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DIVERSITY AND INFECTION DYNAMICS OF HERBACEOUS HOST SPECIES OF *CUSCUTA CHINENSIS* LAM. IN DASPUR-I BLOCK, PASCHIM MEDINIPUR, WEST BENGAL

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Abstract
Cuscuta chinensis Lam. is an obligate stem holoparasitic angiosperm known for its extensive host range and significant ecological impacts on natural and agricultural ecosystems. The present investigation was conducted in four different habitats of Daspur-I Block, Paschim Medinipur, West Bengal, to assess the diversity of herbaceous host species and the degree of infection caused by *C. chinensis*. A total of 26 herbaceous host species belonging to 18 families were identified. Considerable variation in host susceptibility was observed, with infection percentages ranging from 13.63% to 71.04%. Agricultural and plantation habitats supported the highest number of infected hosts, whereas forest habitats remained free from infestation. The findings indicate that *C. chinensis* exhibits a broad host spectrum and possesses the capacity to influence plant community structure through differential infection of herbaceous vegetation. The study contributes valuable information on host-parasite interactions and provides baseline data for ecological monitoring and management of parasitic weeds.
Keywords: *Cuscuta chinensis*, herbaceous hosts, parasitic angiosperm, infection percentage, biodiversity, host-parasite interaction

Introduction

Parasitic flowering plants represent a unique ecological group that derives nutrients and water from other plants through specialized structures called haustoria. Among these, species of the genus *Cuscuta* are widely distributed throughout tropical and subtropical regions and are considered among the most destructive parasitic weeds in both agricultural and natural ecosystems (Dawson et al., 1994). The genus comprises nearly 200 species characterized by thread-like stems, reduced leaves, and limited photosynthetic ability. Consequently, these plants depend almost entirely on host plants for their nutritional requirements (Heide-Jørgensen, 2008).

Cuscuta chinensis Lam. is one of the most common species occurring in South and Southeast Asia. It infects a wide range of herbaceous and woody hosts and is capable of causing severe reductions in growth, reproductive output, and survival of infected plants (Press and Graves, 1995). The parasite establishes physiological connections with host vascular tissues, thereby extracting water, minerals, carbohydrates, and other metabolites. Such interactions frequently result in reduced host vigor and altered plant community dynamics (Musselman, 1987).

The ecological success of *Cuscuta* species largely depends on host availability and environmental conditions. Studies have shown that habitat characteristics significantly influence host diversity and infection intensity, with open agricultural landscapes generally supporting greater infestations than densely shaded habitats (Stefanović and Olmstead, 2004). Despite its ecological and economic importance, detailed information regarding host diversity and infection patterns of *Cuscuta chinensis* in the Daspur region of West Bengal remains limited.

Therefore, the present study was undertaken to investigate the herbaceous host spectrum of *Cuscuta chinensis* in Daspur-I Block and to evaluate host susceptibility through infection percentage analysis.

Materials and Methods

The study was carried out in Daspur-I Block of Paschim Medinipur district, West Bengal. Four representative sites were selected, namely Dihipalsa (Agricultural Land), Baikunthapur (Plantation Land), Kalaikunda (Barren Land), and Sagarpur (Forest Land). Herbaceous vegetation was sampled using 1 m × 1 m quadrats. All plant species infected by *Cuscuta chinensis* were recorded and identified using standard floristic literature.

Data collected included host species name, family, distribution across study sites, infection percentage, affected plant parts, flowering and fruiting status, and host utility value. Infection percentages were calculated based on the extent of parasite coverage observed on individual host plants. Comparative analysis was conducted to determine host diversity and susceptibility among different habitat types.

Results and Discussion

The survey revealed that *Cuscuta chinensis* parasitized 26 herbaceous plant species belonging to 18 families and 24 genera. The broad host range recorded in the present study demonstrates the highly adaptable nature of the parasite and confirms previous observations that *Cuscuta* species are among the least host specific parasitic angiosperms (Dawson et al., 1994). The occurrence of infected hosts across diverse taxonomic groups indicates the ability of the parasite to exploit a wide range of physiological and structural host characteristics.

