



CUSCUTA REFLEXA : A PARASITIC MEDICINAL PLANT

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Abstract

Cuscuta reflexa is an extensive leafless, parasitic climber belong to the morning glory family Convolvulaceae. It is yellowish green and thread like twinning herb and tangled mass covering the host plant. It occurs throughout the India. It has no chlorophyll and cannot make its own food by photosynthesis. The plant is attached to various trees, shrubs, herbs and affect commercially valuable crops. Plant is completely dependent on host plant for their food and nutrition. *C. reflexa* varies in the colours of the flowers produced from white to pink. Seeds are produced in the large quantities. Seeds of *C. reflexa* can survive in the soil for many years in the search of the appropriate host. It has 100-170 species. *C. reflexa* has various type of phytoconstituents including chemicals, flavonoids, carotenoids, the esters of higher aliphatic alcohol with the saturated fatty acids and carbon atoms. It is a parasite plant it sucks nutrient from the host plant for its growth and development hence its phytoconstituent also depends on the host plant. *C. reflexa* has been used from ancient times for various purposes viz. as a purgative in the treatment of liver disorder, cough, itching, constipation, flutance, body pain, jaundice, gout, rheumatism, urination disorders muscles pain, impotence, premature ejaculation, sperm leakage, ringing in the ear, lower back pain, sore knees, leucorrhea, dry eyes, blurred vision and tired eyes. It exhibits anti inflammatory, antiviral, antibacterial, anticonvulsant, antiseptic, analgesic, anesthetic, anti oxidant, antipyretic, bodycardia, antisteroidogenic, antiplasmodic, hemodynamic, nematocidal, anti androgenic, hypocholesterolemic, antiandrogenic, hemolytic, diuretic, dermatigenic, immunostimulant, antiarthritic, antiasthma and anticancer activities. *C. reflexa* is a parasitic weed plant and causes a huge loss to the crop plants every year, still *C. reflexa* is called as miracle medicinal plant because many chemical compounds have been isolated from this plant having medicinal properties.

Key words : *Cuscuta reflexa*, parasitic herb, medicinal herb, ethnomedicinal value.

Introduction

Cuscuta reflexa is an extensive leafless, parasitic climber belong to the morning glory family Convolvulaceae (Story *et al.*, 1958). It is yellowish green and thread like twinning herb and tangled mass covering the host plant. *Cuscuta* is found at the temperate and tropical region of the world with huge species diversity in tropical and sub tropical regions. It occurs throughout the India. This species is common over the northern region of country, Bengal plains, Western ghats, Ceylon, Satara region, Himachal Pradesh, Uttar Pradesh and Uttarakhand (Inamdar *et al.*, 2011). It is also found in plain of Afganistan, Malaysia, Nepal and Thailand (Patel *et al.*, 2012). In English, it is known as Dodder (Nandkarni, 2002). It is also known as Amarbel (Immortal twine), Akashwell (Skywinner), Swarnlata, Akakhilata. Other names include Hellweed, Devilsgut, Begger weed,

Stranglelare, Scald weed, Dodder of thyme, Greater dodder Lesser dodder (Rai *et al.*, 2016), Devils hair, Witch's hair and love vine (Saini *et al.*, 2015). It has no chlorophyll and cannot make its own food by photosynthesis. The plant is attached to various trees, shrubs, herbs and affect commercially valuable crops (Kanade and Gham, 2010). It is parasite on a wide variety of plants including a number of agriculture and horticulture crop species. The common host plants are *Acalypha hispida* (Euphorbiaceae), *Adathoda vasica* (Acanthaceae), *Alstonia scholaris* (Apocynaceae), *Annona squamosa* (Annonaceae), *Bougainvillea spectabilis* (Nyctaginaceae), *Calotropis gigantea* (Asclepiadaceae), *Catharanthus roseus* (Apocynaceae), *Clerodendron viscosum* (Verbenaceae), *Campsis radicans* (Bignoniaceae), *Dalbergia sisso* (Fabaceae), *Dahelia* species (Asteraceae), *Duranta plumieri* (Verbenaceae),

