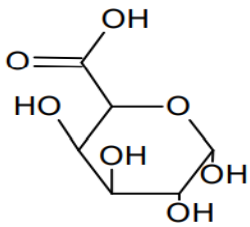
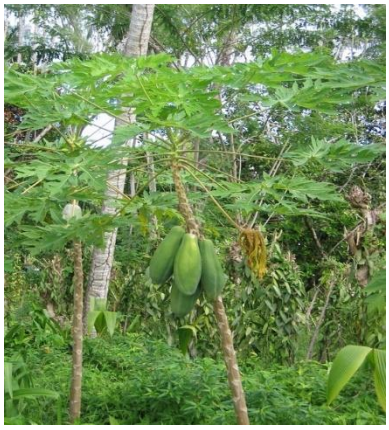


Figure No. 9 Galacturonic Acid

NUTRIENT CONENT OF PAPAYA:
One of the most widely planted fruit trees in the world, particularly in tropical and subtropical regions, is the tree C. papaya, which is native to Central and South America.[21] A significant fruit crop grown all over the world, papayas are mostly eaten fresh. Papaya fruits are primarily made of water and carbohydrates, are low in calories, and are a good source of potassium, ascorbic acid, and vitamins A and C. [22] It is a perennial herbaceous plant with milky latex that can grow up to 12 metres tall. It produces fruit all year long, and each one weighs between 1000 and 3000 g. [23]



(A) **(B)** **(C)**

Figure No. Images of Carica papaya L.: (a) Tree with leaves and green fruits, (b) female flower, and (c) ripe fruit with seeds and pulp.

With a low-calorie content (Table 1) and a high concentration of vitamins and minerals, the fruit of the C. papaya is one of the most popular fruits for human consumption and offers a positive cost-benefit analysis (Table 2). [24]

Table 1: Nutritional value of Carica papaya L. (papaya) macronutrients and fibres per 100 g of pulp from mature fruit, seeds, and leaves. [23,25]

Component	Pulp	Seed	Leaves
Protein	0.6 g	2.6 g	5.8 g
Lipid	0.1 g	3.1 g	1.4 g
Carbohydrates	7.2 g	43.6 g	78.2 g
Fibre	0.8 g	2.11 g	13.1 g
Energy	32..1 kcal	212.7 kcal	348.6 kcal

Table 2: Value of the minerals and vitamins in 100 g of mature fruit pulp, seeds, and leaves of Carica papaya L. (papaya) [24,26]

Component	Pulp	Seeds	Leaves
Sodium	3 mg	ND	ND
Potassium	257 mg	344 mg	534 mg
Phosphorous	5 mg	241.5mg	221.1 mg
Magnesium	10 mg	10.4 mg	32.4 mg
Iron	0.1 mg	0.2 mg	6.4 mg
Calcium	24 mg	54.4 mg	366.1 mg
Vitamin C	61.8 mg	1.7 mg	31.1 mg
Vitamin B9 (Folate)	38 mg	ND	ND
Vitamin B6	0.1 mg	ND	ND
Vitamin B3 (Niacin)	0.34 mg	0.26 mg	0.38 mg
Vitamin B2 (Riboflavin)	0.05 mg	0.05 mg	0.14 mg
Vitamin B1 (Thiamine)	0.04 mg	0.05 mg	0.48 mg
Vitamin A	328 mg	ND	ND
Beta carotene	888 IU	65.64 IU	659.5 IU

