International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Ipomoea Carnea Jacq: A Comprehensive Review

Archana Yadav[1], Dr Hitaishi Singh[2]

[1]Research Scholar, Department of Home Science, Acharya Narendra Dev Nagar Nigam Mahila Mahavidyalaya Kanpur, U.P.- 208012, India
[2]Professor, Department of Home Science, Acharya Narendra Dev Nagar Nigam Mahila Mahavidyalaya Kanpur, U.P. - 208012, India

Abstracts
Pomoea carnea Jacq. A member of the family *Convolvulaceae* is a widely distributed, gregariously growing shrub found across the world. The species is native to South America, West Pakistan, and Sri Lanka, and it was introduced to India as an ornamental plant. In India, it is commonly referred to as *besharam* or *behaya*. Ipomoea carnea thrives in a variety of habitats, including arid and semi-arid regions, ponds, lakesides, roadsides, wastelands, and canal banks. This review provides a comprehensive examination of Ipomoea carnea, encompassing its botanical, ecological, and medicinal aspects. It highlights the plant's morphology, taxonomy, distribution, and reproductive strategies, along with its adaptability to diverse habitats, invasive potential, and behaviour in non-native environments. Furthermore, the review summarizes its chemical profile, mineral and physicochemical properties, proximate composition, and medicinal relevance. The plant has been reported to exhibit notable antibacterial, anti-inflammatory, and antioxidant activities and holds significant traditional value across various cultures.

Keywords: Biocomposites; Phytochemical properties; morphology; chemical composition; medicinal relevance.

1. Introduction:

Pomoea carnea (Family: *Convolvulaceae*), commonly known as Bush Morning Glory in English and Besharam in India, is a widely distributed plant species. The vernacular name *Besharam* or *Behaya* translates to "shameless," referring to the plant's vigorous and uncontrolled growth habit. Ipomoea carnea is distributed across various regions of the world, including Asia, Africa, and North America **[1].** It is a large, diffuse, and robust shrub that typically grows to 2–3 meters in height, with widely spreading branches, and produces a characteristic milky latex **[2].** The plant is considered poisonous and, therefore, unsuitable for use as animal fodder. It grows wild throughout India and in many other parts of the world. Ipomoea carnea is highly adaptable, requiring minimal water for growth and tolerating both drought and waterlogging conditions. Consequently, it can thrive under both rain-fed and irrigated environments. **[3, 4].**

1.1. BOTANICAL FEATURES OF IPOMOEA CARNEA

1.1.1. Taxonomy and Classification:

The taxonomy and classification of Ipomoea carnea are;

A. **Kingdom: Plantae** – This species falls within the plant kingdom, which encompasses multicellular, photosynthesising organisms such as Ipomoea carnea.

B. **Division: Magnoliophyta (Angiosperms)** – Ipomoea carnea is classified among flowering plants whose seeds develop enclosed within fruit.
C. **Class: Magnoliopsida (Dicotyledons)** – As a dicotyledon, Ipomoea carnea seedlings typically produce two seed-leaves (cotyledons) during germination.
D. **Order: Solanales** – The order Solanales includes families such as Convolvulaceae and Solanaceae, and Ipomoea carnea is placed in this group.
E. **Family: Convolvulaceae** – Commonly called the morning-glory or bindweed family, Convolvulaceae includes Ipomoea carnea, a member of this family of vines, shrubs and herbaceous plants.
F. **Genus: Ipomoea** – The genus Ipomoea comprises more than 500 species of herbaceous plants, vines and shrubs; Ipomoea carnea is one such species known for its showy flowers and trailing or climbing habit.
G. **Species: Ipomoea carnea** – This species is recognizable by its heart-shaped leaves, large pink or purplish-pink trumpet-shaped flowers, and its growth as a shrub or small tree; in some locations, it is also noted for its invasive tendencies.
H. **Subspecies and varieties** – Ipomoea carnea is reported to include subspecies (e.g., subspecies fistulosa) or varieties, which may differ in growth habit, flower colour or leaf shape; taxonomic revisions and regional variations may cause these intraspecific ranks to change **[5].** The scientific classification, synonyms and other names of Ipomoea carnea are: **(Table A1) (Figure A1).**

Table A1: Scientific classification, synonyms and other names of Ipomoea carnea [6, 7, and 8].

Scientific classification		Synonyms		Other
Kingdom	Plantae	**English**	Bush Morning Glory	Pink Morning Glory, Borrachero, Bush Morning Glory, Badoh Negro, Matacabra, Morning Glory Tree
Sub Kingdom	Tracheobionta	**Hindi**	Besharm, Bahay	
Division	Spermatophyta	**Marathi**	Besharm	
Sub Division	Magnoliophyta	**Oriya**	Bahay	
Class	Mognolipsida Discotyledons	**Bengali**	Besharam	
Sub class	Asteridae	**Spanish**	Campanagallega, Gloria de la manana	
Order	Solanales	**Chinese**	Shuqianniu	
Family	Convolvulaceae	**German**	Dickstengelige, trichterwinde	
Genus	Ipomoea			
Species	Carnea			

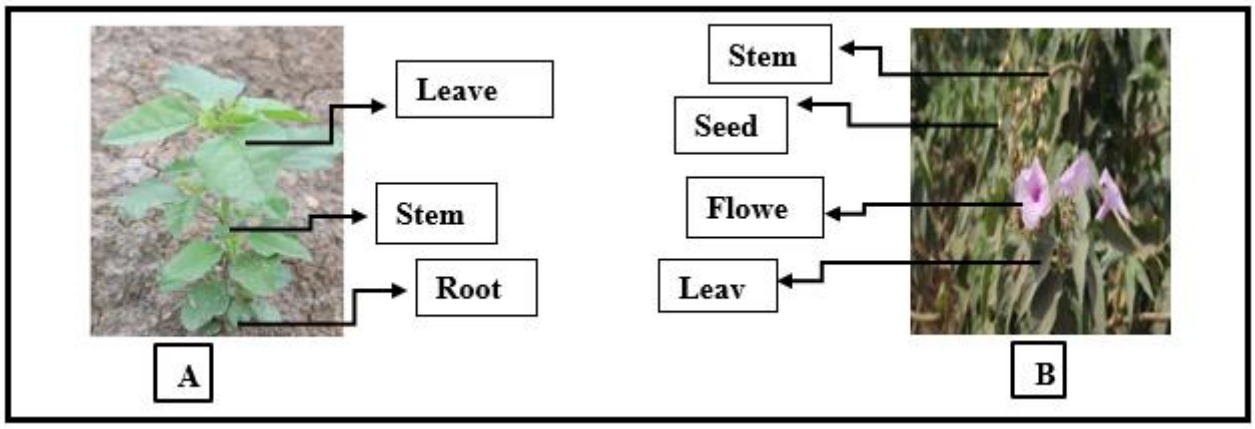


Figure A1: The structural parts of immature (A) and mature Ipomoea carnea (B) [10].

