

A Comprehensive Review on Ipomoea Carnea

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Abstract: *Ipomoea carnea*, commonly known as pink morning glory, is a rapidly growing shrub widely distributed across tropical and subtropical regions. It has garnered attention due to its diverse phytochemical profile, traditional medicinal applications, and ecological significance. The plant is rich in bioactive compounds such as alkaloids, flavonoids, and saponins, which contribute to its reported antimicrobial, antioxidant, anti-inflammatory, and neuroprotective properties. In addition to its medicinal potential, *I. carnea* plays a role in environmental management through phytoremediation and soil stabilization. However, its toxic components—particularly the alkaloid swainsonine—pose serious health risks to livestock and raise concerns about its safe use. Moreover, its invasive nature in non-native habitats highlights the need for careful ecological monitoring. This review explores the botany, phytochemistry, pharmacological potential, toxicology, and environmental impact of *Ipomoea carnea*, emphasizing the need for further studies to balance its benefits and risks.

Keywords: *Ipomoea carnea*, Pharmacological studies, phytomedicine, Traditional Uses.

INTRODUCTION

The plant species *Ipomoea carnea* (Family: Convolvulaceae) is also known as Besharam in India and Bush Morning Glory in English. Its broad dispersion is suggested by the Hindi and Marathi words besharam/behaya, which indicate shameless. The *Ipomoea carnea* plant is found in North America, Asia, and Africa, among other places. Every day, new flowers are produced by the dazzling morning glory flower, which blooms in the sun, dries up in the afternoon, and fades into the night (Soni Rishita, 2024). This flower is described by its name alone. This evergreen, blooming shrub grows to a height of 5 to 6 meters. The thick stem takes years to consolidate into a trunk, with several branches emerging from the base. The stem is greenish, woody, hairy, and upright with a somewhat cylindrical shape. It has leaves that are paired together. Its typical dimensions are 0.5 to 0.8 cm for diameter and 1.25 to 2.75 m for length. The light green leaves are heart-shaped or somewhat lanceolate, and they range in length from 10 to 25

centimetres. The lower surface of the leaf is lighter than the upper surface, which is drab green. Less sunlight may cause the leaves to grow larger than those that get full sun. Throughout the spring and summer, the plants bear bunches of 4-inch pink flowers. The flowers of *Ipomoea carnea* are axial (Afifi, 1988). The green, cylindrical pedicel stands erect. Its length is between 1.5 and 2.2 cm, while its diameter is between 0.15 and 0.20 cm. The mouth of the corolla is 5.2–6.0 cm long and 1.6–1.8 cm wide. It has a full border and a few distinct indentations where the petals are cohesive. The seed is smooth, and the fruit has a glabrous capsule. The blooms are pale rose, pink, or light violet and are in lax, terminal, pedunculate cymes.

BOTANICAL PROFILE:

Taxonomy	Classification
Kingdom	Plantae
Sub-kingdom	Tracheobionta
Division	Spermatophyte
Sub-division	Magnoliophyte
Sub-class	Asteridae
Order	Solanales
Family	Convolvulaceae
Genus	<i>Ipomoea</i>
Species	<i>Carnea</i> Jacq

Table1: Taxonomical classification of genus: *Ipomoea* (Shrivastava, 2015)

Language	Name
Hindi	Beshram, Behaya
Marathi	Beshram
English	Bush morning glory, tree morning glory
Bengali	Beshram
Chinese	Shuqianniu
Spanish	Campanagallega, Gloria de la manana

Table 2: Common names of *Ipomoea* used in different languages (Soni Rishita, 2024)

Synonyms:

Batatas crassicaulis Benth, *Convolvulus batatilla* Kunth, *Ipomoea batatilla* (Kunth) G. Don, *Ipomoea crassicaulis* (Benth.) B.L. Rob. *Ipomoea fistulosa* Mart (Nayak S. K., 2015)

DESCRIPTION OF PLANT:

Ipomoea carnea is a shrub that can grow up to 6 meters tall, but under wet conditions, it may grow shorter. The stem thickens and grows into a big trunk with multiple thick branches emerging from the base after a few years of growth. Petiolate and simple leaves. With diameters of 2.5 to 3.0 mm and lengths of 4.0 to 7.5 cm, the petiole is spherical (Bhalerao S.A., 2016)