The papaya has the highest levels of vitamin C (61.8 mg/100 g), vitamin A (328 mg/100 g), riboflavin (0.05 mg/100 g), folate (38 mg/100 g), thiamine (0.04 mg/100 g), niacin (0.34 mg/100 g), calcium (24 mg/100 g), iron (0.1 g/100 g), potassium (257 mg/100 g), and fibre (0.8 g/ Additionally, compared to other fruits, it has a high carotene concentration. [23,27]
The green fruit has all of the other elements listed in Tables 1 and 2 but is utilised in dishes such salads, pastries, ice creams, and juice without carotene.[27] Consuming the seeds and leaves in addition to the ripe papaya pulp is recommended because they have a better nutritional value and more fibre. [24] In comparison to the fruit pulp, the leaves and seeds contain more carbohydrates (78.2 g and 436 g100 g, respectively) and less protein (5.8 g and 2.63 g100 g, respectively), fats (1.4 g and 3.1 g100 g, respectively), and fibres (13. 1 g and 2.13 g100 g. As a result, they contain more calories (seeds have 212.7 kcal and leaves have 348.6 kcal).[25]
Because the leaves are crucial to the growth of the fruit, their vitamin and mineral concentrations differ from those of the seeds and pulp.[28] For instance, when it comes to minerals, the leaves contain a larger concentration of magnesium, iron, potassium, and calcium (366.1 mg per 100 grammes of leaves compared to 54.4 mg per 100 grammes of seeds). With the exception of vitamin C, the leaves have a larger level of vitamins, with the pulp having the maximum concentration, as indicated in Table 2. [24,29]

HISTOLOGICAL DEVELOPMENT:

The enormous member of the Caricaceae family yields the sweet papaya, often known as papaw or pawpaw. Although its origin is unknown, the papaya may be a hybrid of two or more endemic carica species from Mexico and Central America. It is now grown across the tropical world and in the warmest subtropical areas. The papaya fruit has a mildly sweet flavour that depends on the variety and climate, and it also has a lovely musky aroma. In many nations, it is a popular fruit for breakfast, and it is frequently used in salads, pies, sherbets, cocktails, and sweets. Squash-like dishes can be made with unripe fruit.
The C. papaya is thought to have originated in southern Mexico and Costa Rica before being introduced as a plantation crop in tropical and subtropical countries. Papaya seeds are thought to have travelled and spread throughout the Caribbean and Southeast Asia during Spanish discovery in the 16th century.[30]
According to a long-held idea, many medicinal plants that can be utilised in a variety of human treatments are supposed to be present in nature. Papaya trees are scented tropical evergreens that bear papaya fruit all year long. It is the species that is most frequently farmed and well-known for its therapeutic benefits and nutritional benefits. Carica The scientific name for this fruit, which is in the family Caricacea and genus Carica, is papaya Linn. Christopher Columbus referred the papaya as "Angels' Fruit." By the middle of the seventeenth century, papaya had been widely cultivated. The only papaya grown commercially in the United States now was initially transported to Hawaii in the 18th century.

MEDICINAL AND PHARMACOLOGICAL PROPERTIES:

From papaya, a variety of physiologically active compounds have been identified and their pharmacological effects investigated. Papaya fruit was used to clone and describe an antifungal chitinase. Based on the homology of the chitinase's amino acid sequence with that of other plant chitinases, it is categorised as a class IV chitinase. Additionally, the recombinant papaya chitinase has antimicrobial.[31] The pure chemo papain derived from spray-dried fruit latex that is commercially available has demonstrated immune characteristics.[32]

It has been suggested that the alkaloid carpaine, carpasemine, and benzyl isothiocyanate, as well as cysteine proteinases from papaya fruit, are responsible for the anthelmintic activity of papaya seeds. [33,34] Carpaine, an alkaloid with an intensely bitter taste and a potent heart-depressant effect, has been extracted from the fruit, seed, and leaves in particular. With the use of crude extracts and various fractions from latex, seed, leaf, root, stem, bark, and fruit, papaya's biological activities have been documented. However, numerous papaya pieces have been crudely extracted and employed in traditional medicine to cure a variety of illnesses. However, aside from these, there are several reports on the pharmacological effects and medicinal qualities of papaya based on contemporary scientific studies.

