

Short Communication

Medicinal Importance and Host Specificity of Some Parasitic Plants Growing in Darbhanga District of Bihar, India

Rajnigandha¹ and Khwaja Salahuddin*²

^{1,2}University Department of Botany, L. N. Mithila University, Darbhanga - 846 004, Bihar, India

Key words: Chronic, Cuscutaceae, Ethnobotanical, Luxuriant, Parasitic plants

Darbhanga is one the oldest town of Bihar state. It is situated at the latitude of 26.1408° N and longitude of 85.9055° E. Raj fort place is located at the Darbhanga town and is spread over large area. In this place parasitic plants were found because of other plants of angiosperms (Fig 1).

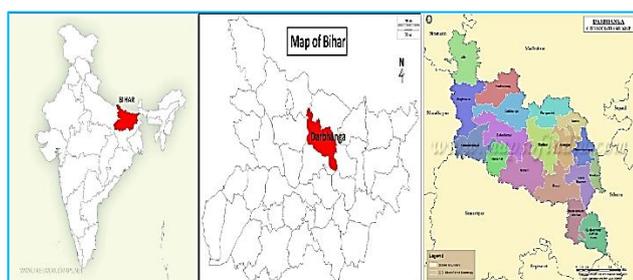


Fig 1 Map of Darbhanga district (Collection site) of Bihar, India

Parasitic angiosperms are the primary habitat of our ecosystem. They behave as prudent predators and are adapted to life cycle of their principal host [1]. Parasitic plants constitute approx. 3900 species amounting to more than 1% of flowering plants [2]. Parasitic plants have been recognized as an entity for over 2000 years. On the basis of autotrophism, parasites were classified as holoparasite and hemiparasites [3]. Again, another classification is on the basis of haustorial connection to the host i.e., they are stem and root parasites. Furthermore, parasites were divided on the basis of presence or absence of chlorophylls i.e., they may be achlorophyllous or chlorophyllous. The non-parasitic plants give rise to parasitic plants in due course of time when evolution took place from autotrophic condition to heterotrophic condition. This evolutionary transition may be partial or complete. Semi parasite or partial parasite have ability to manufacture their own food material relying on the suitable host for water and mineral [4]. Ethnobotany is the study of interaction between plants and people in their local environment [5]. Plants that grow on other living plants and absorb food material from them are called parasite. Some are total parasite

and some are partial parasites. Total parasites are non-chlorophyll in colour and they cannot produce their own food.

Parasitic plants are also divided as specialist and generalist plant parasite [6]. *Cuscuta* is a generalist plant parasite. Host and parasite interaction occurs at haustorium interface. The foreign parasite tissue grows into the host and forms a connection with the vascular system [7]. Because of this they twine around host plant and absorb as much food as possible. Partial parasitic plant are chlorophyllous and can absorb small amount of food.

Plants have always played a major role in the treatment of several chronic diseases of human being. Ethnomedicinal information is an important tool in drug discovery [8]. Our present work is a part that encompasses some medicinal parasitic plants collected from Raj fort palace ranges. The paper deals about the parasitic plants used against the various diseases residing in the community of Raj fort place, Darbhanga.

Regular visit to several areas of Darbhanga District were made to collect all host specimens which were parasitized by the two species of *Cuscuta*. During investigation, some peoples were contacted residing nearby place of Darbhanga so that they get the information about the use of parasitic plants and their plant parts on various disease. The information was gathered from urban and rural inhabitants who were knowledgeable on indigenous herbal medicine by personal interviews. The interviews were in the form of group discussions. The ethnomedicinal information collected was thus interpreted in the light of recent researches and presented in this paper. The survey of these parasitic plants was conducted in the year 2022. During fieldwork plant materials were collected for preparation of herbarium specimens and for biological and chemical testing [9]. Only few parasitic plants of different families were collected and identified with the help of flora of Darbhanga region. The results have been structured according to these categories: number of plants mentioned (with scientific Latin name, botanical families and vernacular names; part used; uses/ailments treated; preparations/administrations; host species and parts of host species. To assess the degree of

Received: 09 Jun 2023; Revised accepted: 02 Aug 2023; Published online: 05 Sep 2023

Correspondence to: Khwaja Salahuddin, University Department of Botany, L. N. Mithila University, Darbhanga - 846 004, Bihar, India, Tel: +91 9668816209; E-mail: salahuddin212@gmail.com

Citation: Rajnigandha, Salahuddin K. 2023. Medicinal importance and host specificity of some parasitic plants growing in Darbhanga district of Bihar, India. *Res. Jr. Agril. Sci.* 14(5): 1162-1164.

originality and novelty of the uses claimed by the informants, these were compared with those reported in several works on ethnobotany, medicinal plants and phytotherapy.

