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Phytodiversity of Parasitic Hosts of *Cuscuta reflexa* Roxb. in Cooch Behar District of West Bengal

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Abstract

Taxon *Cuscuta* belonging to the order Cuscutales originated as a natural climax order from the subclass Magnoliidae. It is provided that this order is a relic of an archaic basic group with abundant primitive features and with outstanding physiological adaptation for parasitism. So, the hosts range diversity of such taxonomic group Cuscuta (particularly *Cuscuta reflexa* Roxb.) in Coochbehar district is discussed in this paper. Altogether, 58 species (54 dicots and 4 monocots) comprising 50 genera, representing 31 families of angiosperms have been found to be the host of *Cuscuta reflexa* in the district. The ratio of monocot to dicot is 1 : 13.5. Among the hosts, two species are new reports (*Malachra capitata* and *Catharanthus pusillus)*, which will be helpful in enriching the current knowledge in the field of biology in near future.

Key words : Dodder *(Cuscuta reflexa),* Hosts, Cooch Behar District, Taxonomic survey.

The Genus *Cuscuta* (Tourn) L. contains large number of species. This is world wide in distribution and consists of three major subgenera-*Monogyna, Cuscuta* and *Gramica* (Monostyleae, Homostyleae and Heterostyleae). Tournefort (1) first introduced the genus *Cuscuta* in the science but mentioned no species under the genus. Linneaus (2) described two species under the genus and gave a clear delimitation of these species of the genus. *Cuscuta europea* L. is taken to represent the type species. The genus *Cuscuta,* commonly called Dodder of the family Cuscutaceae (3), formerly Convolvulacea is a leafless twining, yellow, total-parasite (4). It spreads over more than 100 species distributed in the tropical and temperate region of the world (5). *Cuscuta* is regarded as having medicinal properties ; such as seeds are carminative, anodyne and purgative. Prain (6) has reported only one species i.e. *Cuscuta reflexa* Roxb. Badal et al. (7) has recorded 41 species of hosts from Birbhum district. Ghosh and Das (8), Das (9) Ghosh and Das (10) and Das (11) have recorded 37, 15, 65 and 32 species of angiosperm as host plants of *Cuscuta reflexa* from the erstwhile Midnapore, Bankura, Howrah and Purulia districts of West Bengal. But the study of host range of the parasite from some districts of the state like Nadia, Darjeeling and Jalpaiguri is left untouched. Very recently, Ghosh and Das (12) recorded 44 species of angiosperms as host plants of the said parasite from the district Burdwan.

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Study Site

Cooch Behar district in the state of West Bengal situated on the extreme north east corner of the state. It derives its name from two words viz. Koch and Bihar. Koch is an ethnic group of people inhabiting in the vast tract of land to the north-east of the state of West Bengal, Bihar or more properly 'Vihara' on the other hand denotes an abode or spot. So, Koch Bihar means the land of Koch.

Table 1. Range of hosts of *C. reflexa* with their habitats. Abbreviations used are Hy = Hydrophyte, Me=Mesophyte and Xe = Xerophyte.