Among the recorded families, Amaranthaceae and Poaceae were represented by the highest number of host species, followed by Acanthaceae, Cyperaceae, and Asteraceae. The predominance of these families may be attributed to their abundance within agricultural and disturbed habitats. Similar findings have been reported by Press and Graves (1995), who observed that host abundance often plays a more important role in parasite establishment than phylogenetic affinity. The extensive representation of economically important and medicinally valuable species among infected hosts further emphasizes the ecological significance of *C. chinensis* infestations.

Table 1 presents the distribution pattern and infection percentage of herbaceous host species of *Cuscuta chinensis* across four study sites of Daspur-I Block. A total of 26 host species belonging to 18 families were recorded. Site I (Agricultural Land) exhibited the highest host richness with 24 infected species, followed by Site II (19 species) and Site III (18 species), whereas no infected host species were observed in Site IV. The results indicate that agricultural and plantation habitats provide favorable conditions for the establishment and spread of *C. chinensis*. Among the recorded hosts, *Amaranthus viridis* showed the highest infection percentage (71.04%), followed by *Ruellia tuberosa* (67.85%) and *Alternanthera sessilis* (55.58%). These findings suggest that host abundance and habitat characteristics play a crucial role in determining parasite distribution and infestation intensity.

Table 1. Distribution and Diversity of Herbaceous Host Species of *Cuscuta chinensis* in Different Study Sites

Sl. No.	Host Species	Family	Site I	Site II	Site III	Site IV	Infection (%)
1	*Ageratum conyzoides*	Asteraceae	–	+	–	–	24.98
2	*Alternanthera philoxeroides*	Amaranthaceae	+	+	+	–	34.87
3	*Alternanthera sessilis*	Amaranthaceae	–	+	+	–	55.58
4	*Amaranthus viridis*	Amaranthaceae	+	–	+	–	71.04
5	*Brachiaria ramosa*	Poaceae	+	+	+	–	27.93
6	*Cassia absus*	Caesalpiniaceae	+	–	–	–	20.88
7	*Centella asiatica*	Apiaceae	–	+	–	–	18.01
8	*Commelina benghalensis*	Commelinaceae	–	+	+	–	30.25
9	*Croton bonplandianus*	Euphorbiaceae	–	+	–	–	25.69
10	*Cynodon dactylon*	Poaceae	+	–	+	–	22.26

11	*Cyperus kyllinga*	Cyperaceae	–	–	+	–	31.18
12	*Cyperus tagetum*	Cyperaceae	–	+	–	–	31.25
13	*Heliotropium indicum*	Boraginaceae	–	+	–	–	38.91
14	*Hemigraphis hirta*	Acanthaceae	+	+	–	–	41.01
15	*Ipomoea nil*	Convolvulaceae	–	+	–	–	19.23
16	*Melochia corchorifolia*	Sterculiaceae	–	+	–	–	19.44
17	*Mollugo spergula*	Molluginaceae	–	+	+	–	18.75
18	*Oryza sativa*	Poaceae	–	+	–	–	20.16
19	*Oxalis corniculata*	Oxalidaceae	+	–	–	–	15.63
20	*Phaseolus radiatus*	Papilionaceae	–	+	–	–	25.00
21	*Ruellia tuberosa*	Acanthaceae	+	+	+	–	67.85
22	*Scoparia dulcis*	Scrophulariaceae	–	+	–	–	37.29
23	*Solanum nigrum*	Solanaceae	+	–	–	–	25.00
24	*Stephania japonica*	Menispermaceae	+	+	–	–	32.20
25	*Typhonium trilobatum*	Araceae	+	–	–	–	13.63
26	*Vernonia cinerea*	Asteraceae	+	–	–	–	21.40

Note: (+) Present and infected; (–) Absent.

