

A review on a parasitic plant '*Cuscuta reflexa* Roxb.' for its traditional and Pharmacological uses.

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Abstract: The *Cuscuta reflexa* Roxb. plant is known for its diverse traditional uses in many diseases. *C. reflexa* has many medicinal properties for effective management against various diseases, such as antioxidant, antiulcer, antispasmodic, effective in jaundice and many more. The plant is having economically very important in the near future in the pharmaceutical industries. The *Cuscuta reflexa* as phytomedicine brings us many medicinal importance against the ailments of the body. The phytomedicines are employed to the population by analysing its safety and efficacy. Here, we use to review for the Phytochemicals reported and pharmacological effects of the *Cuscuta reflexa* Roxb. This review will try to reflect the information of the plant in accordance to the disease in the body as a remedy.

Keywords: *Cuscuta reflexa* Roxb., traditional uses, phytochemicals, pharmacological activities.

INTRODUCTION

According to WHO, about 70% to 95% of population in a majority of developing countries still depends on traditional medicine as their remedy for various diseases. People use plants due to their various therapeutical properties against inflammation, allergic, oxidation, microbial infection, diabetes, ageing and more. The various pharmacological effects and properties of the plant is studied broadly in a newly emerged category of drug called as phytopharmaceutics or phytomedicines. Phytomedicine brings new lead drug discoveries and phytopharmaceutics assures the people for its safe and efficacious use of plant-based medicinal products. Plant sources act as a new lead compound provider due to the various chemical entities present in them. [1] The plants produce Secondary metabolites, of which total of 15000 have been isolated, that is less than 10% of the total secondary metabolites produced by plants. These secondary metabolites act as plant's defence mechanism against various microorganisms, insects, herbivores and also effective for animals against various diseases or disorders.

Cuscuta reflexa Roxb

It is a plant used to grow on other plant by climbing and curling around them like a twiner and sucking the necessary nutrients from the host plant via attaching its organ called haustoria to the host. It is categorised as an Angiospermic plant and is a holoparasite. It belongs to family *Convolvulaceae* having genus *Cuscuta* and species *reflexa*. *Cuscuta* is a group of 100- 170 species. *Cuscuta* is found at the temperate and in tropical regions of the world with good amount of species diversity in tropical and subtropical regions.[2]. It is known to parasitize majority of the angiosperms. It is also known as Amarbel (Immortal twine), Akashwell (Sky winner), Swarnlata, Akakhilata. Other names include Hell weed, Devils gut, Begger weed, Scald weed, Dodder of thyme, Greater dodder Lesser dodder[3]

BOTANICAL CLASSIFICATION

Taxonomical classification

Kingdom	Plantae
Subkingdom	Tracheobionta
Super division	Spermatophyta
Division	Angiosperms
Class	Eudicots
Subclass	Asterids
Order	Solanales
Family	Convolvulaceae
Genus	<i>Cuscuta</i>
Species	<i>reflexa</i> Roxb.

VERNACULAR NAMES[4]

English	Dodder Plant
Hindi	Amarabela
Sanskrit	Akasavalli, Amaravalli, Khavalli
Punjabi	Zarbut
Urdu	Akashbel
Bengali	Akashbel

MORPHOLOGICAL CHARACTERISTICS

a) Stem: The stem is highly branched and vegetative during favourable conditions. It is a twiner, Weak, pale-green, develop haustoria at the point of contact with the host plant. The haustoria is absent at axial or tip of the plant. The main organs of the stems are vascular bundles(xylem and phloem), meristem, pith, etc. The main secondary metabolites are also present in it, like, terpenoids, carbohydrates, fats, flavonoids, etc.

b) Haustoria: It is a special organ developed as a result of the evolution in the plants. It has two main stages on the basis of its maturity on the host plant body. Further developed into haustoria hairs. These are hair like projection which ultimately enters into the host body.

c) Flowers: The flowers are very distinct in shape and also small as compared to the other genus of *Cuscuta* species. It has 5 petals and four lobes, Bracteate, ebracteolate, hermaphrodite, actinomorphic, pentamerous, small, pale-green. Further,

Gynoecium: Style is very much reduced, disc red coloured, 2 carpels, syncarpous, superior, bilocular.