2. MARPHOLOGICAL AND PHARMACOGNOSTIC CHARACTERISTICS OF IPOMOEA CARNEA

Ipomoea carnea is a perennial herbaceous shrub or small tree, typically reaching between 1 and 3 metres in height, though under favourable conditions it may grow even taller**.**

2.1. PHARMACOGNOSTIC OF IPOMOEA CARNEA

2.1.1. Ipomoea carnea stems: On terrestrial sites, Ipomoea carnea may reach 5–6 m in height, though in aquatic environments its stature is reduced. The stem is robust and gradually develops into a woody trunk over several years, branching extensively from the base. Its erect, cylindrical form is woody, hairy and greenish in appearance

Microscopic feature of Ipomoea carnea stem: The stem of Ipomoea carnea is upright, woody and covered in fine hairs, with a roughly cylindrical shape and a greenish tint. **(Table A2) (Figure A2)**

Table A2: Microscopic features and Transverse Section (TS), and Longitudinal Section **(LS) of Ipomoea carnea [8].**

Macroscopic Features of Ipomoea carnea

Specification	Description
Shape	Cylindrical
Colour	Green
Odor	No Odor
Internodes	Hallow 3.2-5.9 cm in length
Surface	Hairy
Diameter	0.5-0.9 cm

Microscopic Features of Transverse Section(TS) and Longitudinal Section (LS) of Ipomoea carnea

Specification	Description
Epidermal Cell	Cells are oval in shape, with a robust cuticle layer; the parenchymatous cells appear angular and densely packed.”
Medullary rays	Three tiers of elongated parenchymatous cells arranged closely together; a uniseriate set of three layers of thin-walled parenchymatous cells in the phloem zone; and elongated cells with lignified walls in the xylem zone.
Vascular Bundle	Phloem is densely aggregated on both the outer and inner sides, and the xylem contains primary vessels with lignified walls.”
Combium	5-7 layers of tangentially elongated radially arranged cambi form cells

	Pith	Large-sized circular parenchyma cells in the central pith, each with thin walls, some of which house sparse calcium-oxalate crystals, resin cells and schizogenous glands.

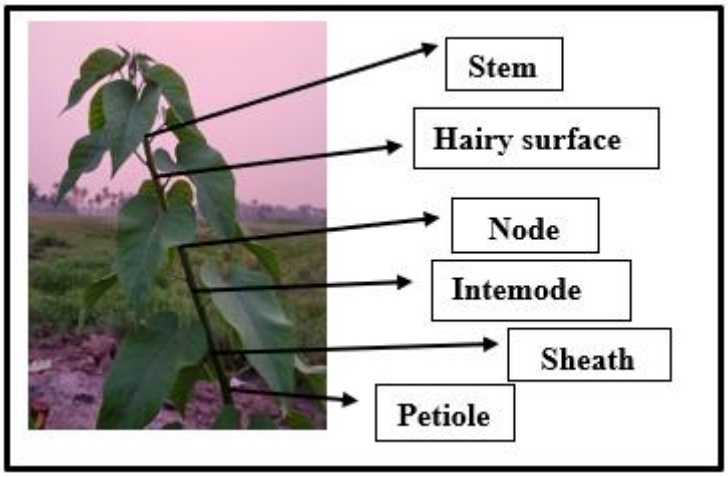


Figure A2: The structural component of Ipomoea carnea stem [11].

2.1.2. Ipomoea carnea Leaf: The leaves are arranged in opposite pairs, measuring approximately 1.25–2.75 m in length and 0.5–0.8 cm in diameter. They are light green, heart-shaped to slightly lanceolate, and range in length from 10 to 25 cm. The upper surface of the leaf is dull green, while the lower surface appears lighter in colour. Leaves growing in shaded conditions tend to be larger than those exposed to full sunlight **[9]. (Table A3) (Figure A3)**

Microscopic feature of Ipomoea carnea Leaf:

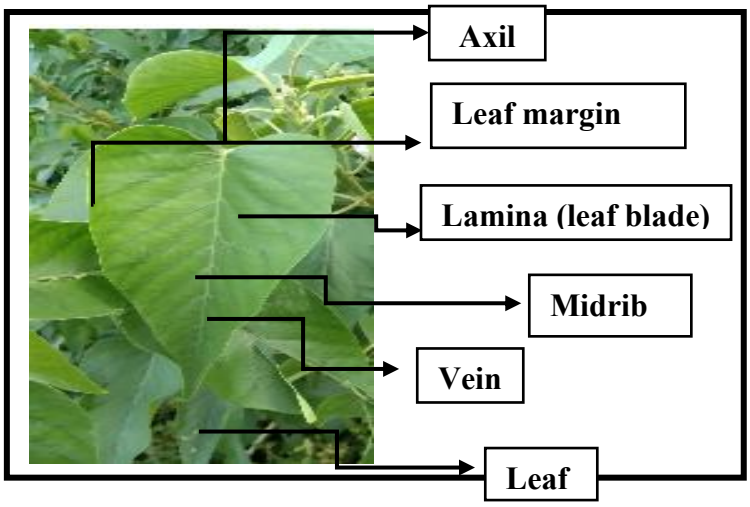
Table A3: Microscopic features and Transverse Section (TS) of Ipomoea carnea leaf [8].

Macroscopic Features of Ipomoea carnea		**Microscopic Features of Transverse Section(TS) of Ipomoea carnea**	
Specification	**Description**	**Specification**	**Description**
Size	12-23 cm in Length and 5.0-9.0 cm in width	**Upper Epidermis**	A single layer of polygonal parenchyma cells bearing trichomes."
Shape	Heart Shaped	**Upper Palisade**	2.3 layers of elongated parenchymatous
Color	Rich Green	**Spongy parenchyma**	Parenchymatous cells are present between the upper and lower palisade layers."
Odor	Odorless	**Lower palisade**	Same to upper palisade 1-2 layer cells
Apex	Cordate	**Lower Epidermis**	Similar to the upper epidermis with more trichomes
		Vascular Bundle	The dorsal side of the leaf contains lignified xylem and non-lignified phloem fibres.