	Botanical name	Family	Dicot (D)/ monocot (M)	Ecological type of the host (habitat)
1	*Acacia arabica* Willd.	Mimosaceae	D	Xe
2	*Adhatoda vasica* Nees	Acanthaceae	D	Me
3	*Aegle marmelos* (L.) Corr.	Rutaceae	D	Me
4	*Anacardium occidentale* L.	Anacardiacese	D	Me
5	*Azadirachta indica* A. Juss.	Meliaceae	D	Me
6	*Barleria prionitis* L.	Acanthaceae	D	Me
7	*Blumea lacera* DC.	Asteraceae	D	Me
8	*Bougainvillea spectabilis* Willd.	Nyctaginaceae	D	Me
9	*Bridelia retusa* Spreng.	Euphorbiaceae	D	Me
10	*Caesalpinia pulcherrima* L.	Caesalpineaceae	D	Me
11	*Calotropis gigantea* R. Br.	Asclepiadaceae	D	Me
12	*Calotropis procera* R. Br.	Asclepiadaceae	D	Me
13	*Canna indica* L.	Cannaceae	M	Xe
14	*Carissa spinarum* L.	Apocynaceae	D	Me
15	*Cassia alata* L.	Caesalpiniaceae	D	Me
16	*Cassia fistula* L.	Caesalpiniaceae	D	Me
17	*Cassia sophera* L.	Caesalpiniaceae	D	Me
18	*Cassia tora* L.	Caesalpiniaceae	D	Me
19	*Casuarina equisetifolia* L.	Casuarinaceae	D	Xe
20	*Catharanthus pusillus* (Murr.) G. Don.	Apocynaceae	D	Me
21	*Cestrum diurnum* L.	Solanaceae	D	Me
22	*Cestrum nocturnum* Lam.	Solanaceae	D	Me
23	*Clerodendrum inerme* (L.) Gaertn.	Verbenaceae	D	Me
24	*Clerodendrum indicum* (L.) O. Ktze.	Verbenaceae	D	Me
25	*Cocinia indica* Wight. & Arn.	Cucurbitaceae	D	Me
26	*Duranta repens* L.	Verbenaceae	D	Me
27	*Ecbolium viride* (Forsk.) Alston	Acanthaceae	D	Me
28	*Eichhornia crassipes* Solms	Pointederiaceae	M	Hy
29	*Ficus hispida* L.	Moraceae	D	Xe
30	*Ficus infectoria* Roxb.	Moraceae	D	Xe
31	*Flacourtia indica* (Burm. f.) Merr.	Flacourtiaceae	D	Me
32	*Glycosmis arborea* (Roxb.) DC.	Rutaceae	D	Me
33	*Heliotropium indicum* L.	Boraginaceae	D	Me
34	*Hemigraphis hirta* T. And.	Acanthaceae	D	Me
35	*Hibiscus vitifolius* L.	Malvaceae	D	Me
36	*Ipomoea carnea* Jacq.	Convolvulaceae	D	Me
37	*Jatropha gossypifolia* L.	Euphorbiaceae	D	Me
38	*Lantana camara* L.	Verbenaceae	D	Xe
39	*Malachra capitata* L.	Maelvaceae	D	Me
40	*Mikania micrantha* H. B. K.	Asteraceae	D	Me
41	*Monochoria hastate* (L.) Solms	Pontederiaceae	M	Hy
42	*Nerium indicum* Mill.	Apocynaceae	D	Xe
43	*Parthenium hysterophbrus* L.	Asteraceae	D	Me
44	*Passiflora foetida* L.	Passifloraceae	D	Me
45	*Pedilanthus tithymeloides* Poit.	Euphorbiaceae	D	Me
46	*Phoenix sylvestria* Roxb.	Arecaceae	M	Xe
47	*Phyllanthus niruri* L.	Euphorbiaceae	D	Me
48	*Pithecelobium dulce* (Roxb.) Benth.	Mimosaceae	D	Me
49	*Quisqualis india* L.	Combretaceae	D	Me
50	*Solanum sisymbrifolium* Lamk.	Solanaceae	D	Me
51	*Streblus asper* Lour	Moraceae	D	Me
52	*Teramnus labialus* (L.f.) Spreng	Papilionaceae	D	Me
53	*Tiliacora racemosa* Colebr.	Menispermaceae	D	Me

Table 1. Continued.