Euphorbia spp. (Euphorbiaceae), *Ficus glomerata* (Moraceae), *Hamelia patens* (Rubiaceae), *Hibiscus-rosa sinensis* (Malvaceae), *Helenium autumnale* (Asteraceae), *Hevea brasiliensis* (Euphorbiaceae), *Ixora* (Malvaceae), *Impatiens* species (Balsaminaceae), *Jatropha curcas* (Euphorbiaceae), *Lantana camara* (Verbenaceae), *Linum usitatissimum* (Linaceae), *Medicago sativa* (Fabaceae), *Nerium oleander* (Apocynaceae), *Petunia* species (Solanaceae), *Phyllanthus niruri* (Euphorbiaceae), *Punica granatum* (Myrtaceae), *Ricinus Communis* (Euphorbiaceae), *Solanum tuberosum* (Solanaceae), *Vitex negundo* (Verbenaceae) (Thankamma and Marattukatam, 1995; Schoolmaster, 2005; Patel *et al.*, 2012 and Nikam *et al.*, 2014). Plant is completely dependent on host plant for their food and nutrition. The water and inorganic nutrient are absorbed through the xylem connection between the host and parasite, while organic substance are transported from the phloem of the host to that of the parasite via the phloem connections. It will produce haustoria inserting themselves in to the vascular system of the host. The *C. reflexa* epidermis cells start to elongate and enriched with cytoplasm (Vaughn, 2003). They secrete a layer of electron dense material consisting of a mixture of nonesterified pectin. With these cement like substance the parasite is closely fixed to host (Heide, 1991 and Vaughn, 2002, 2003). The initial contact to the host is established by the prehaustorium or the adhesive disc, following contacting and twinning around a host organ, namely stem or petiole. The organic matter is transported from the phloem of the host to the parasite through the haustorium (Kumar *et al.*, 2012). *C. reflexa* is usually associated with parasitism in ornamental plants. The stem is thread like filament, it is begin to grow and attached themselves to near by host plant. This plants have no roots in the ground and it grow over the host body without touching the ground surface in its complete life span (Dawson *et al.*, 1994). Plant has the ability not only to recognize its host plant but also to move towards its prey with significant precision and efficiency. It can also choose an appropriate host between many plants on the basis of volatile compounds release by the host plant as their normal process of transpiration (Kapoor *et al.*, 2008). *C. reflexa* varies in the colours of the flowers produced from white to pink. Flowers generally produced in the early summer and autumn. Seeds are produced in the large quantities. Seeds of *C. reflexa* can survive in the soil for many years in the search of the appropriate host. At this time it depends on the food reserve in the endosperm of seed (Sarma *et al.*, 2008). It has 100-170 species (Vijikumar *et al.*, 2011 and Rai *et al.*, 2016).

Taxonomy of the *C. reflexa*

Habit : A twining total parasite. Stem :Weak, twiner, pale-green, develop haustoria at the point of contact with

the host. Leaf:Absent. Inflorescence:Flowers solitary or in racemose clusters. Flower: Bracteate, ebracteolate, hermaphrodite, actinomorphic, pentamerous, small, pale-green. Calyx: 5 sepals, fused, valvate. Corolla:5 petals, united, campanulate, valvate, with 5 coronary outgrowths at the base corolla. Androecium:5 stamens, epipetalous, alternipetalous, filaments of different sizes dorsifixed. Gynoecium: style very much reduced, disc red coloured, 2 carpels, syncarpous, superior, bilocular, carpels medianly placed, 2 or more ovules in each locule, axile placentation stigma bifid and hairy, a nectariferous disc is present below the ovary (Sharma, 2009).