Base	Symmetric
Venation	Reticulate Pinnate
Midrib	Prominent on the lower surface
Surface	Hairy on both sides
Margin	Entire

Trichomes	Epidermis bears glandular, multicellular, branched, thin-walled trichomes.
Stomata	Presence of paracytic-type stomata
Stomatal Index	13.5
Collenchyma	Presence of multiple layers of both the upper and lower ends of the midrib
Cortical Parenchyma	Multilayered, compactly arranged parenchymatous cells occupy about three-fourths of the midrib region

Figure A3: The structural component of Ipomoea carnea Leaf [10].



2.1.3. Ipomoea carnea Flower: The shrubs bear clusters of four-inch pink flowers throughout the spring and summer. The flowers, borne axially on Ipomoea carnea, are supported by upright green pedicels about 0.15 – 0.20 cm in diameter and 1.5 – 2.2 cm long. The corolla is 5.2 – 6.0 cm in length, and the mouth ranges from 1.6 – 1.8 cm wide; the limb has an entire margin and features a few shallow indentations where the petals join **[9,12]. (Table A4) (Figure A4)**

Microscopic feature of Ipomoea carnea Flower:

Table A4: The structural component and Microscopic features of Ipomoea carnea Flower [13, 14].

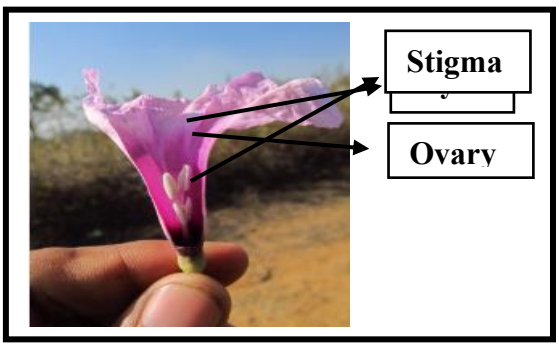
Structural component	
Specification	**Description**
Flower	Trumpet-shaped or funnel-shaped
Color	Most often pink, though occasionally white or softly pale lavender

Microscopic features	
Specification	**Description**
Flowe	Axillary or solitary, or arranged in a scorpioid such as a monochasial cymose inflorescence.”
Pedicel	Erect, solitary and cylindrical, light-green in colour and lightly

Size	Measuring approximately 5 to 10 cm in length and diameter
Petals	The flower features five petals that are fused, forming a trumpet-shaped corolla.
Sepals	Five green, pointed, leaf-like sepals
Pistil	The central reproductive apparatus, comprising the ovary, style and stigma
Stamens	Five stamens fused into a tube.
Blooming Season	Extending from spring through to autumn, influenced by both climate and site-specific conditions
Pollination	Attracted by bees, butterflies, and other pollinators
Aesthetic Value	Commonly cultivated for its decorative blooms.
Growing Conditions	Thrives in warm climates with well-drained soils, and benefits from consistent watering
Pruning	Frequent trimming to promote flowering and preserve form

	pubescent, measuring about 1.5–2.2 cm in length and 0.14–0.20 cm in diameter."
Calyx	Remaining intact, the structure consists of five separate sepals, quincuncially arranged, and ovate.
Shape	Light-green, upright, cylindrical and solitary; slightly pubescent and measuring roughly 1.5 – 2.2 cm in length with a diameter of approximately 0.14–0.20 cm."
corolla-	With five petals conjoined into a single corolla (sympetalous), the bloom is delicate and pink-white, with distinct pink to violet bands where the petals meet. The corolla's mouth is uniformly edged yet slightly indented at the joins, measuring roughly 4.7 to 6.0 cm in length and 1.6 to 1.8 cm across at the opening.

Figure A4: The structure of Ipomoea carnea Flower [15].



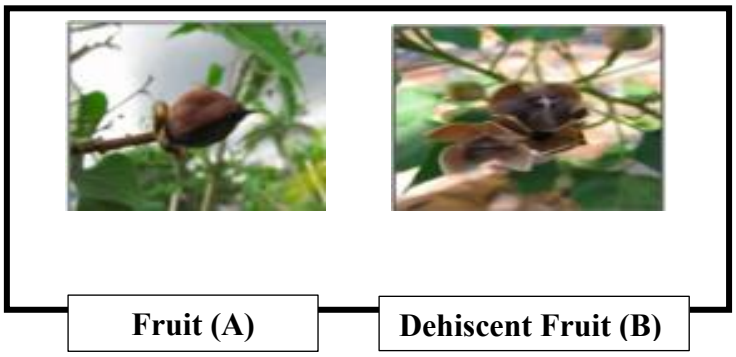
2.1.4. Ipomoea carnea Fruit: The fruit is a simple, dry, dehiscent capsule that splits in a septifragal manner (i.e., its valves detach from the septa) and develops from a superior ovary. It is borne on a stalk (pedicellate), nearly globular in form, with a pointed apex and a rounded base. When unripe, it is grey-green, maturing to grey-brown. It retains five persistent sepals and the remnants of the style at the apex. Its dimensions range about 1.0 to 1.5 cm in height and from 0.8 to 1.3 cm in width. The capsule typically encloses four dark brown seeds densely covered in hairs. The pericarp

is thin (approximately 0.1 cm thick), smooth, and hairless, with the inner surface exhibiting a yellowish-grey hue **[16]. (Table A5) (Figure A5)**

Table A5: The structural component Ipomoea carnea Fruit [16].

Structural component	
Specification	**Description**
Fruit	Dry dehiscent capsule
Shape	Borne on a stalk, nearly spherical in form, with a pointed tip and a rounded base.
Unripe	Greyish green
Ripening	Greyish brown
Pericarp	Thin or 0.1 cm thick,

Figure A5: The Ipomoea carnea Fruit (A) and Dehiscent fruit (B) [17].