Part of plant	Description
Stem	<i>Ipomoea carnea</i> has an upright, hairy, woody stem that is roughly cylindrical in form and has a greenish hue.
Root	The plant has several lateral rootlets growing from its tap root. The root is 2.0– 3.0 cm in diameter and 50–60 cm long. The root's exterior is yellowish brown, with a rough surface displaying longitudinal striations. It is cylindrical in shape, firm, and can fracture easily when it's young before hardening into fibrous material as it gets dry.
Leaves	Throughout the spring and summer, the plants produce clusters of 4-inch-long pink blooms. Its cylindrical, green pedicel shaped blooms are axial. The flower has a maximum length of 1.5 to 2.2 cm and a maximum diameter of 0.15 to 0.20 cm. The terminal blooms have a delicate violet, pink, or rose colour.
Fruits	The fruit are ovoid, pale brown capsules that are 1.5 to 2 cm long and still have the sepals attached. The four black to brown seeds is released when the septa between them open
Seeds	The seeds have a triangle cross shape, with one short convex side and two long, flat sides. Up to one-centimetre-long hairs cover them.

Table 3: Description of *Ipomoea carnea*.

HABITAT:

Ipomoea carnea is a shrub that grows between one and three metres tall. In open spaces, it grows upright or ascending; in shaded areas, it tends to climb, with twining stems that can reach five metres in length. This flower is often seen along the side of the road and in rural Bangladeshi and Indian communities. At heights of up to 1,000 metres above sea level, along rivers and canals, and occasionally on beaches (Henderson L., 2015)

MORPHOLOGICAL AND ANATOMICAL CHARACTERISTICS OF IPOMOEA CARNEA:

Morphological Characteristics

Although it can grow shorter in watery settings, *Ipomoea carnea* can reach a maximum height of 6 meters. The stem thickens and grows into a big trunk with several thick branches emerging from the base after a few years of growth. Petiolate and

simple leaves. The cylindrical petiole can grow to 4.0–7.5 cm in length and 2.5–3.0 mm in diameter (Kiran BR, 2016). The upright, hairy, woody stem of *Ipomoea carnea* is greenish in color and generally cylindrical in shape. Additionally, the plant's leaves alternate. Typically, its leaves measure 0.5 to 0.8 cm in diameter and 1.25 to 2.75 m in length. The leaves are bright green, heart-shaped, or somewhat lanceolate, and range in length from 10 to 25 cm (Sharma A. a., 363-377). Clusters of 4-inch pink flowers are produced by the plants during the spring and summer. Its green pedicel-shaped, cylindrical blooms are axial. Flowers can grow up to 1.5 to 2.2 cm in length and 0.15 to 0.20 cm in diameter. The blooms are light violet, rose, or pink in color, with terminal, pedunculate cymes; the seeds are silky; and the fruits have a glabrous capsule (Soni Rishita, 2024).The mouth of the corolla is 1.6–1.8 cm wide and 5.2–6.0 cm long, with a complete edge and a few noticeable indentations at the locations where the petals are cohesive. It is referred to as *Ipomoea fistulosa* and *Ipomoea crass caulis* in science (7532696526962, 2011), This plant's seed has three sides: a convex dorsal surface, and two flat ventral surfaces with a central depression (Soni Rishita, 2024).



Leaves



Whole Plant

Anatomical Characteristics Using an anatomical classification, *Ipomoea carnea* can be grouped based on its internal anatomical characteristics. Even though *Ipomoea carnea* may not have as many in-depth anatomical studies as other species that have been studied in great detail, general anatomical features can nevertheless be established (Sharma A. a., 363-377).

CHEMICAL COMPOSITION:

Overview of Phytochemicals Present in *Ipomoea carnea*

Ipomoea carnea contains a diverse range of phytochemical components in various plant parts, all of which support the plant's biological traits. For instance, compounds like 2-Ethyl-1,3-dimethylbenzene, 2-(12-Pentadecynyloxy) tetrahydro-2H-pyran, and 3-Furanyl [2-hydroxy-4-methyl-2-(2-methyl propyl) cyclopentyl]-methanone are found to be present in the roots. In addition, the roots include linoleic acid, hexadecanoic acid, and 2,2-Dideuteriooctadecanal. Furthermore, the stems contain compounds including 1-Octadecanol, Hexadecanoic Acid, 2-(12-Pentadecynyloxy) tetrahydro-2H-pyran, and epiglobulol that contribute to their chemical composition. These components emphasize the stem's function in the plant's physiology and potential therapeutic benefits (Sahayaraj, 2015). *Ipomoea carnea*'s leaves, which contain a variety of compounds, are another significant part of the plant. Studies have shown that the compounds include hexadecanoic acid, stearic acid, 1,2 diethyl phthalate, n-octadecanol, octacosane, hexatriacontane, tetracontane, and 3-diethylamino-1-propanol (Sahayaraj, 2015), (Balogh, 1999) (Tirkey K, 1998). The presence of swainsonine and calystegines B1, B2, B3, and C1 in the aqueous ethanolic extract of the leaves further demonstrates the medicinal potential of this plant portion (Balogh, 1999). Furthermore, it has been discovered that *Ipomoea carnea* flowers contain a broad variety of phytochemicals, such as flavonoids, tannins, glycosides, alkaloids, polysaccharides, and phenolic compounds (Balogh, 1999), (Mungole, 2010), (Tirkey K, 1998). octacosane, hexatriacontane, tetracontane, and 3-diethylamino-1-propanol. The flowers' therapeutic significance is shown by the presence of swainsonine and calystegines B1, B2, B3, and C1 (Balogh, 1999). Lastly, *Ipomoea carnea* seeds have also been shown to contain swainsonine and calystegines B1, B2, B3, and C1, suggesting that

these bioactive compounds are continuously present throughout the plant. This in-depth examination of the phytochemical constituents present in the various sections of *Ipomoea carnea* demonstrates the plant's possible therapeutic advantages and supports further study for prospective use in pharmaceutical applications (Mungole, 2010).

MEDICINAL PROPERTIES:

Many cultures have utilized *Ipomoea carnea* for therapeutic purposes. Traditional medical traditions, primarily in Africa, Asia, and South America, have utilized extracts from different parts of the plant to treat a variety of illnesses. Alkaloids, flavonoids, saponins, and other bioactive compounds are abundant in the plant and contribute to its medicinal qualities. It has been used medicinally as an antipyretic to lower fever, an analgesic to relieve pain, and an anti-inflammatory medication to treat inflammation. Additionally, it has long been used to treat gastrointestinal issues, rheumatism, and arthritis. *Ipomoea carnea* exhibits potential in traditional medicine, but more scientific study is required to verify its safety and effectiveness for use in contemporary medical applications. Always get medical advice before using any herbal remedy for therapeutic purposes (Soni Rishita, 2024).

TRADITIONAL USES:

Traditional herbal medicines are being used for basic healthcare by almost 80% of the world's population, a significant increase over the past several years (Anand, 2013). Regardless of socioeconomic background, herbal medicines are growing in popularity in India. It is anticipated that the use and acceptance of herbal formulations would increase in the near future. The eastern Indian state of Bangladesh is renowned for its subtropical climate, plateau topography, rich floristic variety, and significant tribal population. Bangladesh has been a hub for traditional ethno-medical knowledge due to these circumstances (Tomar, 2012). Before its present increase in pharmacological characteristics, *I. carnea* was used as a therapeutic herb in many societies' traditional medical traditions, mainly in the Indian subcontinent. The milky juice of this plant is used to treat leukoderma and related skin disorders, as well as a topical antiseptic in lesions. The boiling roots are used to induce menstruation and as a laxative. In the middle Himalaya, *I. carnea* is used to treat rheumatism and gout. Other traditional uses of this plant include the treatment of

sexually transmitted diseases, diarrhoea, hypertension, and immunodeficiency (Fatima, 2014).

Sl. No	Parts of the Plant	Traditional Use	Reference
1.	Leaf	Leaf hot water extract reduces the teratogenic effects of cyclophosphamide and possesses antirheumatic qualities.	(Tomar, 2012).
2.	Root	Boiled roots are used as a menstrual stimulant and laxative.	(Fatima, 2014).
3.	Bark	Leucoderma and other associated skin conditions have long been treated using latex, or milky sap, which is extracted from the bark of	(Fatima, 2014).
4.	Flower	It is well known that tannins found in flowers have anti-inflammatory, antifungal, antibacterial, and antioxidant properties.	(Tomar, 2012).

Table 4: Traditional medicinal uses of Ipomea carnea.