Phytochemistry of *Cuscuta reflexa*

Various phytoconstituents have been isolated from their different host. It is a parasite plant it sucks nutrients from the host plant for its growth and development hence its phytoconstituent also depends on the host plant. The chemical constituent of *C. reflexa* are dulcitol, mannitol, sitosterol, carotenoids, flavonoids (Subramanian and Nair, 1963; Udavant *et al.*, 2012), isorhamnetin-3-O-neohesperidoside, apigenin-7- β -rutinoside, lycopene (Dandapani and Nagrajan, 1989), 6,7-dimethoxycoumarin (scoparone), 6-hydroxy-4-(4-hydroxyphenyl)-7-methoxycoumarin, quercetin, hypero-side (Ramachandran and Thirupurasundari, 1992), apigenin-7-O-glucoside, kaempferol-3-O- α -rahnmoside, myricetin-3-O- α -rhanmoside (Yadav *et al.*, 2000) 7-(3,4hydroxyphenyl)-N-[(4 methoxyphenyl)ethyl] propionamide, 7-(4-hydroxy,3-methoxyphenyl)-N-[(4-butylphenyl) ethyl] propenamide (Anis *et al.*, 2002), reflexin (Tripathi *et al.*, 2005), violaxanthin, lutein, lycopene, carotene, α -cryptoxanthin (Mukherjee *et al.*, 2008), amarbelin (pigment), cerotic, linolenic, oleic, stearic, andpalmitic acids, phytosterols (seeds), abscisic acid (leaves), leuteolin and its glycosides (Mythili *et al.*, 2011), quercetin, cuscutin (stem) amino acids and cuscutalin (Versiani, 2004). It also contains palmitic, linolenic acids, leuteolin, cuscutin, astragalgin, benzopyrones, glucopyranosides, quercetin-3-O-glucoside, begenin (Pacheco *et al.*, 1966; Kelker *et al.*, 1984 and Anis *et al.*, 1999). Seeds of *C. reflexa* also contain the esters of higher aliphatic alcohol with the saturated fatty acids, respectively containing 26 and 28 carbon atoms among which cerotic acid has been identified and seeds yield a transparent greenish yellow semi drying oil (Mukherjee *et al.*, 2008). Lupeol isolated from *C. reflexa* is a pharmacologically active tri-terpenoids and having antimicrobial, anti-inflammatory, antitumor, antiprotozoal and chemoprotective properties (Gallo *et al.*, 2009). As an anti-inflammatory agent lupeol is found to decrease interleukin 4 production by T-helper Type-2 cells (Geetha *et al.*, 2001; Saleem, 2009).

