Cuscuta reflexa Roxb. (*Aftimoon)*: A traditional miracle plant

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ABSTRACT

*Cuscutareflexa*Roxb. traditionally known as *Amarbel*, *Akashabela*and *Aftimoonhindi* belonging to the family Cuscutaceae/ Convolvulaceae is a parasitic plant that draws its nutrition from the host plant on which it grows. It is known to be useful in curing numerous diseases including jaundice, epilepsy, melancholia, anxiety, gout, alopecia and chronic fever etc., for ages. These therapeutic propertiesmay be attributed to numerousphytochemicalslike cuscutin, cuscutalin, cuscutamine, amarbelin, quercetin, reflexin, luteolin, myricetin,and beta-sterol etc., present in this miracle plant. The literature on the ethnomedicinal, pharmacognosy, phytochemistry, traditional uses and biological application of the herb *Cuscutareflexa*Roxb is critiqued in this chapter.

Keywords: *Cuscuta reflexa* Roxb., *Aftimoon*, Parasitic plant, Phytochemistry, Unani Medicine

I. INTRODUCTION

Cuscutareflexa is a parasitic plant commonly known as *Aftimoonhindi* or *vilayti*, dodder plant, devil's hair, witch's hair, love vine, a*marbel, akashabela*. *Aftimoon* is an Arabic form of the Greek word meaning 'growing on thyme'. This name is given by Dioscorides to a plant growing in Cappidocia and Pamphylis, which was used for purging yellow and black bile (Dymock *et al*., 1891). It is rootless, perennial, leafless climbing parasitic twining herb which sucks nutrient from host plant with help of special organ called haustorium.The thin and red colour is of best quality. Its medicinal values are described by the ancient Unani physicians like Dioscorides, *IbnSina* and *Jalinoos* etc. It is used to treat variety of ailment arising because of excessive *balgham, sauda*, and *safra*(phlegm, black & yellow bile) such as *Malikholia*(Melancholia),*Waswas*(Anxiety),*Sara* (Epilepsy), *Kaboos* (Nightmare), *Falij*(Paralysis), *Laqwa* (Facial paralysis), Alopecia, *Yarqan* (Jaundice) and other diseases of liver and spleen. Hence, it is traditionally called as 'Miracle plant'(Ibn Baitar, 1986; Ghani, 2011; Lalchand *et al*., 2017; Khory and Katrak, 1985; Fatima *et al.*,2023).Various phytoconstituents likealkaloids, protein, flavonoids, resin, tannin, glycosides and carbohydrates and inorganic substances such as aluminium, iron, calcium, sodium and potassium are present in it(Anonymous, 1992).

A. **Taxonomy** (Ibn Sina, 2010; Anonymous, 1950; Anonymous, 2007; Anonymous, 1992)

Kingdom	Plantae
Subkingdom	Tracheophyta
Division	Angiosperm
Class	Eudicots
Order	Solanales
Family	Cuscutaceae/ Convolvulaceae
Genus	*Cuscuta*

Species	*reflexa*(100-170 Species)
Botanical name	*Cuscutareflexa*Roxb.

Fig 2.3. (a) *Aftimoon* (*Cuscutareflexa*Roxb.)

Fig 2.3. (b) Sample of Dried *Aftimoon* (*Cuscutareflexa*Roxb.)

B. **Vernacular names** (Ibn Sina, 2010; Anonymous, 1950; Anonymous, 2007; Anonymous, 1992;Ashraf, H. M., ynm)

Arabic	*Aftimoon, Kasus, Sharulzabiha*
Assamese	*Akakhilata*
Bengali	*Algusi, Swarnlata*
English	*Dodder, Air creeper*
French	*Cuscute*
Gujrati	*Akaswel*
Hindi	*Amarbel, Akashbel*
Kannada	*Amaraballi, Akashballi*
Marathi	*Nirmuli*
Persian	*Darakht-e-pechan, Aftimoon, Tukhm-e-kasus*
Punjabi	*Nilathari, Amil*
Sanskrit	*Akashabhavna, Amarvela*
Tamil	*SitamaPurgonalu, Erumaikkottan,Kodiyagundal*
Telugu	*Nulutega, Lanjasavasamu,Savarapukada*
Unani	*Aftimoon*
Urdu	*Aftimoon, Akasbel*