Papaya leaf antioxidant activity varies depending on variety, age, and solvent. Water, methanol, and 70% ethanol were the extraction solvents employed. According to the findings, mature leaves that had been removed using water had the highest level of antioxidant activity. [35,36]

According to one study, papaya peel and seed aqueous extract exhibits larvicidal effects on Aedes aegypti larvae. Additionally, it was discovered that seed extract had greater larvicidal efficacy than peel extract. Maybe because extract contains phytochemicals like flavonoids, tannins, and alkaloids. Another study demonstrated that Aedes aegypti is resistant to insects by way of leaf, bark, root, and seed. Additionally, it was discovered that crude ethanol extract outperformed aqueous extract in terms of effectiveness in containing the vector. Additionally, it was shown that C. papaya leaf extract has the potential to become a source of natural pesticide against the mosquitoes that transmit the diseases chikungunya, filaria, and malaria. [37,38,39]

- **ANTIFUNGAL ACTIVITY**

Fluconazole and papaya latex work together to prevent the growth of Candida albicans. Transmission electron microscope findings show that this synergistic action leads to some cell wall breakdown.[40] When given to a culture during the exponential development phase, latex is statically effective against C. albicans, with a 60% success rate. The lack of polysaccharides in the outermost layers of the fungal cell wall causes cell wall disintegration, which leads to the release of cell debris into the culture medium and the fungistatic effect. [41]

- **IMMUNOMODULAORY ACTIVITY**

In the macrophage cell line RAW 264, fermented papaya preparation has immunomodulatory and antioxidant action. It is also a macrophage activator that increases nitric oxide generation and TNF-alpha secretion without the help of lipopolysaccharides.[42] The concentration of bioactive flavonoids in the antioxidant cocktail, which was produced by fermenting unpolished rice, papaya, and sea weeds with efficient lactic acid bacteria, yeast, and photosynthetic bacteria, has been demonstrated to reduce lipid peroxidation in vivo.[43]

- **ANTIMALARIAL ACTIVITY**

Significant antimalarial activity is seen in the papaya fruit's rind petroleum ether extract. This plant, which is widely distributed across the tropics and whose rind is usually discarded as garbage, contains an active ingredient that may have great commercial potential.[44]

- **ANTISICKLING ACTIVITY**

The anti-sickling activities of C. papaya fruit pulp in distilled water, methanol, and chloroform using sodium metabisulfite were described by Mojisola et al. in the Journal of Natural product. A change in haemoglobin inside of red platelets, where a glutamic acid at position six is replaced by valine, causes sickle cell disease.[59]

- **ANXIOLYTIC AND SEDATIVE EFFECTS**

Numerous medicinal plants or their constituents have sedative and anxiolytic properties. In a study to determine the sedative and anxiolytic properties of ethanolic C. papaya pulp extract in mice, the findings revealed that extract at 100 mg/kg had anxiolytic effect.[60]

- **ANTI-DIABETIC/HYPOGLYCEMIC ACTIVITY**

A major global health issue is diabetes mellitus and the complications that are associated to it. Although oral hypoglycaemic medications are helpful and effective in treatment, they can also have negative side effects. Natural remedies play a significant part in the treatment of problems and type 2 diabetes. A crucial study was conducted to assess the antihyperglycemic and hypolipidemic activity of an aqueous extract of C. papaya Linn's leaves, and the findings demonstrated that the extract significantly decreased blood glucose levels and serum lipid profiles in alloxan-induced diabetic rats when compared to the control group.[61]

- **ANTIFERTILITY EFFECT**

Taking 100 mg/kg of crude, ripe pawpaw seeds orally for 8 weeks caused degeneration of the germinal epithelium and germ cells, a decrease in the number of Leydig cells, and the appearance of vacuoles in the tubules, according to a significant study.[62] Another study's findings showed that oral administration of the aqueous extract of C. papaya (Linn.) seeds at all dose regimens tested, including 50 mg/kg, 100 mg/kg, and 800 mg/kg body weight, altered the normal oestrous cycle's sequence, showing no ovulation and increasing the number of shed ovaries.[63]