Medicinal value of *C. reflexa*

C. reflexa has been used from ancient times for

various purposes *viz.* as a purgative in the treatment of liver disorder, cough, itching, constipation, flutance, body pain. *C. reflexa* possess antiviral, anticonvulsant activity, bodycardiya, antisteroidogenic, antispasmodic and hemodynamic activity (Costa *et al.*, 2005). Its worm paste is used to treat gout, rheumatism and paste of whole plant is used for the treatment of headache (Baquar *et al.*, 1967; Siwakoli *et al.*, 1996). *Cuscuta* is used in the treatment of urination disorders muscles pain, impotence, premature ejaculation, sperm leakage, frequent urination, ringing in the ear, lower back pain, sore knees, leucorrhea, dry eyes, blurred vision, tired eyes and cough. It is also used as blood purifier and hair growth promoters (Pandit *et al.*, 2008). Seeds and stem are highly medicinal values. Seed of *C. reflexa* have neutral nature and sweet in taste and have carminative, sedative, emmenagogue, diuretic, anodyne and anthelmintic properties and used to treat bilious (Khan *et al.*, 2010). Seeds are also useful in the treatment of spleen disease, chronic fever griping and hiccough (Kirtikar and Basum, 1740 and Boquar *et al.*, 1967). A cold infusion of seeds is given as a depurative and carminative is pain and aches of stomach (Chopra *et al.*, 1956). Seed poultice can also apply locally for pain. Stem decoction are useful in constipation, flatulence, liver complaints, bilious affection and to cure epilepsy (Kiritikar and Basu, 2005; Misra *et al.*, 2006 and Jadhav, 2006). Stem is antibacterial, antimicrobial activities and used externally to treat itch and internally in fever (Nair and Subramanian, 1964; Pal *et al.*, 2006). It is useful in the treatment of androgen induced alopecia (Pandit *et al.*, 2008). The aqueous and alcoholic extract of *C. reflexa* has diuretic property (Sharma *et al.*, 2009). The crude water extract of *C. reflexa* exhibited anti HIV activity which could be due to combinatory effects with compound of different mode of action (Mahmood *et al.*, 1997). The methanol extract of *C. reflexa* exhibited antibacterial and free radical scavenging activity (Uddin *et al.*, 2007). Ethanolic extract of *C. reflexa* showed antimicrobial activity against *Escherichia coli* (Ayesha *et al.*, 2011). It also shows antibacterial activity against *Staphylococcus aureus*, *S. epidermis*, *Micrococcus luteus* and *Pseudomonas aeruginosa* (Pal *et al.*, 2006 and Sharma *et al.*, 2013). Methanolic extract of *C. reflexa* and its subsequent ethyl acetate fraction showed significant inhibition against alfa glucosidase. It is a membrane bound enzyme at the epithelium of small intestine. Intestine of this enzyme prolongs the absorption time of glucose in the blood after a meal (Eram *et al.*, 2002 and Rahmatullah *et al.*, 2009). Juice of the plant mixed with the juice of *Saccharum officinarum* or Coconut water is used in the treatment of jaundice. The plant juice is given in combination with other purgative decoction. It internally treats the retention of urine while being applied externally for skin itches (Kirtikar and Basum, 1740). It is also cure to cough and diabetes (Datta *et al.*, 2006 and Mahanta *et al.*, 2006), eczema (Rahman *et al.*, 2007), abortifacient activity (Mahajan, 2007), plant juice cause depression with nausea vomiting and abortion (Katewa, 2008). The fruit are used in treating fever and

cough. The other pharmacological activities are relaxant and spasmolytic action (Prasad, 1965), effect on blood pressure (Singh and Garg, 1973; Gilani and Aftab, 1992), cholinergic action (Kayath and Goel, 1995), antioxidant activity (Yadav *et al.*, 2000; Srivastava *et al.*, 2004 and Solat *et al.*, 2013), toxicological evaluation (Mazumdar *et al.*, 2003), antisteriogenic activity (Gupta *et al.*, 2003), hepatoprotective activity (Balakrishnan *et al.*, 2010 and Jha *et al.*, 2011), diuretic activity (Sharma *et al.*, 2009), anticonvulsant activity (Borole *et al.*, 2011), anticancer and anti-inflammatory activity (Suresh *et al.*, 2011; Chatterjee, 2011; Dandopani *et al.*, 2011). Traditional use of *C. reflexa* is in bone fracture, lock of jaw (Pande *et al.*, 2007).

Conclusion

India is blessed with a large number of medicinal plants. Medicinal plants are a great source of many phytochemicals. These phytochemicals contains 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 related to the Convolvulaceae family. *C. reflexa* survive as holoparasites and it depend on nutrients, water and carbohydrates from other host plants. *Cuscuta species* lack roots or leaves but possess specific penetrating organs, the so called haustoria, which are fully developed 5–6 days after the first contact, when an interaction between parasite and host is established. The seeds of *C. reflexa* are alterative, anthelmintic and carminative. They are used in the treatment of bilious disorders. The whole plant is purgative. It is used internally in treating protracted fevers and externally in the treatment of body pains and itchy skin. 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. *C. reflexa* is a parasitic weed plant and causes a huge loss to the crop plants every year. Still *C. reflexa* is called as miracle medicinal plant because many chemical compounds have been isolated from this plant having medicinal properties

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