	Botanical name	Family	Dicot (D)/ monocot (M)	Ecological type of the host (habitat)
54	*Trema orientalis* Bail	Urticaceae	D	Me
55	*Vitis trifolia* L.	Vitaceae	D	Me
56	*Xanthium strumarium* L.	Asteraceae	D	Me
57	*Zizyphus mauritiana* Lamk.	Rhamnaceae	D	Me
58	*Zizyphus oenoplea* (Linn.) Mill.	Rhamnaceae	D	Me

The study site i.e. district Cooch Behar lies between the parallels $25^0 57' 56''$ and $26^0 32' 46''$ N latitude and the longitude of the eastern most point being between $89^0 52' 00''$ east and the longitude of the western most point being $88^0 45' 02''$ E. The northern boundary and most part of the western boundary are formed by the district of Jalpaiguri. The southern boundary of the district is bounded by the Rangpur district of Bangladesh, the eastern boundary is formed by the district of Goalpara of Assam. The total geographical area of this district is 3,387 sq km (13). A major part of the district possesses plain land which forms the land in Himalayan terai of West Bengal. Principal rivers are Torsa and Sankosh. All of them are passing from north to south. Apart from these, there are a number of rivulets ranging from small to medium are flowing within the district. In the town there are three large and beautiful tanks situated namely Bairagidighi, Laldighi and Garhdighi. The district has 5,697 hectares of forest lands which are in the form of protected forests and unclassified state forests. Of the 5,697 hectares of forest lands, 50 hectares are the protected and the remaining go under unclassified state forest lands.

Methods

Eight study sites for field survey have been taken for consideration during 2002—2007. These are Sitalkuchi, Mathabhanga, Cooch Behar north, Cooch Behar west, Sitai, Dinhata and Natabari area. Parasite of *Cuscuta* with hosts of different kinds were collected and studied in different times. Hand sections have been made in laboratory from normal and haustorial regions. Simple, double and triple staining with Bismark brown, Safranin, light green, golden yellow and aniline blue have been tried following Mukherjee (14) ; 1% aqueous crystal violet was used to stain nucleus. Some photographs and herbarium specimens have been made and housed in our personal custody for further work and for reference.

Results and Discussion

In total 58 species of host plants of *Cuscuta reflexa* have been found (Table 1) in the Cooch Behar district. It spreads over 54 species of dicots and four monocots belonging to 31 families. Out of 31 families, 28 are dicot families and 3 are monocot families i.e. 90.32% of host families are under dicot and 9.6% hosts families are under monocot type. Considering genus wise it is found that 58 host species of the plant parasite are restricted to 44 genera of dicots and 4 genera of monocots i.e. 91.66% dicots and 8.33% monocots. The ecological habitat of the hosts also varies widely (Table 2). They range from Hydrophytes two to Xerophytes eight through Mesophytes (48). In all the habitats, hosts belonging to both monocot and dicots are distributed showing its wide range of affinity.

In the present study, 58 species as hosts of *Cuscuta reflexa* are recorded from the district of Cooch Behar as against 52 species, 65 species, 44 species and 37 species in Uttar Dinajpur district (12). Howrah district (8), Burdwan district, and erstwhile Midnapore district (10) respectively. During 1998, Das (3) added 35 species as hosts of *Cuscuta reflexa* from the same district of Midnapore (35 dicots and two monocots) and thus total record of hosts come to 72. In the districts Purulia and Bankura hosts of the same parasite recorded in number as 32 and 15 respectively. So, the record of hosts in Cooch Behar district stand third position i.e. 58 in number among the districts. Further, one species of monocot i.e. *Phoenix sylvestris* has been found to be infested by the dodder *(C. reflexa)* in Cooch Behar district. There has been report of attack by dodder on four species of monocot,

Table 2. Distribution of hosts of *C. reflexa* under different groups of plants with their habitats.

Ecological type of the host	Monocot	Dicot	Total	Percent of monocot	Percent of dicot	Monocot to dicot ratio
Hydrophytes	02	00	02	100	000	2:00
Mesophytes	00	48	48	000	100	0:46
Xerophytes	02	06	08	25	75	1:3
Total	04	54	58	6.89	93.10	1:13.5

such as *Canna indica, Eichhornia crassipes, Monochoria hastata* and *Phoenix sylvestris*. No infestation of the parasite *Cuscuta reflexa* on Monocot species, such as, *Dioscorea alata* (Dioscoreaceae) has been found till date though there is enough cultivation practice going on at the north east part of the area.

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