Parasitic plants were reported from Raj fort place so these parasitic plants have also been found in some other parts of Darbhanga District. Only the two species of *Cuscuta* e.g., *Cuscuta chinensis* Roxb. and *Cuscuta reflexa* Roxb. are total stem parasites. The frequency of total parasitic plants is only 2.8%. The effect of parasite on vegetation was found at several locations in study area.

Total parasites or holoparasites developed mechanism to ensure that their seeds require suitable host. The seeds of normal plants typically germinate under favourable environmental conditions to non-parasites. The seeds of parasitic plants have developed into seedlings then they locate the host. Roots of parasitic plants are available to recognize and form haustoria with the roots of other plants that they face in the soil. Likewise, thread like shoot of *Cuscuta* uses information about the colour of host and volatile chemical

which is produced in response to growth towards host plants. The moment should reach the host plant it forms a coiled structure called haustoria [10].

It is reported that a good parasite does not kill its host plant. It is due to the fact that degree of pathogenicity considerably varies and is exhibited by various parasitic plants. This variation is greater than those that dramatically affect the physiology and fecundity as shown by *Striga* and *Orobanchae*. Degree of pathogenicity is dependent on several factors such as biomass ratio of parasite to host, the number of parasites attach to the individual host, the length of the time requires for the parasite to complete the life cycle. In spite of variation in the pathogenicity and dynamics of life cycle, all species of parasitic plant have evolved under the constraint that they do not kill their host before reproduction. The preference of parasite to host is natural. A parasite may choose the additional host artificially [11]. It is now evident that parasitism indicates a broader range of host plant. It was reported in *Cuscuta epilinum* which requires linen host. In terms of host specificity, a broad host range has been found for several species of *Cuscuta*.

Name of host plant	Family	Habit	Parasitizing part
<i>Acacia nilotica</i>	Mimosaceae	Tree	Stem
<i>Polyalthia longifolia</i>	Annonaceae	Tree	Stem and leaf
<i>Azadirachta indica</i>	Meliaceae	Tree	Stem and leaf
<i>Salvadora persica</i>	Rhamnaceae	Stem and leaf	Stem and leaf
<i>Cassia accidentalis</i>	Caesalpinaceae	Tee	Stem

The morphological features and ethnomedicinal importance of collected plants were mentioned individually.

1. *Cuscuta reflexa* Roxb. (Vernacular name: Amarvel)

Family: Cuscutaceae

Habit: It is a total stem parasite found everywhere. It grows on *Acacia* spp but occasional on bushes (Fig 2).

Morphological features: Stem parasite with greenish-yellow, leafless twinning and hanging pale yellow, fleshy stems. Flowers white or creamy white solitary or in umbellate clusters in short racemes. Fruit is capsule, glabrous circum-sessile near the base.

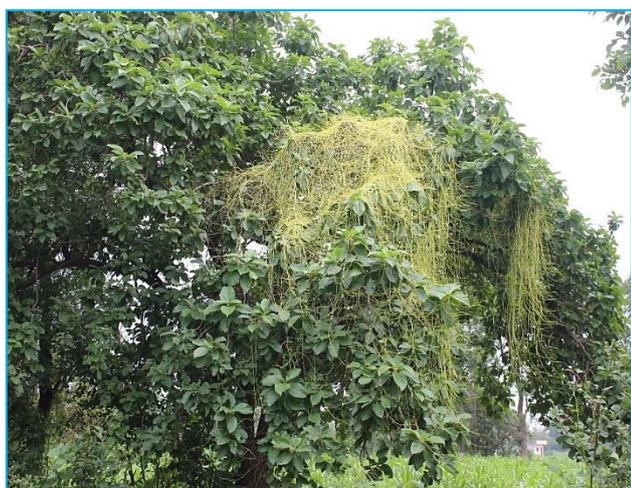


Fig 2 *Cuscuta reflexa*

Significance

The decoction of seeds in high doses causes abortion. It is used to cure liver ailments, stomach disorder and UTI [12]. The plant paste is applied on swollen testicles. It is also used or applied on the scalp to prevent hair fall. Tribals take orally decoction of stem to cure diarrhea, cholera and asthma, fever,

cough and cold. Further, the whole plant is used in the treatment of headache, joint ailment and sprain [13]. *Cuscuta reflexa* has overall antifungal and antibacterial activities [14].

2. *Cuscuta chinensis* Roxb. (Vernacular name: Amarvel)

Family: Cuscutaceae

Habitat: It is also a total stem parasite. It grows on *Cassia* spp (Fig 3).

Morphological features: Plant is twiner, thin yellow vine lacking leaves or roots. Flowers that are very small, have two styles with capitate stigmata and produce 3-4 obovoid seeds per capsule. It has glomerulate to dense paniculiform inflorescences.



Fig 3 *Cuscuta chinensis*

Significance

The dry seed is used as a tonic and aphrodisiac to nourish the liver and kidneys and to treat impotence and seminal emission. It is also widely used to improve sexual function,

prevent and treat cardiovascular disease, osteoporosis and ageing [15]. *Cuscuta chinensis* is overall used as anti-inflammatory agent, antioxidant agent and analgesic properties [16].