Table 2. Biological Characteristics and Host Susceptibility of Herbaceous Hosts of *Cuscuta chinensis*

Host Species	Infection (%)	Plant Parts Affected	Host Flowering/Fruiting	Parasite Present
Amaranthus viridis	71.04	Leaf, Stem	Yes	Yes
Ruellia tuberosa	67.85	Leaf, Stem, Fruit	Yes	Yes
Alternanthera sessilis	55.58	Leaf, Stem	Yes	Yes
Hemigraphis hirta	41.01	Leaf, Stem	No	Yes
Heliotropium indicum	38.91	Leaf, Stem	Yes	Yes
Scoparia dulcis	37.29	Leaf, Stem	Yes	Yes
Alternanthera philoxeroides	34.87	Leaf, Stem	Yes	Yes
Stephania japonica	32.20	Leaf, Stem	Yes	Yes
Cyperus tagetum	31.25	Leaf, Stem	Yes	Yes
Cyperus kyllinga	31.18	Leaf, Stem	Yes	Yes
Commelina benghalensis	30.25	Leaf, Stem	No	Yes
Brachiaria ramosa	27.93	Leaf, Stem	No	Yes
Croton bonplandianus	25.69	Leaf, Stem	Yes	Yes
Phaseolus radiatus	25.00	Leaf, Stem	No	Yes
Solanum nigrum	25.00	Leaf, Stem	Yes	Yes
Ageratum conyzoides	24.98	Leaf, Stem	Yes	Yes
Cynodon dactylon	22.26	Leaf, Stem	No	Yes
Vernonia cinerea	21.40	Leaf, Stem	Yes	Yes
Cassia absus	20.88	Leaf, Stem	Yes	Yes
Oryza sativa	20.16	Leaf, Stem	Yes	Yes
Melochia corchorifolia	19.44	Leaf, Stem	Yes	Yes
Ipomoea nil	19.23	Leaf, Stem	Yes	Yes
Mollugo spergula	18.75	Leaf, Stem	Yes	Yes
Centella asiatica	18.01	Leaf, Stem	No	Yes
Oxalis corniculata	15.63	Leaf, Stem, Fruit	Yes	Yes
Typhonium trilobatum	13.63	Leaf Sheath, Leaf	No	Yes

Table 2 summarizes the biological characteristics and susceptibility of herbaceous host species to *Cuscuta chinensis*. Leaves and stems were the most commonly affected plant parts, indicating that these tissues serve as primary attachment sites for haustorial penetration. The majority of host species were infected during flowering and fruiting stages, demonstrating that the parasite remains active

throughout host reproductive phases. The highest susceptibility was observed in *Amaranthus viridis* and *Ruellia tuberosa*, while *Typhonium trilobatum* and *Oxalis corniculata* exhibited relatively low infection levels. The variation in infection percentages among host species may be attributed to differences in host morphology, physiology, nutrient availability, and defense mechanisms. The results highlight the broad host range and ecological adaptability of *C. chinensis* within the study area.

Analysis of site-wise distribution indicated considerable variation in host occurrence. Site I (Dihipalsa Agricultural Land) recorded the highest host diversity with 24 infected species, followed by Site II (Baikunthapur Plantation Land) with 19 species and Site III (Kalaikunda Barren Land) with 18 species. In contrast, no infected herbaceous host species were recorded from Site IV (Sagarpur Forest Land). The absence of infestation in the forest habitat may be associated with dense canopy cover, reduced light availability, and limited herbaceous vegetation. Since *Cuscuta* species require adequate sunlight for growth and successful host location, shaded forest environments may restrict their establishment (Heide-Jørgensen, 2008).

The infection percentage varied substantially among host species, indicating differential susceptibility to parasitism. The highest infection percentage was observed in *Amaranthus viridis* (71.04%), followed by *Ruellia tuberosa* (67.85%) and *Alternanthera sessilis* (55.58%). These species appear to provide favorable physiological conditions for parasite attachment and nutrient acquisition. High infection rates may be related to stem morphology, vascular organization, nutrient content, and host abundance within the habitat. Similar host preferences have been documented in several *Cuscuta* species, where rapidly growing herbaceous plants frequently exhibit greater levels of infestation (Musselman, 1987).