C. **Geographical distribution**

This parasitic climber commonly found in tropical and temperate region of the world throughout India and ascends the Himalayan to about 3000 meter and in Ceylon up to an altitude of 8000 ft., sometimes completely covering bushes and trees. It is abundant in Bengal plains, Punjab and U.P. It is also found in Pakistan, Persia, Afghanistan, Malaysia, Nepal and Thailand. It grows during the rain every year the growth is afresh on the same plant and flowering takes place from late October to March.(Anonymous, 1950; Nadkarni, 1982; Kirtikar and Basu, 2012; Khory and Katrak, 1985; Anonymous, 2007; Anonymous, 1992; Lubhaya, 1977)

D. **Botanical description**

The herbaceous climber *C. reflexa*originates from the soil and becomes a parasite on the trees it encounters. It is chiefly found on *Zizyphus, Adhatoda*, and *Ficus* etc. Its stems are very long, rather stout, closely twining, branched, glabrous, pale greenish, yellow, sometimes dotted with red. Flowers solitary or in umbellate clusters of 2-4 or in short racemes; pedicles short, glabrous, usually curved (rarely 0); bracts 1.5 mm long, ovate oblong, obtuse, fleshy. Calyx divided almost to the base; lobes 3 mm. long, slightly unequal, broadly ovate, obtuse, glabrous, fleshy. Corolla white; tube 6-8 by 4 mm. almost cylindrical; lobes 2.5-3 mm. long, deltoid, acute, reflexed; scales almost at the base of corolla tube, large, oblong, subquadrate or somewhat obovate, fimbriate and incurved at the apex. Stamens are in the throat of the corolla-tube; filaments scarcely any; anthers about ½- exserted beyond the top of the corolla-tube. Ovary is ovoid; style simple, very short and thick; stigma 2, distinct, large, thick and fleshy, 1.5 mm long, ovoid. Capsules are 6-8 mm in diameter, depressed-globose, glabrous, circumscissile near the base. Seeds are 2-4 in number, black, and glabrous(Nadkarni, 1982; Anonymous, 1992;Kirtikar and Basu, 2012).

II. UNANI DESCRIPTION

A. **Morphological features (*Mahiyat*)**

Aftimoon is an Arabic form of the Greek word meaning 'growing on thyme'.This name is given by Dioscorides to a plant growing in Cappidocia and Pamphylis, which was used for purging yellow and black bile(Dymock *et al*., 1891). *Aftimoon* is a parasitic plant that climbs and grows upon the larger trees usually it spreads on *Mango*, *Acacia*, *Zizyphus*, *Adhatoda*, and *Ficus* trees. It is very thin like thread yellowish golden in colour and does not grow from soil. Leaves of Cuscuta are very small; seeds are minute and reddish yellow coloured. Flowers are hair like thin, reddish, acrid taste with some astringency. It takes its nutrition from host plant and make the later dry. It is usually found in hilly areas and forest. Cuscuta which is found in Island of Aqritash, called *Aqritashi* is considered to be the best. *AftimoonMuqaddasi* is found on *Muqaddas* island, grown on *Satar* (*Zatariamultiflora*) plant, is not the actual *Aftimoon*. On rubbing it gives smell similar to that of *Satar*. *Aftimoon* is usually adulterated with *hasha* (*Thymusvulgaris*) but can be identified on the basis of the difference in colour as *hasha* is not red like the *Aftimoon*(Ghani, 2011).

Ibn-e-Sina has described *Aftimoon* as an acrid, red and seed-bearing plant. The plant which is used medicinally as *Aftimoon* in India is imported from Persia. Muslim physicians used this as a purgative of yellow and black bile and mentioned its efficacy in various disorders of brain like fits, melancholy and insanity etc. *Habish Ibn Al-Hasan* claims *Malikholia* was successfully treated when patients were administered Cuscuta

either by alone or in combination with *Afsanteen*(Ibn Baitar, 1986; Ibn Sina, 2010; Lubhaya, 1977; Bagdadi, 2005; Ashraf, H. M., ynm).