SUMMARY

The study of parasitic plants and their ethnobotanical survey were accomplished in the vicinity of Raj palace of Darbhanga District of Bihar. The parasitic plants were seen in this region because of luxuriant growth of other host plants. Some parasitic plants have been reported and belong to family of Cuscutaceae. The morphological characters as well as their host were found out. *Cucuta* is a total stem parasite growing on *Acacia nilotica* and *Cassia fistula* etc. Some of the plants were explored with respect to treating incurable and chronic diseases.

Seeds of *Cuscuta* were used in the treatment of osteoporosis and joint ailments. *Cuscuta* was found to be energizer for liver and kidney disorders. The aim of our study is to record the medicinal value of these parasitic plants. The ethnomedicinal importance of these parasitic plants were found out. The paste of overall plant of *Cuscuta reflexa* was used in case of swollen testicles. *Cuscuta chinensis* worked wonder as energizer for liver and kidney disorder. There plants were explored with respect to the treatment of chronic and incurable disease.

Acknowledgements

Authors are grateful to Prof, Shahnaz Jamil, Head, University Department of Botany Bihar for her constant support and encouragement. The corresponding author is also thankful to the staff of Raj fort palace, Darbhanga for their assistance.

LITERATURE CITED

1. Albert M, Belastegui-Macadam X, Bleischwitz M, Kaldenhoff R. 2008. *Cuscuta* spp: parasitic plants in the spotlight of plant physiology, economy and ecology. *Progress in Botany* 69: 267-277.
2. Nickrent DL. 2002. *Phylogenetic Origin of Parasitic Plants* (Eds.), J.A. Lopez-Saez, P. Catalan and L. Saez. Parasitic plants of the Iberian Peninsula and Balearic Islands, Mundiprensa, Madrid. 5: 29-56.
3. Bhagaonkar PY, Deokule S. 2002. Some useful ethnomedicinal plants of Korku of Melghat region (MS). *Ethnobotanical Research* 12(1/2): 16-19.
4. Arora RK. 1997. Ethnobotany and its role in the conservation and use of plant genetic resources in India. *Ethnobotanical Research* 9: 6-15.
5. Nickrent DL. 2020. Parasitic angiosperm: how often and how many? *Taxonomy* 69: 5-27.
6. Kaiser B, Vogg G, Furst UB, Albert M. 2015. Parasitic plant of genus *Cuscuta* and their susceptible and resistant host plant. *Frontiers in Plant Science* 5: 21-28.
7. Lanini W, Kogan M. 2005. Biology and Management of *Cuscuta* in crops. *Ciencia e Investigacion Agraria* 32: 165-179.
8. Nwakocho MI, Aigbokhan EI. 2013. Host range and preference of *Cuscuta campestris* among common weeds in Benin city, Nigeria. *Nigerian Journal of Botany* 26(2): 1-29.
9. Ibrar M. 2002. Responsibilities of ethnobotanists in the field of medicinal plants. In: Proceeding of workshop on curriculum Development in Applied Ethnobotany. Ethnobotany Project, NWFR, Pakistan, 34-D 2: 16-20.
10. Salahuddin K, Gor S, Visavadia M, Soni V, Tatmia N. 2013. Ethnobotanical survey of some parasitic plants growing in girnar forest of Junagadh District of Gujarat, India. *International Research Journal in Biological Sciences* 2(4): 59-62.
11. O'Neil A, Rana S. 2017. An ethnobotanical analysis of parasitic plants in the Nepal Himalaya. *Journal of Ethnobiology and Ethnomedicine* 12(14): 14.
12. Mahwasane ST, Middleton L, Boaduo N. 2013. An ethnobotanical survey of indigenous knowledge on medicinal plants used by the traditional healers of the Lwamondo area, Limpopo province, South Africa. *South African Journal of Botany* 88: 69-75.
13. Ho A, Costea. 2018. Diversity, evolution and taxonomic significance of fruit in *Cuscuta*; the evolutionary advantages of indehiscence. *Perspectives in Plant Ecology, Evolution and Systematics* 32: 1-7.
14. Palevitch DZ, Yaniv A, Dafui, Friedman J. 2002. Medicinal plants of Israel: An ethnobotanical survey. In: Herbs, Spices and Medicinal Plants. (Eds.) L. E. Crackes and J. E. Simon, The Haworth Press, Inc., U.S.A. 1: 280-345.
15. Li A, Haider MS, Hanif S, Akhtar N. 2014. Assessment of the antibacterial activity of *Cuscuta pedicellata* Ledeb. *African Journal of Biotechnology* 13: 430-433.
16. Ahmad A, Tandon S, Xuan TD, Nooreen Z. 2017. A review on phytoconstituents and biological activities of *Cuscuta* Species. *Biomedicine and Pharmacotherapy* 92: 772-795.