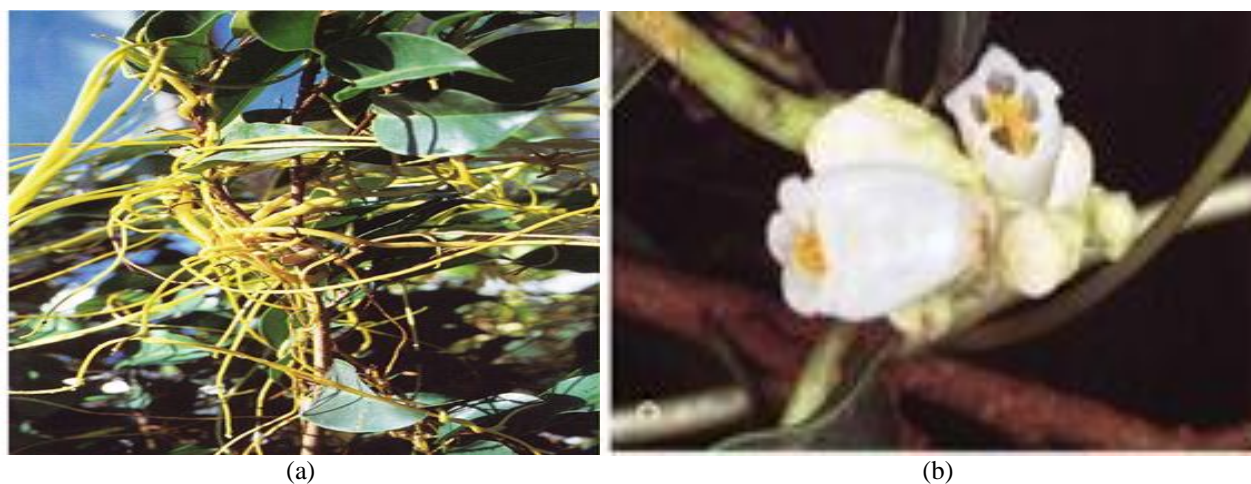
Carpels: The carpels are Medially placed, 2 or more ovules in each locule, axile placentation stigma bifid and hairy, a nectareous disc is present below the ovary.

Androecium: Here mainly 5 stamens, epipetalous, filaments are of different sizes dorsifixed, alternipetalous.

Corolla: There are total of 5 petals, united, campanulate, valvate, with 5 coronary outgrowths at the base corolla.

Calyx: There were 5 sepals, fused, valvate.

d) Seed: These are small were having hard coat which helps them to survive many harsh seasons and climates. The seeds are viable for a very long period of time.[5]



(a)

(b)

Image of *C. reflexa* stem(a) and flower(b)

GEOGRAPHICAL DISTRIBUTION

Cuscuta reflexa Roxb. occurs throughout the India. This species is common over the northern region of country, Bengal plains, Western ghats, Satara region, Himachal Pradesh, Uttar Pradesh and Uttarakhand. It is also found in plain of Afghanistan, Malaysia, Nepal and Thailand.

FAVOURABLE AND HIGHLY FREQUENT HOSTS OF THE *CUSCUTA* PLANT:

The *Cuscuta reflexa* mainly parasitise all the angiospermic plants. The highly frequent host plants are given in the table below. The hosts include ephemeral, annual, biennial and perennial life span; herb, shrub, climber, liana and tree habits; and agricultural, horticultural, medicinal, weeds, forest and economically important plants. *Cucurbita moschata* (Cucurbitaceae)[6], *Jatropha curcas*(Ephorbiaceae), *Parthenium hysterophorus*(Asteraceae), *Vitex negundo*(Verbenaceae), *Oryza sativa*(Poaceae), *Justicia adhatoda*(Acanthaceae), *Datura metel*(Solanaceae), *Acacia catechu*(Mimosaceae), *Mangifera indica*(Anacardiaceae), *Ficus bejamina*(Moraceae), *Lantana camara*(Verbenaceae), *Calotropis gigantea*(Apocynaceae), *Bambusa tulda* (Poaceae), *Azadirachta indica*(Meliaceae)[7], etc.

PHYTOCONSTITUENTS REPORTED IN *CUSCUTA REFLEXA* ROXB.

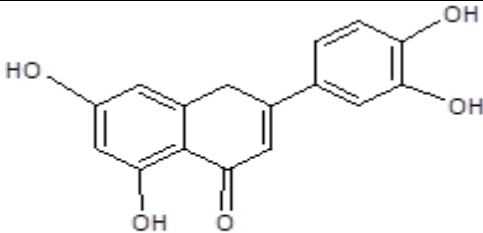
Based on the characteristic, each type of *Cuscuta* sp., have different type of phytochemical identity. Diverse types of phytochemicals have been isolated from the *Cuscuta reflexa* plant based on the host and plant nutrition.[8]Most of the phytochemicals are listed below which were reported so far in the plant *Cuscuta reflexa*. They were mainly alkaloid, flavonoids, phenols, glycosides, terpenoids, etc. [9] The various chemical constituents are present in various extracts obtained from the plant and so the plant exhibits various pharmacological activities like antioxidant, antibacterial, antidiabetic, anticarcinogenic, antispasmodic, effective in jaundice, etc.[10,11]