2.1.5. Ipomoea carnea Seed: The seed develops from an inverted (anatropous) ovule. It is wrapped in a thick, easily removable layer of pale-brown to greyish-brown hairs (trichomes). In cross-section, the seed is three-sided: two flat ventral faces—often exhibiting a central depression—and one convex dorsal face. Near the base of the ventral surface, adjacent to the hilum, there is a pale scar marking the micropyle. A raised ridge, the raphe, extends from the hilum at the base up to the chalaza at the apex. On the exterior, the seed is cloaked in a dense, cotton-like coat of short, glossy hairs (0.01–0.02 mm thick) that are slightly swollen at their bases; these hairs are particularly elongated along the curved margins of the abaxial surface (at both the top and base of the elliptically-flattened section). Beneath this hairy covering lies a very hard, black, bilayered testa about 0.3 mm thick **[9, 16]. (Table A6), (Figure A6)**

Table A6: The structural component Ipomoea carnea Seed [9, 13].

Structural component	
Specification	**Description**
Seed length	0.4-0.6 cm
Diameter	0.2-0.3 cm

Color	Dark brown to black	
Trichomes	0.7-1.0 cm	
Texture	Hard, woody	

Figure A6: The Ipomoea carnea Seed [13].

2.1.6. Ipomoea carnea Root: The plant develops small adventitious roots on its ventral surface. It also features a primary tap-root from which numerous lateral rootlets emerge. The main root reaches approximately 50–60 cm in length and has a diameter of about 2.0–3.0 cm. On the outside, the root appears yellowish-brown, with a rough texture and distinct longitudinal striations. Its shape is cylindrical and solid. When fresh, it fractures with a flexible break, but when dried, it becomes fibrous **[18]. (Figure A7)**

Figure A7: The Ipomoea carnea Root [19].

SIGNIFICANCE OF IPOMOEA CARNEA

As a raw material for paper manufacturing, this plant serves as an effective alternative to wood. The extracted pulp can be blended with other natural pulps to produce disposable products and various value-added items. The plant also exhibits high material quality, with a cellulose content exceeding 55% and a lignin content of approximately 17%. These characteristics indicate that it is a fibrous material suitable for use as a filler in lightweight polymer composites, providing an efficient approach for utilizing this widely available shrub in textile applications. In addition, the plant shows significant potential in the production of activated carbon, energy generation, inhibition activity, pharmacological applications, papermaking, proximate chemical extraction, pesticides, and bio-compost. **[20].**

PURPOSE AND SCOPE OF THIS STUDY:

A comprehensive study of Ipomoea carnea could address a range of objectives, including ecological, medicinal, botanical, textile, chemical-compositional, mechanical-structural, and nutritional aspects. The potential aims and associated parameters include;

3. CHEMICAL COPOSITION OF IPOMOEA CARNEA:

3.1.Phytochemicals present in Ipomoea Carnea:

Table B1: The Chemical composition of Ipomoea carnea [21, 22].

Measurement Parameter	Result
Acetyl content	4.32
Uronic anhydride	3.45
Ether Solubility	3.04
1%NaOH solubility	28.6
Cold water solubility	8.43
Methoxyl content	4.76
Pentosan content	17.60
Holocellulose	67.49
Hemicellulose	22.40
Lignin content	18.08
Alcohol benzene solubility	8.46
Ash content	6.14
Alpha cellulose	46.45
Hot water solubility	12.60

Table B1.1. : Parts of the Chemical composition of Ipomoea carnea.

S. No.	Parts of Ipomoea carnea	Description	References
1.	**Root**	2-Ethyl-1, 3-dimethylbenzene, 2-(12-pentadecynyloxy) tetrahydro2H-pyran, 3 furanyl [2-hydroxy 4-methyl-2-(2-methylpropyl) cyclopentyl] - methanone, 2, 2 2, 2-dideuterooctadecanal, Hexadecanoic acid and Linoleic acid.	[23]
2.	**Leaves**	Hexadecanoic acid, stearic acid, 2 diethyl phthalate, n-octadecanol, octacosane, hexatriacontane, tetracontane, 3-diethylamino-1- propanol. Leaves also contains swainsonine and calystegines B1, B2, B3 and C1	[24]
3.	**Stem**	2-(12-Pentadecynyloxy) tetrahydro-2H-pyran, 1-Octadecanol, Hexadecanoic acid, Epiglobulol, Squalene, 1-Octadecanol.	[23]
4.	**Flowers**	Flavonoids, tannins, glycosides, alkaloids, carbohydrates and phenolic compounds.	[25]
5.	**Seed**	swainsonine and calystegines B1, B2, B3 and C1	[24]

Table B.1.2: Parts of the Pharmacological Studies of Ipomoea carnea

S. No.	Pharmacological Studies	References
1.	Immune-modulatory effect	[26]
2.	Anti-oxidant activity	[27]
3.	Wound healing activity-	[28]
4.	Anti-Inflammatory Activity	[29]
5.	Antifungal Activity	[30]
6.	Cardiovascular Activity	[31]
7.	Nervous System activity	[32]
8.	Anti-hypoglycemic activity	[33]
9.	Antimicrobial activity-	[33]
10.	Hepatoprotective activity	[33]
11.	Anti-diabetic activity	[34]
12.	Anti-cancer activity	[9]
13.	Anxiolytic activity	[35]
14.	Glycosidase inhibitory activity	[24]
15.	Anticonvulsant activity	[36]
16.	Peroxide production activity	[35]
17.	Sedative activity	[31]
18.	Mosquitocidal activity	[28]

3.2 Anatomical Characteristics of Ipomoea Carnea:

Ipomoea carnea can be classified according to its internal anatomical traits **[12].** The following presents its basic anatomical categorization.

A. Root Anatomy: The roots of Ipomoea carnea frequently exhibit anatomical features characteristic of dicotyledonous plants, such as a central vascular cylinder (stele) surrounded by cortical tissue, an endodermis and an epidermis. Typically, the root system comprises a substantial tap root from which numerous lateral roots develop.