- **ANTI-TUMOR/CANCEROUS ACTIVITY**

Plants and their products play a therapeutic role in the prevention and treatment of cancer. In this context, papaya and its beneficial elements play a big part in the treatment of cancer. An important study looked at the impact of aqueous-extracted C. papaya leaf fraction on the development of different tumour cell lines and on the anti-tumour activity of human lymphocytes. The findings revealed that the CP extract had growth inhibitory activity on tumour cell lines produced from adenocarcinoma (MCF-7),

hepatocarcinoma (HepG2), lung adenocarcinoma (PC14), exocrine gland epithelioid cancer (Panc-1), and carcinoma (H2452) in a very dose-dependent manner. In addition, CP extract repressed the proliferative responses of haematopoietic cell lines, together with T-cell cancer (Jurkat), plasma cell leucaemia (ARH77), Burkitt's cancer a (Raji), and anaplastic massive cell cancer (Karpas-299) [64]

- **ANTI-INFLAMMATORY ACTIVITY**

Numerous plants or isolated plant compounds demonstrate an anti-inflammatory effect by modulating a variety of activities. Nonsteroidal anti-inflammatory medicines (NSAIDs), one type of currently prescribed medication, can cause stomach and intestinal ulcers. An important study revealed that the methanolic extract from the seeds of the C. papaya showed inhibition ranging from 57.1% to 64.2%, which is lower than the 85.7% of aspirin, a common anti-inflammatory medicine.[65]

- **ANTIOXIDANT ACTIVITY**

Natural or plant-based products are a strong source of antioxidants and play a crucial role in the treatment and prevention of diseases. In H2O2 oxidative stress-induced human skin Detroit 550 fibroblasts, a significant study's findings have demonstrated that C. papaya seed water extract has potent antioxidant activity. These findings also confirm that the extract is not toxic, reduces cell death, maintains Ca2+ homeostasis, and combats mitochondrial dysfunction. The results of a second study that was conducted to determine the antioxidant and cytotoxic capabilities of fruit and seed extracts demonstrated that both ethyl acetate fractions from the fruits and seeds of C. [66]

- **WOUND HEALING EFFECT**

Numerous plants and the elements they contain have been demonstrated to be important in the healing of wounds. In a study, streptozotocin-induced diabetic rats were utilised to evaluate the aqueous extract of C. papaya fruit for its wound healing potential using excision and dead space wound models. The results showed that the wound area was reduced by 77% in the extract-treated animals compared to 59% in the controls. [67]

AIM: FORMUATION AND EVALUATION OF HERBAL PAPAYA SOAP.

This study's main objective is to create and assess a herbal bath soap with a papaya plant soap base that has special dermatological properties according to Ayurveda

OBJECTIVES:

1. Help hydrate, tone, clean, and revitalize your skin. Every skin type and age group is catered for in herbal papaya soap.

2. Human skin has grown more delicate and prone to accelerated ageing as a result of increased pollution, allergies, microbes, etc. The creation of a herbal papaya soap suitable for all skin types has been attempted. All the parameters have been determined after the synthesis in order to meet the quality requirements.

3. To create and assess a poly herbal papaya soap prepared with herbal components for cosmetic use.

Vitamin C, an antioxidant that can lessen uneven pigmentation and promote the development of collagen, is abundant in papaya soap. Another essential ingredient for the skin is vitamin A, which is also included in the soap. It encourages the growth of new skin cells and could lessen scars, blemishes, and dark spots.

METHODOLOGY:

Preparation of solid soap:

To Prepare Soap we take the required quantity of base in 500 ml of beaker and maintain the temperature at 45c to heat the soap base on the water bath without stirring. Then the soap base will be converts into liquid form and then add the all ingredients to the above mixture. Boil the mixture 45c on the water bath to obtain proper mixture without stirring. Then the mixtures poured into the soap moulds and freeze the soap containing mounds up to 2-3 hours after 2-3 hours remove the soap moulds from the freeze. Allow to 5 minutes then soap will be formed.

Formulation Table:

Ingredients	Quantity
Papaya Powder	15 gm.
Sandal Wood Oil	3-4 Drops
Turmeric	0.6 gm.
Honey	1.3 gm.
Vit E Capsule	5 Drops
Rose Water	Qs.
Soap Base	83 gm.