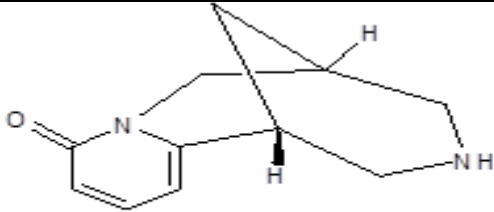
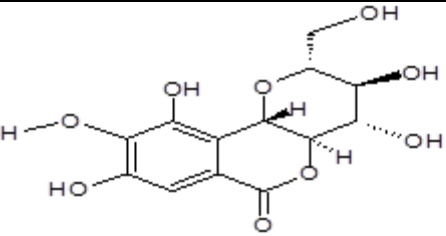
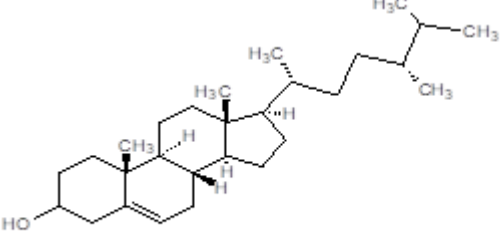
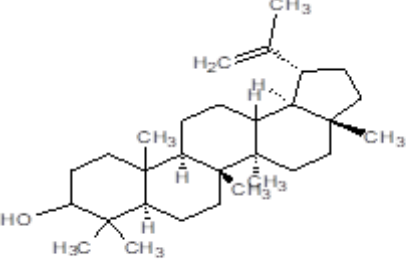
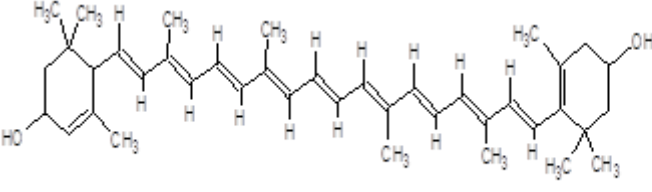
Chemical Constituents
Quercetin, Hyperoside,

Kaempferol,
 Myricetin,
 Quercetin 3-O-neohesperidoside,
 Leuteolin,
 Quercetin-3-O-glucoside,
 3,5,7,3'-pentahydroxy flavanone (taxifolin
 Reflexin,
 5-hydroxy-7-methoxy-6-(2,3-epoxy-3-methylbutyl)-flavanone
 Kaempferol-3-O-glucoside,
 Myricetin-3-O-alpha-rhamnoside
 Apigenin-7-b-rutinoside
 3'-methoxy-3',4',5,7- tetrahydroxy flavone,
 3'-methoxy-4',5,7-trihydroxy flavone-3-glucoside
 Myricetin-3- glucoside,
 6,7,8- Trimethoxy 2H-1- benzopyran-2-one,
 4,4',6-Trihydroxyauran,
 Chlorogenic acid,
 Taxifolin 7-O- b D- glucopyranoside
 Methylcytisine,
 Lacceroic acid
 Lupanine,
 3,4-Di-O-caffeoylquinic acid
 4-oic acid-7-oxo-kaurene-6 alpha-O- b D-glucoside
 Cuscutoside-A
 Caffiec acid
 21-Hydroxy odoroside H
 Odoroside H
 Stigmast-5-en-3-O-b-D-glucopyranoside b
 Stigmast-5-en-3-yl-acetate
 Campesterol
 Sesamin
 Gitoxygenin
 Stigmasterol
 Lupeol
 Oleanolic acetate
 Alpha – Amyrin
 Beta – Amyrin
 Alpha Amyrin Acetate
 Beta Amyrin Acetate
 Hydroxyoleanane
 Maragenin
 Aromandendrin
 Ursolic acid
 Carotene
 Lutein
 Lycopene
 Violaxanthin
 Rubixanthin

STRUCTURES OF CHEMICAL CONSTITUENTS

The chemical structure of some of the basic phytochemicals reported in the *Cuscuta reflexa* Roxb.

Name of compound	Chemical structure
Quercetin	

Cytisine	
cuscutin	
Campesterol	
Lupeol	
Lutein	

TRADITIONAL USE OF *CUSCUTA REFLEXA* PLANT

The plant species is most frequently used for the treatment of jaundice.

s.no.	part	Type of dosage form	Tradition use
1	Whole plant	Paste Maceration Infusion Juice Pills Powder	Treatment of swollen testicles, gout and joint pain, causes abortion, anti-rheumatic, analgesic Infection treatment Anti-poisonous Antiseptic, useful in itching skin and jaundice Anti-tuberculosis Anti-fertility agent, astringent, diaphoretic.
2	stem	Decoction Paste	Hepatoprotective, antidiarrheal, useful in constipation, stomach disorders, urinary tract infections, jaundice, epilepsy, cholera, asthma Anti-hair fall, anti-rheumatic, useful in skin diseases

			Jaundice treatment
3	Seeds	Decoction	Cause abortion, Carminative, anthelmintic, sedative, diuretic, liver disorders useful in ulcer.
4	Leaves	Poultice Extract	Pain reliever Anti-hypertensive, anti-diarrheal, useful in jaundice
5	Fruits	juice	Effective in scabies, Antipyretic, cough reliever

PHARMACOLOGICAL ACTIVITIES OF *CUSCUTA REFLEXA* ROXB.