B. Stem Anatomy: Ipomoea carnea is capable of undergoing secondary thickening, which may lead to the formation of woody tissue in more mature axes. Anatomically, the stem may exhibit vascular bundles embedded within ground tissue (parenchyma), encased by an epidermis, and arranged either in a ring-like pattern or scattered throughout the cross-section **[14].**

C. Leaf Anatomy: The leaf blade of Ipomoea carnea typically consists of upper and lower epidermal layers, a differentiated mesophyll (including palisade and spongy parenchyma), vascular bundles, and stomata for gas exchange. The foliage is usually simple, with an entire margin and pinnate (netted) venation **[37].**

D. Flower Anatomy: The reproductive organs of Ipomoea carnea are enclosed within floral whorls, conforming to the typical dicotyledonous floral architecture. Anatomical features of the flower may encompass the corolla lobes (petals), stamens, carpels, and sepals, together with associated reproductive tissues such as the ovary housing ovules **[37].**

E. Fruit Anatomy : The fruit of Ipomoea carnea is a capsule filled with seeds enclosed in compartments. The fruit anatomy may include layers of pericarp tissue (epicarp, mesocarp and endocarp) surrounding the seeds.

F. Seed Anatomy: The seed anatomy of dicotyledonous taxa typically comprises a protective seed coat, nutritive endosperm (when present), and a well-developed embryo **[14].**

DISTRIBUTION OF IPOMOEA CARNEA:

Ipomoea carnea is an evergreen shrub that can grow up to about five meters tall. Over the years, its sturdy stem gradually develops into a well-defined trunk, from which several branches emerge at the base. The stem is erect, cylindrical, woody, somewhat hairy, and greenish in colour. The leaves are arranged alternately, and are either lance-shaped or heart-shaped, light green in colour; their lower surface is a paler shade than the upper side. In shaded conditions, with reduced sunlight, the leaves may grow larger compared to those exposed to full sun **[38].** The fruits are pale pink to light violet and enclosed in a smooth, non-hairy capsule, with silky seeds inside. The flowers appear in loose clusters forming dichotomously-branched, peduncle-borne cymes located both in the leaf-axils and at the tips of branches **[39].**

HABITAT OF IPOMOEA CARNEA:

This plant flourishes in locations that receive abundant sunlight and have well-drained soil. It is commonly encountered in open areas, alongside roadsides and drainage ditches, on riverbanks, and in other disturbed or degraded habitats. As long as the soil does not become waterlogged, it is capable of growing in a range of soil types—sandy, loamy or clay. Moreover, it tolerates occasional flooding and is often found in riparian zones, benefiting from proximity to water yet showing resilience to short-term inundation **[38, 39].**

CLIMATE FOR IPOMOEA CARNEA:

Ipomoea carnea is mechanically vulnerable to frost and cannot endure prolonged periods of cold or freezing conditions. Adequate rainfall or irrigation is necessary for its growth and reproduction, although it becomes fairly drought-tolerant once fully established. It thrives best in warm tropical and subtropical climates, where temperatures remain relatively high year-round **[38, 39].**

4. BIOACTIVE COMPONENT OF IPOMOEA CARNEA:

S. No.	Bioactive components	Effect	References
1.	**Alkaloids**	Alkaloids are nitrogen-containing natural compounds. Some of those present in this plant include Lysergic acid and its derivatives. These substances may possess psychoactive properties and have been investigated for their potential use in treating neurological conditions.	[40]
2.	**Flavonoids**	Flavonoids are a broad class of plant-derived metabolites with diverse biological activities. They function as antioxidants and hold potential health benefits, including anti-inflammatory and anti-cancer effects.	[28]
3.	**Tannins**	Tannins are polyphenolic compounds. They have astringent properties and are known for their ability to bind and precipitate	[41]

		proteins. Tannins may have antimicrobial and anti-inflammatory effects and could contribute to the plant's medicinal Properties.	
4.	**Saponins**	Saponins are glycosides with foaming properties. Cholesterol-lowering effects and their ability to boost the immune system. Saponins found in Ipomoea Carnea may contribute to its medicinal properties.	[42]
5.	**Cardiac glycosides**	The plant contains cardiac glycosides such as digitoxigenin and gitoxigenin. These compounds have been investigated for their cardiovascular properties they enhance the strength of heart contractions and help regulate heart rhythm.	[43]

Table C: Bioactive components and effect of Ipomoea Carnea.

ECOLOGICAL FUNCTION AND CONSEQUENCES

Ipomoea carnea serves important ecological functions across the ecosystems it inhabits. Below are several of its ecological significances.

A. Habitat: Ipomoea carnea provides both habitat and food for a range of organisms in its native ecosystems. Its dense stands offer shelter for insects, birds and small animals, while also serving as a food resource for various fauna.

B. Food: The flowers of Ipomoea carnea attract pollinators such as bees and butterflies, thereby helping to support the pollination of other plant species in the surrounding ecosystem.

C. Soil Stabilization: The extensive root system of Ipomoea carnea helps to stabilize soil, especially in erosion-prone areas such as riverbanks and slopes. By anchoring the soil and reducing runoff, the plant supports soil fertility and structure, which in turn benefits other plants and organisms in the ecosystem.

D. Invasive Potential: Ipomoea carnea has been introduced for ornamental use. In some regions, its rapid growth and tendency to form dense thickets can allow it to outcompete native vegetation, which may result in ecosystem disruption and reduced biodiversity.

E. Allopathic Effects: Ipomoea carnea releases allopathic compounds that can inhibit the growth of other plant species in its vicinity.

F. Nitrogen Fixation: Ipomoea carnea has been found to have nitrogen-fixing abilities. Nitrogen fixation is the process by which certain bacteria convert atmospheric nitrogen into a form that plants can use. This ability enriches the soil with nitrogen **[44].**

Figure D: Interaction with the surroundings of Ipomoea Carnea [24, 45].