PHARMACOLOGICAL STUDIES:

Antifungal

Action it has been discovered that Ipomea carnea possesses antifungal properties against Curvularia lunata and Alternaria alternative. Eleven pathogenic and non-pathogenic fungi are susceptible to the antifungal effects of Ipomea carnea extracts in methanol and chloroform. Ipomea carnea leaf antifungal fractions were obtained using Cladosporium coumarone and Colletotrichum gloeosporioides as test organisms. The suppression of Alternaria alternative and A. porri spore germination in a dose-dependent manner further confirmed the effectiveness of the purified fraction. The active portion was determined to be a mixture of (E)-octadecyl p-coumarate and (Z)-octadecyl p-coumarate (Nidiry).

Anti-diabetic activity

In one study, rats with normal blood sugar and rats with diabetes caused by streptozotocin were used to

examine the anti-diabetic effects of Ipomea carnea leaves. Ipomea carnea aqueous extract significantly reduces rats' blood glucose levels. It enhances glucose tolerance in healthy rats (Khatiwora, 2013).

Anti-cancer activity

According to in-vitro and in-vivo studies, the hydro alcoholic extract of Ipomea carnea leaves has significant anticancer effects that are dose-dependent. This is probably due to the presence of phytochemicals such flavonoids, phenols, and alkaloids (harma, 2013)

Wound healing activity

95 ethanol was used to extract fresh Ipomea carnea flowers, the extract was then condensed in a vacuum, and the resulting aqueous concentrate was treated with sequential fractions of various solvents, such as ethyl acetate, diethyl ether, and chloroform. The fresh blooms of Ipomea carnea contain kaempferol and its 3-O—D glucoside. These were known to have a great deal of promise for mending wounds. An inflammatory phase typically precedes the formation of collagen fibers, fibroblast proliferation, scar drying and shrinkage, and wound healing. Although they happen simultaneously, these phases have no connection to one another. These effects are significantly better than untreated wounds and comparable to those of sulphathiazole (56, 2007).

Anti-microbial activity

Several investigations have proven I. carnea's antibacterial activity. According to Adsul et al. (Adsul VB K. E., 2012). I. carnea's acetone extract works well against Salmonella typhimurium and P. vulgaris bacteria, whereas its ethanol extracts works well against Pseudomonas aeruginosa. Dibutyl phthalate, a secondary product from I. carnea, has been shown to exhibit antibacterial action against a number of gram-negative bacteria, including Proteus mirabilis, Klebsiella pneumonia, and P. aerugi. It has been discovered that several of I. carnea's resin glycosides enhance the effects of antibiotics, such as tetracycline, kanamycin, and chloramphenicol, which are commercially effective against bacteria (Corona-Castañeda B, 2012). These resin glycosides' antibacterial phytoconstituent is thought to potentially cooperate. In tropical countries, I. carnea has long been utilized in traditional medicine to heal skin disorders, despite the paucity of

scientific research on the subject. Mogle [24] showed that aqueous leaf extracts from *I. carnea* had antifungal activity against seven fungi as follows: *Aspergillus niger*, *Penicillium digitatum*, *Botrytis cinera*, *Rhizopus arrhizus*, *Aspergillus flavus*, *Chaetomium brasiliense*, and *Rhizoctonia solani*. Of them, the extract's effectiveness against *A. niger* was the most promising (UP., 2013). The primary antifungal component of *I. carnea* leaves was found to include two coumarate isomers, (E)-octadecyl p-coumarate and (Z)-octadecyl p-coumarate.

Anti-oxidant activity

A class of substances known as antioxidants has the ability to prevent reactive free radicals from damaging other molecules. They may therefore be beneficial to your health and aid in preventing degenerative disorders. The leaves, stem, and flowers of *I. carnea* are rich in antioxidants such as flavonoids and polyphenols, according to Khatiwora et al (Khatiwora E A. K., 2010). The polyphenol and flavonoid contents of *I. carnea* were found to have strong DPPH radical scavenging activity, a reliable assay for evaluating antioxidant capacity (Adsul VB K. E., 2012). Antioxidant phytoconstituents are more abundant in the blossom region of this plant.