When taken internally treats the retention of urine while being applied externally for skin itches. It is also used to cure the **cough and diabetes, eczema abortifacient**, cholinergic action, anti-steroidogenic activity, hepatoprotective activity, diuretic activity, anticonvulsant activity.

- Hepatoprotective Activity:-** The **methanolic** extracts of *C. reflexa* is evaluated for hepatoprotective activity on carbon tetrachloride induced hepatotoxicity in liver histoarchitecture and alteration in certain biological parameters was observed.[48]
- Antitumor Activity:-** The **Chloroform** and **ethanol** extracts is having antitumor activity reported against Ehrlich ascites carcinoma tumour in mice. [49,50]
- Antioxidant Activity:-** The **Ethyl acetate** and **ethanol** extract of the plant showed higher activity than other fractions, and very close and identical in the magnitude and comparable to the standard antioxidant agents.[51]
- Antibacterial Activity:-** An **ethanolic** extract of *Cuscuta reflexa* showed antimicrobial activity against *E. coli* and *S. Sonnei*. Plant also shows antimicrobial activity against different microorganism like, *Staphylococcus epidermidis*, *Staphylococcus aureus*, *E. coli*, *Micrococcus luteus*, *Pseudomonas aeruginosa*. [52]
- Hypoglycaemic activity:-** A **Methanolic** extract showed significant inhibition against α -Glucosidase.[53,54]
- Effect on blood pressure:-** **Alcoholic** extract of *Cuscuta reflexa* have positive inotropic and cardiogenic activities on the perfuse frog heart. Series of experiments on dog results in the fall in blood pressure.[55]
- Relaxant and spasmolytic action:-**An **Aqueous** and **alcoholic** extracts showed relaxant and spasmolytic action on small intestine of guinea pig and rabbit.[19]
- Diuretic Activity:-** An **Aqueous** and **alcoholic** extracts of *C. reflexa* showed diuretic activity in Wistar rat.[2]
- Anti-diabetic activity:-** The **methanol** and **aqueous** of *C. reflexa* has significant antidiabetic effects and also improves metabolic alterations.[56]
- Hair growth activity:-** **Petroleum-ether** and **ethanolic** extract of *C. reflexa* is given and hair growth is observed in male swiss albino rats. *C. reflexa* extract is useful in the treatment of alopecia. This study showed us that it is capable of promoting follicular proliferation or preventing hair loss in cyclophosphamide-induced hair fall in In-vivo conditions.[57]
- Anti-inflammatory and Anti-carcinogenic activity:-** In different phases of pathogenesis of cancer, inflammatory reactions play a vital role for the stoppage of cancer from spreading. In Vitro and In-vivo tests, **aqueous** and **alcoholic** extracts of stem of *C. reflexa* and its ethyl acetate fraction showed remarkable anti-inflammatory activity. *C. reflexa* significantly suppressed inflammation by reducing the volume of water in the body up to 80 percent in rats.[58,59]
- Anti-fertility effect:-** **Methanolic** extract brings back the normal oestrus cycle and decrease the ovarian and uterus weight in adult female mice.[60]

CONCLUSION

C. reflexa is a holoparasitic and it depend on nutrients, water and carbohydrates from other host plants. *Cuscuta* species lack roots or leaves but possess specific penetrating organs, called haustoria, which are fully developed in 5–6 days after the first contact with host body. The plant is employed in Ayurvedic medicine to treat difficulty in urinating, jaundice, muscle pain and coughs. The juice of the plant, mixed with the juice of *Saccharum officinarum* or coconut water is used in the treatment of jaundice. The phytoconstituents such as flavonoids, alkaloids, glycosides, steroids, volatile oils and resins are encountered as important bioactive ingredients of the plant. This plant considered as a miraculous plant having broad spectrum of pharmacological activities. Decoction, extracts, paste, powder, juice and infusions from various parts of plant impart therapeutic nature against numerous ailments of human beings. The phytochemicals contain antimicrobial, anticancer and antioxidant potentials and can be used as a potential drug for the treatment of various diseases *C. reflexa* is a parasitic weed plant and causes a huge loss to the crop plants every year. Still *C. reflexa* is considered as very Important medicinal plant because many chemical compounds have been isolated from this plant having medicinal properties. Hence, this review, paves a way for people to explore more for its various traditional and therapeutic uses.

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