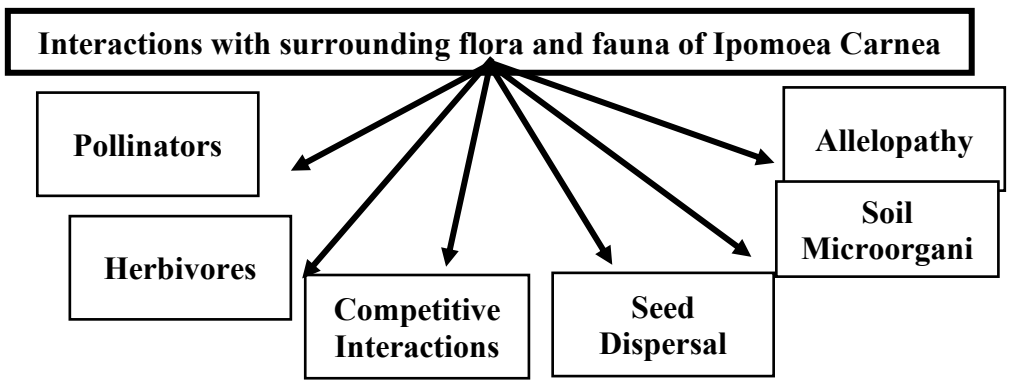


Figure E: Ecological effects of Ipomoea carnea [23, 45

Environmental Impact of Ipomoea Carnea

- Aggressive Growth
- Difficulty of Control Toxicity
- Habitat Alteration
- Impact on Waterways
- Reducing biodiversity through Allelopathy

5. TOXICITY COMPONENTS IN IPOMOEA CARNEA:

The Ipomoea carnea has several poisonous substances that can affect human and animal health. These poisonous substances are;

A. Calystegines: Calystegine compounds belong to a class of nor-tropane alkaloids that inhibit glycosidases — the enzymes responsible for breaking down carbohydrates. By blocking these enzymes, they interfere with normal cellular functions and thereby increase the plant's overall toxicity **[28].**

B. Swainsonine: An indolizidine alkaloid that induces locoism by inhibiting the α-mannosidase enzyme. This impairment disrupts central nervous system function and produces neurological symptoms in animals **[28].**

C. Lysergic Acid Derivatives: Ergot alkaloids, which are linked to lysergic acid, hallucinations and unpredictable behaviour, can be caused by these substances **[28].**

D. The Convolvulaceae Resin Glycosides: Having laxative qualities, these substances can upset the digestive system and cause vomiting, diarrhoea, and headaches **[23, 46].**

5.1. Human toxic effects of Ipomoea Carnea:

Ipomoea carnea has toxic substances to can cause negative consequences on human and cattle health. These are;

- Liver Damage
- Dermatological Reactions
- Respiratory Problems
- Neurological Symptoms
- Gastrointestinal Disturbances **[38, 47].** Similar symptoms are seen in animals and pets that consume the Ipomoea carnea plant. These symptoms are;

5.2. Ipomoea Carnea impacts on livestock health:

- Neurological Disorders
- Gastrointestinal Problems
- Reproductive Problems
- Weight Loss and Poor Condition
- Fatalities **[12, 23 and 46].**

6. MEDICINAL PROPERTIES OF IPOMOEA CARNEA:

Ipomoea carnea is abundant in alkaloids, flavonoids, saponins, and various other bioactive compounds that contribute to its therapeutic potential. The plant has been employed in traditional medicine as an analgesic for alleviating pain, an antipyretic for reducing fever, and an anti-inflammatory agent for

managing inflammation. Additionally, it has been traditionally utilized to treat ailments such as rheumatism, arthritis, and gastrointestinal disorders. Across various cultures, particularly in regions of Africa, Asia, and South America, extracts derived from different parts of Ipomoea carnea have been incorporated into traditional medicinal systems for the management of diverse health conditions **[48].**

6.1. Traditional Applications (Ethnobotany):

The species has been employed in various traditional medical systems, including Ayurveda, Siddha, and Unani, as a component of folk medicine. It is particularly valued for its efficacy in treating dermatological disorders; notably, the plant's milky latex is used to manage leukoderma and other skin ailments **[48].** A hot-water extract of the entire plant is traditionally used for its antirheumatic properties and is also believed to mitigate the teratogenic effects of cyclophosphamide **[49].** It is also harmful for animals because leaf has Leaves have toxic and poisonous effects on the nervous system **[12].** In experimental studies on rats, the aqueous leaf extract of Ipomoea carnea demonstrated embryo toxic effects, leading to skeletal and visceral malformations, developmental deformities, and reduced maternal reproductive performance **[50].** Additionally, in African traditional medicine, the leaves of Ipomoea carnea are reputed to be beneficial in the treatment of piles, rheumatic pain, toothache, and various inflammatory conditions **[47].** The leaf extract of Ipomoea carnea exhibits significant antinociceptive and anti-inflammatory properties. The extract is believed to release certain precursors that modulate the nociceptive pathway, thereby inhibiting pain perception and alleviating symptoms associated with inflammatory conditions **[38].**

6.2. Ipomoea carnea for modern medicine:

Research has identified numerous bioactive compounds in Ipomoea carnea, including phenolic and flavonoid constituents, which contribute to its broad spectrum of medicinal properties. Notably, the plant exhibits significant analgesic and anti-inflammatory activities, suggesting potential therapeutic applications in the management of inflammatory disorders and pain **[31].** Owing to its strong antioxidant capacity, I. carnea may also play a role in mitigating conditions associated with oxidative stress, such as cancer, neurodegenerative diseases, and cardiovascular disorders. Furthermore, the species demonstrates notable antibacterial and antifungal activities, showing effectiveness against a variety of microbial pathogens. Emerging evidence also suggests that Ipomoea carnea may possess antidiabetic potential, possibly through mechanisms involving enhanced insulin sensitivity or modulation of glucose metabolism. In addition, its neuroprotective properties indicate potential usefulness in the treatment of neurological disorders, including Parkinson's and Alzheimer's diseases **[51].**

Despite these promising findings, it is important to note that Ipomoea carnea contains toxic constituents, which necessitate careful evaluation before therapeutic application. To establish safe and standardized formulations and to substantiate its pharmacological potential, extensive research and well-controlled clinical studies are essential. If these challenges are effectively addressed, Ipomoea carnea could emerge as a valuable source of novel compounds for the development of modern therapeutic agents **[28, 52].**

ECOLOGICAL MANAGEMENT AND SUSTAINABLE USE OF IPOMOEA CARNEA:

Numerous strategies are involved in the Ecological Management and Sustainable Use of Ipomoea carnea, which are;

- Invasive Species Management
- Habitat Restoration
- Integrated Pest Management (IPM)
- Research And Monitoring

- Community awareness and education **[46, 47].**

RESEARCH GAP OF IPOMOEA CARNEA:

Extensive research has been conducted on Ipomoea carnea, focusing on its human and animal health impact, phytochemical profile, chemical composition, and toxicological properties. However, several research gaps have remained. These gaps are;

Extensive studies have been conducted on the pharmacological and bioactive components of Ipomoea carnea*;* however, its nutritional potential for improving human and animal health remains underexplored and could be beneficial if utilized appropriately **[40].** As previously noted, numerous investigations have also examined the ecological consequences **[44],** environmental impact **[23],** and medicinal properties of the species, yet several aspects in these areas still warrant further research.