Moderate infection levels were recorded in species such as *Hemigraphis hirta* (41.01%), *Heliotropium indicum* (38.91%), *Scoparia dulcis* (37.29%), and *Stephania japonica* (32.20%). These species support successful parasite establishment but may possess partial resistance mechanisms that limit extensive colonization. Host defense responses such as lignification, biochemical barriers, and altered vascular development have been reported to reduce haustorial penetration in susceptible plants (Press and Graves, 1995).

The lowest infection percentages were observed in *Typhonium trilobatum* (13.63%), *Oxalis corniculata* (15.63%), and *Centella asiatica* (18.01%). Such low levels of infection suggest the presence of morphological or physiological characteristics that inhibit parasite development. Previous investigations have demonstrated that host species differ considerably in their compatibility with parasitic plants owing to differences in stem anatomy, secondary metabolite production, and defense signaling pathways (Heide-Jørgensen, 2008).

The study further revealed that leaves and stems constituted the primary plant organs affected by the parasite. The thread-like stems of *Cuscuta chinensis* twined extensively around host shoots and formed multiple haustorial connections with stem tissues. In a few species, flowers and fruits were also affected, indicating advanced stages of infestation. Such extensive parasitism can significantly reduce photosynthetic efficiency and reproductive success of host plants. According to Dawson et al. (1994), severe infestations often result in diminished flowering, reduced seed production, and overall decline in host fitness.

An important observation of the present study was that most host species were infected during flowering and fruiting stages. This suggests that *Cuscuta chinensis* remains physiologically active throughout the reproductive phase of its hosts. The parasite may therefore compete directly with host reproductive structures for nutrients and assimilates, thereby affecting reproductive performance. Similar relationships between parasitic weeds and host reproductive biology have been documented by Musselman (1987), who reported reduced seed production in heavily infected host populations.

The findings collectively indicate that *Cuscuta chinensis* has the capacity to influence vegetation composition within the study area. By selectively infecting certain species more intensely than others, the parasite may alter competitive relationships among plants and consequently affect community structure. Such ecological impacts are particularly important in agricultural ecosystems where

susceptible species may experience substantial reductions in productivity. The high infection percentages observed in several economically useful plants highlight the need for continuous monitoring and management interventions.

Conclusion

The present investigation demonstrates that *Cuscuta chinensis* possesses a broad herbaceous host spectrum in Daspur-I Block and is capable of infecting a wide variety of plant families. A total of 26 host species belonging to 18 families were recorded, with agricultural habitats exhibiting the highest host diversity and infection intensity. Considerable variation in susceptibility was observed among host species, with *Amaranthus viridis* showing the highest infection percentage and *Typhonium trilobatum* the lowest. The study confirms the ecological adaptability of *Cuscuta chinensis* and its potential to alter plant community dynamics through differential host exploitation. These findings provide valuable baseline information for future ecological studies and for developing effective management strategies aimed at controlling parasitic weed infestations in agricultural and natural ecosystems.

References

Dawson, J. H., Musselman, L. J., Wolswinkel, P., & Dörr, I. (1994). Biology and control of Cuscuta. Reviews of Weed Science, 6, 265–317.

Heide-Jørgensen, H. S. (2008). Parasitic Flowering Plants. Brill Academic Publishers, Leiden.

Musselman, L. J. (1987). Parasitic Weeds in Agriculture. CRC Press, Boca Raton.

Press, M. C., & Graves, J. D. (1995). Parasitic Plants. Chapman and Hall, London.

Stefanović, S., & Olmstead, R. G. (2004). Testing the phylogenetic position of Cuscuta and the monophyly of Convolvulaceae. American Journal of Botany, 91(7), 109–115.