PAPAYA:

Botanical Name: Carica Papaya

Biological Source: Papaya (carica papaya), commonly known as Papaw or Pawpaw, is a big plant that produces a succulent fruit.
Family: Caricaceae
Geographical Source: Mexico and Central America
Chemical Constituent: Carbohydrates, Proteins, Alkaloids (Carpaine and Pseudocarpaine) Proteolytic Enzyme.
Description-
Color: Green Yellowish and Orange
Odor: Strong Odor

Taste: Sweet and Juicy taste

Use: Papaya products help to reduce acne by removing dead skin cells.

- Papaya is also used skin whitening. [68]

HONEY:

Botanical Name: Apis millifera, Apis dorsata

Biological Source: Bees deposit sugary secretions in honey comb
Family: Apidae
Geographical Source: California, New Zealand, Australia, and Africa.

Colour: Pale Yellowish to Yellowish Brown.

Odour: Characteristic, Pleasant.

Taste: Sweet and Faintly acid

Solubility: Water soluble alcohol insoluble.

Use: Ayurvedic formulation vehicle with demulcent, sweetening, and antiseptic properties. [69]

TURMERIC:

Botanical Name: Haldi, Indian Saffron.
Biological Sources: It consist of dried rhizomes of Curcuma Longa Linn plant.
Family: Zingiberaceae

Geographical Source: India, Malaysia, China, and West Pakistan. Maharashtra, Tamil Nadu, West Bengal, Uttar Pradesh, and Punjab are all in India.

Chemical constituents: Starch, curcuminoids, resinous material, volatile oil

Use: Enhance skin health and treats acne.[70].

SANDALWOOD:

Botanical Name: Yellowish Sandalwood , Lignam Santali.
Biological Source: Dried hard wood of Santalum album.
Family- Santalaceae.
Chemical constituent- Sandalwood oil, α-santalol.
Description-
Colour- yellowish or Pale reddish
Odour-Strong and Fragrant

Taste- Slightly bitter

Used- Antiseptic, Expectorant, Coloring agent, Flavoring agent. [71]

VITAMIN E:

Scientific Name: Tocopherol
Biological Source: Plant-based oils, nuts, seeds, fruits, and vegetables.
Chemical constituents: α-, β-, γ-, and δ-tocopherols and the corresponding four tocotrienols.
Description:
Color: Yellow to Yellowish brown.
Odour: Faint characteristic.
Texture: Sticky, oily, clear & viscous liquid.
Taste: Metallic taste.

Uses: Moisturizing skin, wound healing, skin cancer prevention, reducing skin itching, preventing or minimizing the appearance of scars, preventing or treating fine lines and wrinkles.

ROSE WATER:

To make rose water, rose petals are steam-distilled. Rose water, which has a pleasant aroma, is sometimes used as a mild natural fragrance in place of perfumes that include chemicals. Rose water has been utilised for centuries, even in the Middle Ages. It is thought to have its origins in what is currently Iran. It has historically been utilised in both cosmetics and food and beverage items. It also has a lot of possible health advantages, such as the following.

1. Helps soothe skin irritation
2. Soothes sore throats
3. Reduces skin redness
4. Helps prevent and treats infections
5. Contains antioxidants
6. Heals cuts, scars, and burns
7. Has anti-aging properties

EVALUATION OF PAPAYA SOAP:

- **Physical Parameters:**

In this test, the soap's colour, odour, texture, and state are all noted.

Sr. No.	Parameter	Test-1	Test-2	Test-3
1.	**Colour**	Orange	Orange	Orange
2.	**Odour**	Pleasant	Pleasant	Pleasant
3.	**Texture**	Smooth	Smooth	Smooth
4.	**State**	Solid	Solid	Solid

○ **pH Determination:**

A pH meter was used to measure the pH, and distilled water was used to create a 10% soap solution. The electrode was inserted into the solution after calibrating the pH meter with buffer solution. The pH value was determined and noted.

pH-

Sr. No.	Formulation	pH
1.	Test-1	9.2
2.	Test-2	9.3
3.	Test-3	9.2

○ **Foam Retention Test:**

25 ml of the 1% soap solution was added to a 100 ml graduated measuring cylinder. The cylinder was shaken ten times with hands over it. At 1-minute intervals for 4 minutes, the amount of foam was measured.