Conclusion:

This review provides a comprehensive analysis of Ipomoea carnea*,* encompassing its botanical characteristics, morphological and anatomical features, microscopic structure, chemical composition, bioactive constituents, medicinal properties, and its potential significance in contemporary medicine.

References

1. Correll, D. S., & Johnston, M. C. (1970). Manual of the vascular plants of Texas.
2. Haines, H. H. 'Botany of Bihar and Orissa', Vol. II, Calcutta Publications, India. 1969.
3. Chand, N., Khazanchi, A. C., & Rohatgi, P. K. (1986). Structure and properties of Ipomoea carnea: Its performance in polymer, clay and cement-based composites. *International Journal of Cement Composites and Lightweight Concrete*, *8*(1), 11-20.
4. Dutt, D., & Tyagi, C. H. (2010). Studies on Ipomoea carnea and Cannabis sativa as an alternative pulp blend for softwood: optimization of soda pulping process. *J. Sci. Ind. Res*, *69*(6), 460-467.
5. Shrivastava, D. & Shukla, K. 2015. Pharmaceutical efficacy of Ipomoea carnea. *Biological Forum – An International Journal.*7(1): 225-235.
6. Saxena, P. K., et al. (2017). A review of Ipomoea carnea: An exploration. *International Research journal of pharmacy,* 8(6), ISSN 2230-8407. doi: 10.7897/2230-8407.08688.
7. Nandkumar, P. (2009). Pulp Blending and Its Effects on the Strength Properties of Ipomoea carnea Jacq. *Asian journal of chemistry*, 3, 4571-4576.
8. Sahu, K., & Kohli, S. (2018). Pharmacognostical analysis of the leaf and stem of Ipomoea carnea (L.) Jacq (Convolvulaceae) grown in India. *Journal of Pharmacognosy and Phytochemistry*, *7*(4), 929-934.
9. MS, A., MMA, A., & SA, E. K. (1988). Macro-and micromorphology of Ipomoea carnea Jacq. Growing in Egypt-Part I: leaf and flower.
10. Dreamstime: https://www.dreamstime.com/photos-images/ipomoea-carnea.html.
11. Wikimedia Commons: https://commons.wikimedia.org/w/index.php?search=Ipomoea+carnea++stem+&title=Special%3AMediaSearch&type=image.
12. Sharma, A., & Bachheti, R. K. (2013). A review of Ipomoea carnea. *Int J Pharm Bio Sci.,* 4(4): 363 - 377.
13. Puri, S., et al. (2024). Pharmacological Activities of Ipomoea carnea: A Comprehensive Review. *International Journal of Innovation Research in Technology,* 11(4), 2349-6002.

14. Mukherjee, P., Pathak, S. K., & Kumar, J. (2019). Studies on morpho-taxonomy, anatomy and palynology of Ipomoea carnea Jacq growing in Jharkhand, India. *Annals of Plant Sciences*, *8*(3).
15. Eflora of India: https://efloraofindia.com/efi/ipomoea-fistulosa/.
16. Shaltout, K. H., Al-Sodany, Y. M., & Eid, E. M. (2006). The biology of Egyptian woody perennials-2. Ipomoea carnea Jacq. *Ass. Univ. Bull. Environ. Res*, *9*(1), 75-91.
17. Wadnerwar, N., Deogade, M., & Singh, M. (2023). Pharmacognostical and Pharmaceutical Exploration of the Traditional Medicine Ipomoea carnea Jacq. *International Journal of Ayurvedic Medicine*, *14*(1), 139-144.
18. Afifi, M. S., Amer, M. M. A., & El-Khayat, S. A. (1988). Macro-and micro-morphology of Ipomoea carnea Jacq. Growing in Egypt. Part II. Stem and root. *Mansoura Journal of Pharmaceutical Science*, *4*, 88-97.
19. Nazim, N. B., Khatun, A., & Mannan, M. A. (2024). Traditional uses, phytochemistry and pharmacology of Ipomoea Carnea: An updated systematic review.
20. Bhalerao, S. A., & Teli, N. C. (2016). Significance of Ipomoea carnea Jacq. A comprehensive review. *Asian Journal of Science and Technology*, *7*(08), 3371-3374.
21. Fatima, N., Rahman, M. M., Khan, M. A., & Fu, J. (2014). A review on Ipomoea carnea: pharmacology, toxicology and phytochemistry. *Journal of Complementary and Integrative Medicine*, *11*(2), 55-62.
22. Thakkar, N., Saxena, S., & Malik, P. (2022). Pharmacological Study on Ipomoea carnea-A. *International Journal of Research and Review,* 9(9), E-ISSN: 2349-9788; P-ISSN: 2454-2237, DOI: https://doi.org/10.52403/ijrr.20220904.
23. Sahayaraj, K., Kombiah, P., Dikshit, A. K., & Rathi, M. J. (2015). Chemical constituents of essential oils of Tephrosia purpurea and Ipomoea carnea and their repellent activity against Odoiporus longicollis. *Journal of the Serbian Chemical Society*, *80*(4), 465-473.
24. Balogh, D., Dimande, A.P., Lugt, V.D., Molyneux, J.R., Naude, T.W., Welman, W.G. (1999). Lysosomal storage disease induced by Ipomoea carnea in goats in Mozambique. *Journal of Veterinary Diagnostic Investigation,* 11, 266-273.
25. Mungole, A.J., Awati, R., Chaturvedi, A., Zanwar, P. (2010). Preliminary phytochemicals of Ipomoea obscura (L) - A hepatoprotective medicinal *plant. International Journal of Pharm Tech Research,* 2(4), 2307-4304.
26. Kunal, V., Singla, C., Sharma, A., & Bhiman, A. (2021). An update on phytochemistry and therapeutic properties of Ipomoea carnea. *Journal of Pharmacognosy and Phytochemistry*, *10*(1), 1-6.
27. Arshad, S., Shahwar, D., Jahangir, M., Siddiqui, S. Z., Shahzadi, T., & Ajaib, M. (2010). Evaluation of comparative antioxidant potential of aqueous and organic fractions of Ipomoea carnea. *Journal of Medicinal Plants Research*, *4*(18), 1883-1887.
28. Ambiga, S., Narayanan, R., Gowri, D., Sukumar, D., & Madhavan, S. (2007). Evaluation of wound healing activity of flavonoids from Ipomoea carnea Jacq. *Ancient science of life*, *26*(3), 45-51.
29. Khalid, M. S., Singh, R. K., Reddy, I. N., Kumar, S. J., Kumar, B. S., Kumar, G. S., & Rao, K. S. (2011). Anti-inflammatory activity of aqueous extract of Ipomoea carnea Jacq. *Pharmacologyonline*, *1*, 326-331.
30. Nidiry, E. S. J., Ganeshan, G., & Lokesha, A. N. (2011). Antifungal activity and isomerization of octadecyl p-coumarates from Ipomoea carnea subsp. fistulosa. *Natural Product Communications*, *6*(12), 1934578X1100601224.