B. **Parts used (*Hisas-e-Musta'mla*)**

Whole plant and Seeds (Ghani, 2011; Ibn Baitar, 1986; Lubhaya, 1977; Anonymous, 1992; Nadkarni, 1982)

C. **Temperament (*Mizaj*)**

Hot 3º and Dry 3º (As per Jalinoos)	(Ibn Baitar, 1986; Ibn Sina, 2010; Ashraf, H. M., ynm)
Hot 3º and Dry 2º	(Lubhaya, 1977; Anonymous, 1992)
Hot 3º and Dry 1º (As per Ibn Sina)	(Ghani, 2011; Ibn Sina, 2010)
Hot2º and Dry 2º	(Ghani, 2011; Anonymous, 2007)

D. **Toxicity (*Mazarrat*)**

Harmful for lungs and people having hot temperament. It produces uneasiness, dryness, syncope and increased thirst. (Ghani, 2011; Ashraf, H. M., ynm)

E. **Corrective (*Musleh*)**

*Zafran (Crocus sativus), Katira (Astragalus gemmifer*Labill*), Sharbat Sandal Anar, Samagh-e-Arabi (Acacia arabica), Gul-e-Banafsha (Viola odorata), Gule-e-Gaozaban (Borago officianalis)* and fried in*Roghane Badam* (Ghani, 2011; Ibn Baitar, 1986; Anonymous, 1992; Ashraf, H. M., ynm).

F. **Substitute (*Badal*)**

Ustukhudoos (Lavandula stoechas), Bisfaij (Polypodium vulgare), Turbud (Ipomoea turpethum), Ghariqoon (Agaricus alba), Gil-e-armani, Katira (Astragalus gemmifer Labill)(Ghani, 2011; Anonymous, 1992; Ashraf, H. M., ynm)

G. **Therapeutic dosage (*Miqdar-e-Khurak*)**

3-5 gm	(Lubhaya, 1977; Anonymous, 2007; Ashraf, H. M., ynm)
4-6 gm	(Anonymous, 1992)
3.5-7 gm	(Ibn Baitar, 1986)
7-14 gm	(Ghani, 2011)
14-21 gm (Rhazi)	(Ibn Baitar, 1986)

H. **Compound formulations (*Murakkabat*)**

SikanjbeenAftimooni,*Sharbat Deenar*,*ItrifalAftimoon*(Anonymous, 1992; Anonymous, 2007), *MajoonNaja*, *MajoonUshba*, *ItrifalUstukhudoos*, *ItrifalDeedan-wa-ghadadi*, *Sharbat Ahmad Shahi*, *ArqMusaffiKhoonba-nuskha-e-khas*(Lubhaya, 1977)

I. **Pharmacological actions (*Af'aal*)**

Actions	**Reference**
Mulattif(Demulcent)	Ghani, 2011; Lubhaya, 1977; Anonymous, 1992
Muhallil (Resolvent)	Ghani, 2011; Lubhaya, 1977; Kirtikar and Basu, 2012; Anonymous, 1992; Anonymous, 2007; Ashraf, H. M., ynm
Mufatteh(Deobstruent)	Ghani, 2011; Anonymous, 2007
Mushil-e-balgham-wa-sauda-wa-safra(Purgative of phlegm, black and yellow bile)	Ghani, 2011; Lubhaya, 1977; Ibn Baitar, 1986; Kirtikar and Basu, 2012; Khory and Katrak, 1985; Nadkarni, 1982; Anonymous, 1992; Anonymous, 2007; Ibn Sina, 2010; Ibn Sina, 1996; Ashraf, H. M., ynm
Musaffi-e-khoon(Blood purifier)	Ghani, 2011; Lubhaya, 1977; Kirtikar and Basu, 2012; Anonymous, 2007; Ashraf, H. M., ynm
Kasir-e-riyah(Carminative)	Nadkarni, 1982; Lubhaya, 1977; Kirtikar and Basu, 2012
Muqawwi-e-shaar(Hair tonic)	Lubhaya, 1977
Moalid-e-mani	Lubhaya, 1977