Sr. No.	Formulation	Foam Retention (per min)
1.	Test-1	2.3
2.	Test-2	2.2
3.	Test-3	2.1
4.	Test-4	2.0

○ **Foam Height:**

In 25 mL of distilled water, 0.5 grammes of soap were spread as a sample. A 100 ml measuring cylinder was then filled with water to bring the volume up to 50 ml. After giving 25 strokes, the sample was allowed to wait until the aqueous volume reached 50 ml before measuring the height of the foam above the liquid.

Sr. No.	Formulation	Foam Height (cm)
1.	Test-1	2.5
2.	Test-2	2.4
3.	Test-3	2.5

○ **Irritation Test:**

Before new skin care products and components are introduced to the market, they must undergo testing for potential adverse skin reactions (allergy and irritation). To assure customer safety, a dermatological test for human irritability was conducted. All of the test substances (soap base, papaya peel soap, extracted papaya oil, and papaya peel powder) did not irritate skin when used in the tests. In addition, none of the volunteers complained of annoyance during the test period. It is reasonable to conclude that under typical usage conditions, neither of the two soaps was likely to irritate skin.

Sr. No.	Formulation	Irritation Effect
1.	Test-1	Nil.
2.	Test-2	Nil.
3.	Test -3	Nil.

○ **User Satisfaction Test:**

After using both soaps, 20 individuals were asked to complete a survey to measure their contentment. The level of volunteer satisfaction was measured using a 5-point Likert scale. The volunteers were quite satisfied with the texture of the papaya peel soap, but only slightly so with the smell. In any case, there was a clear preference among them for papaya peel soap. The spreadability of papaya peel soap during use received high marks from the participants. They also succeeded in producing peel soap that feels highly absorbable, scrubby, and moisturized. Finally, the volunteers expressed genuine satisfaction with the papaya peel soap.

○ **The Improvement of skin color level:**

Skin colour improvement was assessed using a skin colorbar (adapted from Von Luschan's Chromatic scale) before and after the administration of soap for one month. The scores were calculated using the improvement in skin colour level. The results showed that papaya peel soap (different level = 1.150.93) had a stronger effect on skin colour improvement than soap base (different level = 0.700.64).

DISCUSSION:

In terms of eradicating microorganisms from hands, the soap has shown good cleansing effectiveness. Papaya soap is a good source of vitamin C, an antioxidant that can lessen uneven pigmentation and promote the formation of collagen. Vitamin A is another essential ingredient for the skin that is included in the soap. It may aid in fading scars, dark spots, and blemishes while encouraging the growth of new skin cells.

Your skin feels clean and revitalised after using soap to eliminate dirt and perspiration from your body.

Result: The soap made was evaluated for physicochemical characters such as physical parameters like color, odor, texture state, etc. & pH, foam retention, foam height, irritation test, user satisfaction test and the improvement of skin color level and for other parameters, good characteristics were observed.

Conclusion:
The results indicate that adding crude papain to solid soap boosted dirt removal when compared to soap without enzyme, but had no influence on fatty acids, alkali free, pH, specific density, or foam stability. Based on antioxidant activity, skin safety, and strict adherence to SNI 1996 specifications, Recipe IV was the best formula. It contained 30% papaya fruit as an antioxidant and 1.5 percent crude papain enzyme. The colour of soap is orange, odour is pleasant, texture is smooth with solid state. The pH of the soap is 9.2, the foam retention per minute is 0.1, the average foam height is 2.6. Papaya soap had no skin irritation, costumer satisfied & skin colour improvable. Skin feels clean and revitalised after using soap to eliminate dirt and perspiration from your body.

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