31. Bachhav, K. V., Burande, M. D., Rangari, V. D., & Mehta, J. K. (1999). Effect of aqueous extract of Ipomoea carnea leaf on isolated frog and mouse heart. *Indian Journal of Experimental Biology*, *37*(11), 1080-1084.
32. Ríos, E., Cholich, L., & Silva, J. (2008). Acosta de Pérez. Histopathological lesions in the central nervous system of goats poisoned by Ipomoea carnea. *Rev. Vet*, *19*(2), 130-134.
33. Kamal, A. M., Shakour, Z. T. A., All, S. A., Sleem, A. A., & Haggag, E. G. (2017). Phytochemical and biological investigation of Ipomoea carnea Jacq. Grown in Egypt. *International Journal of Pharmacognosy and Phytochemical Research*, *9*(2), 266-281.
34. Khatiwora, E., Adsula, V. B., Kulkarni, M., Deshpande, N. R., & Kashalkar, R. V. (2013). Isolation and characterization of substituted dibutyl phthalate from Ipomoea carnea stem. *Der Pharma Chemica*, *5*(5), 5-10.
35. Bidkar, J. S., Bhujbal, M. D., Ghanwat, D. D., & Dama, G. Y. (2012). Anxiolytic activity of aqueous and methanolic extracts of Ipomoea carnea leaves. *International Journal of Universal Pharmacy and Bio Sciences*, *1*(2), 1-11.
36. Bhattacharya, S. K., Ray, A. B., & Dasgupta, B. (1975). Central Nervous System Depressant Activity of Ipomea carnea Jacq. *Indian Journal of Pharmacology*, *7*(4), 31-34.
37. Afifi, M. S., Amer, M. M. A., & El-Khayat, S. A. (1988). Macro-and micro-morphology of Ipomoea carnea Jacq. Growing in Egypt. Part II. Stem and root. *Mansoura Journal of Pharmaceutical Science*, *4*, 88-97.
38. Kumar, A., Manral, U., & Sharma, S. (2014). Traditional remedy for muscle strain using Ipomoea carnea Jacq. And Ricinus communis L. leaves in Haryana, India. *International Journal of Medicinal Plants*, *108*, 625-631.
39. Cook, C. D. K. (1987). Ipomoea fistulosa: A new problem for India. *Aquaphyte*, *7*(1), 12.
40. Ikeda, K., Kato, A., Adachi, I., Haraguchi, M., & Asano, N. (2003). Alkaloids from the poisonous plant Ipomoea carnea: effects on intracellular lysosomal glycosidase activities in human lymphoblast cultures. *Journal of agricultural and food chemistry*, *51*(26), 7642-7646.
41. Abd-ElGawad, A. M., Elshamy, A. I., Elgorban, A. M., Hassan, E. M., Zaghloul, N. S., Alamery, S. F., & Ei-Amier, Y. A. (2022). Essential oil of Ipomoea carnea: Chemical profile, chemometric analysis, free radical scavenging, and antibacterial activities. *Sustainability*, *14*(15), 9504.
42. Kashyap, S., & Rani, L. (2021). Phytochemical screening of primary and secondary metabolites in four species of Ipomoea (I. aquatica, I. batata, I. carnea, I. palmata)-an underutilized ethnomedicinal weed of Jharkhand. *Biospectra*, *16*, 139-144.
43. Khatri, R. A. (2025). Review of Properties of Indian Wild Medicinal Weed: Ipomoea carnea Jarq. *International Journal of Creative Research through* (IJCRT), 13(8), ISSN 2320-2882.
44. Rishita, S., Khushi, S., Harsh, P., Aastha, P., Mulla, T., & Jha, A. N. (2025). A comprehensive review of Ipomoea carnea: botanical, ecological and medicinal perspectives. *International Journal of Research in Pharmacy and Allied Science*, *3*(6), 10-41.
45. Tirkey K, Yadava RP, Mandal TK, Banerjee NL. (1998). The pharmacology of Ipomoea carnea. Ind. *Vetn. J* 65:206-210.
46. Latif, A. K. A., Prasad, A. K., Shankul Kumar, S. K., Iyer, S. V., Patel, H. A., & Patel, J. A. (2012). Comparative antidiabetic studies of leaves of Ipomoea carnea and Grewia asiatica on streptozotocin-induced diabetic rats.

47. Chowdhury, A. K. A., Ali, M. S., & Khan, M. O. F. (1997). Antimicrobial activity of Ipomoea fistulosa extractives. CABI digital library, 68(4), 379-380.
48. Adsul, V. B., Khatiworaa, E., & Deshpande, N. R. (2012). Evaluation of antioxidant activity of Ipomoea carnea leaves.
49. Phillips, O., Gentry, A. H., Reynel, C., Wilkin, P., & Gálvez-Durand, C. (1994). Quantitative ethnobotany and Amazonian conservation. *Conservation biology*, *8*(1), 225-248.
50. Hosomi, R. Z., de Souza, H., Górniak, S. L., Habr, S. F., Penteado, S. W., & Varoli, F. M. F. (2008). Embryotoxic effects of prenatal treatment with Ipomoea carnea aqueous fraction in rats. *Brazilian Journal of veterinary Research and animal Science*, *45*(1), 67-75.
51. Rout, S. K., & Kar, D. M. (2013). Sedative, anxiolytic and anticonvulsant effects of different extracts from the leaves of Ipomoea carnea in experimental animals. *Int J Drug Dev Res*, *5*(2), 232-243.