J. **Therapeutic uses (*Mahall-e-Istema'alat*)**

Therapeutic uses	**Reference**
Malikholia(Melancholia)	Ghani, 2011; Lubhaya, 1977; Ibn Baitar, 1986; Anonymous, 1992 Anonymous, 2007 Ibn Sina, 2010; Ashraf, H. M., ynm
Sara (Epilepsy)	Ghani, 2011; Lubhaya, 1977; Ibn Baitar, 1986 Ibn Sina, 2010; Ashraf, H. M., ynm
Kaboos (Nightmare)	Ghani, 2011; Lubhaya, 1977; Anonymous, 2007; Ashraf, H. M., ynm
Falij(Paralysis)	Ghani, 2011; Kirtikar and Basu, 2012
Laqwa (Facial paralysis)	Ghani, 2011; Ashraf, H. M., ynm
Khadre(Numbness)	Ghani, 2011
Waswas(Anxiety)	Ghani, 2011
Mania	Ghani, 2011
Junoon (Schizophrenia)	Ghani, 2011 Lubhaya, 1977; Anonymous, 1992; Anonymous, 2007; Ashraf, H. M., ynm
Deedaneam'a(Intestinal worm infestation)	Ghani, 2011; Lubhaya, 1977; Ibn Baitar, 1986; Kirtikar and Basu, 2012; Khory and Katrak, 1985; Nadkarni, 1982; Anonymous, 1992
Sartan (Cancer)	Ghani, 2011; Ibn Baitar, 1986
Khafqan (Palpitation)	Ghani, 2011
Warm-e-tihal(Splenomegaly)	Ghani, 2011; Kirtikar and Basu, 2012; Anonymous, 2007; Ashraf, H. M., ynm
Jildi amraaz (Skin diseases)	Ghani, 2011; Lubhaya, 1977; Ibn Baitar, 1986; Ashraf, H. M., ynm
Mudammil-e-qurooh(Cicatrizant)	Lubhaya, 1977; Ibn Baitar, 1986
Yarqan(Jaundice)	Kirtikar and Basu, 2012
Amraaz-e-jigar-wa-tihaal (Disease of liver and spleen)	Kirtikar and Basu, 2012; Khory and Katrak, 1985; Anonymous, 2007
Humma (Fever)	Kirtikar and Basu, 2012

III. PHYTOCHEMISTRY

It is been reported to possess organic substances as alkaloids, protein, flavonoids, resin, tannin, glycosides and carbohydrates and inorganic substances as aluminium, iron, calcium, sodium and potassium. (Anonymous, 1992). It contains Flavonoids and flavonoid glycosides such as kaempferol, quercitin, 30-methoxy-3, 40, 5, 7-tetrahydroxy flavones and 30-methoxy-40, 5, 7-trihydroxy flavone-3-glucoside are reported to be present in *C. reflexa*(Subramanian *et al*., 1963). Reflexin, 5-hydroxy-7-methoxy-6-(2, 3-epoxy-3-methylbutyl)-flavanone, is obtained from the stems of *C. reflexa*(Tripathi *et al*., 2005). Glycosides and steroids such as Cuscutin, stigmasterol and sitosterol were detected from its roots. Lycopene, dulcitol, mannitol, apigenin-7-b-rutinoside, 6–7 dimethoxy coumarin are also isolated from *C. reflexa*(Dandapani *et al*., 1989; Ramachandran *et al*., 1992). This plant also produces alkaloid component known as Cuscutalin, 1% and Cuscutin, 0.02% as the principal active ingredients, as well as a number of phenolic compounds. Cuscutalin and cuscutin are the pharmacologically active chemical constituents of this plant(Anis et al, 1999). The *C. reflexa*seeds contain the pigments, amarbelin and cuscutin. They contain a wax consisting of esters of higher aliphatic alcohols with saturated fatty acids containing 26 and 28 carbon atoms among which cerotic acid has been identified(Mukherjee et al., 2008). The seeds produce a semi-drying, translucent greenish yellow oil. Linolenic, linolic, oleic, stearic, and palmitic fatty acids are among the other phytoconstituents. A phytosterol can be found in the unsaponifiable fraction. Cuscutin is additionally present in the stem(Anonymous. 1950;Chatterjee *et al*., 2014)

IV. PHARMACOLOGICAL STUDIES

Antidepressant activity

Zeeshan *et al*., (2016) assessed the methanolic extract of *C. reflexa*for antidepressant action using various behavioral model such as Tail Suspension Test (TST), Forced Swim Test (FST) and locomotor activity test. The serotonergic and noradrenergic changes were evaluated using 5-hydroxytryptophan (5-HTP) induced head twitches and Yohimbine potentiation tests, respectively. The result showed that the *C. reflexa*extract significantly reduced the immobility time in TST (EC50 ~ 50 mg/kg) and FST without affecting the locomotor counts. The extract also significantly increased the 5-HTP induced head twitches and Yohimbine induced

lethality. This effect can be attributed to quercetin mediated rise in neuronal serotonin and noradrenaline levels possibly via MAO inhibition as quercetin is an inhibitor of MAO.

Adnan *et al.*, (2020) reported that mice treated with methanolic extract of *C. reflexa*demonstrated a dose-dependent decrease in the time of immobility in both forced swimming and tail suspension tests.