Anti-inflammatory effect

In a rat paw edema model induced by formalin (0.1%), Ruchi et al. (Ruchi J, 2009) showed the anti-inflammatory effects of methanolic and petroleum ether extracts of *I. fistulosa*, a subspecies of *I. carnea*, leaves. A time-dependent evaluation of the extract's anti-inflammatory activity indicates that it has anti-inflammatory qualities at various acute phases of inflammation. This anti-inflammatory property may be due to the β -sitosterol concentration of *I. fistulosa* or *I. carnea* (Ruchi J, 2009) The anti-inflammatory qualities of aqueous extracts of *I. carnea* leaves were evaluated using a rat paw edema model induced by carrageenan (0.1%) (Khalid MS, 2011). Although the results of this study are similar to those of the previously mentioned study (Ruchi J, 2009), the anti-inflammatory effect is stronger in the early phases of inflammation (Khalid MS, 2011).

Sedative activity

The sedative effects of petroleum ether, alcohol, and aqueous extracts of *I. carnea* leaf were evaluated in mice and rats using the head dip test and the phenobarbitone-induced sleeping duration (Rout SK, 2013). A study found that at high doses,

phenobarbitone-induced experimental models exhibited a significant reduction in locomotor activity together with a dose-dependent increase in sleeping time. Furthermore, it was discovered that a high dosage of alcoholic and aqueous extract decreased exploratory behavioural potential in the head dip test (Rout SK, 2013).

Cardiovascular Activity:

The isolated frog heart was momentarily stopped for five to ten seconds following the injection of an aqueous extract of *Ipomoea carnea*. As the dosage was raised, the duration rose by as much as two minutes. Due to intracellular calcium release or salt extrusion, *Ipomoea carnea* may have a positive inotropic effect on isolated frog hearts (Sharma A. a., A review on *Ipomoea carnea*, 2013). When 1 g/ml of atropine was administered, the extract's stimulant action rose and the early distinct phase diminished (Nandkumar P., 2011).

Nervous System activity:

Goats fed fresh leaves, flowers, and stems of *Ipomoea carnea* for 45 to 60 days showed signs of hirsute coat, depression, ataxia, hypermetria, wide-based stance, in coordination of muscular movements, severe tremors, spastic paresis, aberrant postural reactions, nystagmus, hyperreflexia, hypersensitivity to sound, head tilting, and loss of equilibrium. The cerebellum is one of the main organs impacted by *Ipomoea carnea* poisoning. In order to synchronize the skeletal the poisonous plant *Ipomoea carnea* has an adverse effect on the central nervous system. Data from other areas of the brain, mainly the spinal cord and sensory receptors, is interpreted by the muscles (Soni Rishita, 2024).

Anti-hypoglycemic activity

Intraperitoneally, rats were given 150 mg/kg of dissolved alloxan in distilled water. After 48 hours of light ether anaesthesia, blood samples were extracted from the retro-orbital venous plexus, and the serum's glucose content was ascertained by centrifuging it. Rats designated as "hyperglycemic animals" have blood glucose levels higher than 250 mg/dl. Six groups of ten hyperglycaemic rats were then created: one group of diabetic rats was given 100 mg/kg b.wt. Of ethanol extract from leaves, another group was given 100 mg/kg b.wt. of ethanol extract from flowers, a sixth group was given 100 mg/kg b.wt. of rutin orally for ten days in a row, and a group of healthy rats was also included. Within 48

hours of starting the extracts and taking Metformin, hyperglycaemia was confirmed. One day after the last dose of either drug, a blood sample was extracted from the retro-orbital venous plexus of eighteen food-deprived rats and centrifuged for ten minutes at 3000 rpm. To find quinine amine, the blood glucose level in the serum was measured using a test reagent kit (Bio diagnostic, Egypt). After measuring the absorbance at 510 nm, the data were expressed in milligrams per decilitre (CDK., 1987).

CONCLUSION

Ipomoea carnea is a plant of considerable pharmacological, ecological, and environmental interest. Its rich phytochemical composition underlies a wide range of biological activities, including antimicrobial, antioxidant, and anti-inflammatory effects, supporting its traditional medicinal use. Additionally, its ability to absorb heavy metals makes it valuable for phytoremediation. However, the presence of toxic compounds, especially swainsonine, raises serious safety concerns, particularly in livestock and potential human applications. Furthermore, its invasive growth behaviour in non-native regions calls for careful ecological management. Overall, *I. carnea* presents a complex profile with significant potential, but its application must be guided by rigorous scientific evaluation and controlled use to mitigate associated risks.

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