Anti-anxiolytic activity

dnan *et al.*, (2020) analysed anti-anxiolytic activity of methanolic extract of *C. reflexa*by using elevated plus maze and hole board tests. It showed that extract in a dose of 200 and 400 mg/kg exhibited a significant dose-dependent reduction of anxiety-like behavior in mice

Anti-nociceptive activity

Adnan *et al*., (2020) investigated methanolic extract of *C. reflexa*activity for nociceptive effect which was assessed by the chemical-induced (acetic acid and formalin) pain models. In both cases, 400 mg/kg was found to be most effective and significantly ($p<0.001$) inhibited acetic acid stimulated writhing and formalin-induced licking (pain response) in mice.

Antihypertensive activity

Singh *et al*, (1973) reported the alcoholic extract of *Cuscutareflexa*has positive inotropic and cardiotonic activities on the perfuse frog heart. It caused a fall in blood pressure, in a series of experiments on dog blood pressure.

Gilani *et al*, (1992) also reported ethanolic extract from the stem of *Cuscutareflexa* caused a decrease in arterial blood pressure and heart rate in pentothal-anaesthetized rats in a dose-dependent manner. Hypotensive and bradycardiac effects of *C. reflexa*were found to be independent of cholinergic receptor stimulation or adrenergic blockade.

Antibacterial activity

Ayesha *et al*., (2011) and Sharma *et al.*, (2013) investigated on Crude ethanolic extract of *Cuscutareflexa* which showed antimicrobial activity against *E. coli, S. Sonnei, Staphylococcus aureus, Staphylococcus epidermidis, E. coli, Micrococcus luteus, Pseudomonas aeruginosa.*

Antioxidant activity

Perveen *et al*., (2013) investigated in vitro antioxidant activity of *Cuscutareflexa* stems by estimating the degree of non-enzymatic haemoglobin glycosylation. Ethyl acetate and ethanol extract showed higher activity than other fractions, and were very close and identical in magnitude and comparable to the standard antioxidant agents.

Antiepileptic and anticonvulsive activities

Borole*et al*., (2011) revealed that *Cuscutareflexa* showed significantreduction in the duration of convulsion in tonic seizure induced by pentylenetetrazole (30mg/kg ip) in mice. It also reduces the tonic extension convulsion induced by maximum electroshock-induced convulsions.

Hypoglycaemic activity

Anis *et al.*, (2002) reported methanolic extract of *Cuscutareflexa*Roxb. and its subsequent ethyl acetate fraction showed significant inhibition against α-Glucosidase. It is a membrane bound enzyme at the epithelium of the small intestine. Inhibition of this enzyme prolongs the absorption time of glucose in the blood after a meal.

Anti-HIV activity

Mahmood *et al*., (1997) claimed that the crude water extracts of *C. Reflexa* exhibited anti-HIV activity which could be due to combinatory effects with compounds of different modes of action. The methanol extract of *C. Reflexa* exhibited anti-bacterial and free radical scavenging activity.

Relaxant and spasmolytic action

Prasad *et al*., (1965) examined aqueous and alcoholic extracts of the *Cuscutareflexa* stems which showed relaxant and spasmolytic action on small intestine of guinea pig and rabbit. Extracts also exhibited acetyl choline like action.

Hepatoprotective activity

Jha *et al*., (2011) reported hydroalcoholic extract of *C. reflexa*showed hepatoprotectic activity in albino rats against paracetamol induced hepatic damage and act as hepatoprotective agent.

Antitumor activity

Dandopani*et al.*, (2011) reported Chloroform and ethanol extracts of *C. reflexa*showed antitumor activity against Ehrlich ascites carcinoma tumor in mice at doses of 200 & 400 mg/kg body weight orally. Acute oral toxicity studies were also performed to determine the safety of the extracts.

V. CONCLUSION

India has a broad variety of medicinal herbs thathave been scientifically proven andreported to have incredible effects in treating various ailments, *C. reflexa*is one of them.Being an incredible parasitic weed plant *C. reflexa*it is knownas"miracle plant" in ethnobotany and it is now been reported to havean array of medicinal properties, including antidepressant, anti-anxiolytic, antitumor,antiepileptic, anticonvulsive antibacterial, antioxidant, hypoglycaemic, anti-HIV, and hepatoprotective activities. However, more explorationatthe molecular levelisthe need of the hour in order tobring medicine back to its root, so that herbal medicinal plants can be widely accepted after being scientifically validated.From this analysis, it can be inferred that *Cuscutareflexa* is a safe, historically usedand experimentally documented natural remedythat can be effectively employed in treating numerousdiseases.

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