

## TAXONOMIC AND BIOGEOGRAPHIC NOTES ON CUSCUTACEAE FROM PAKISTAN AND KASHMIR

M. TAHIR RAJPUT\* AND SYEDA SALEHA TAHIR\*

*The Arnold Arboretum of Harvard University,  
22 Divinity Avenue, Cambridge, M.A. 02138, U.S.A.*

### Abstract

A distributional survey in relation to the phytogeographical regions, recognised in Pakistan and Kashmir, for all the 14 taxa attributed to the family Cuscutaceae has been carried out. The analysis indicated that the taxa are mainly distributed in N.W.F.P. and Kashmir. Five of these taxa are uniregional and the remaining 9 are pluri-regional in distribution. The maximum phytogeographic distribution of this family is in Irano-Turanian-region, while Sino-Japanese region and Saharo-Sindian region, have more or less equal distribution, and no taxa have been reported from Indian region.

### Introduction

The family Cuscutaceae includes a single genus *Cuscuta*, which has about 170 species, distributed in almost all the continents (Willis, 1988). Several species of *Cuscuta* are important weeds of agricultural crops. In spite of its importance no detailed study on this genus has been conducted in Pakistan. Stewart (1972) listed 20 taxa belonging to this genus from Pakistan and Kashmir. During a survey of the genus for the flora of Pakistan (Rajput & Tahir, 1988), only 14 species could be identified. In this compilation the status of all the species names available hitherto from Pakistan and Kashmir region in various taxonomic literature has been assessed as far as possible, and the names have been typified giving complete synonymy. As a result of this survey it further seemed essential to carryout a biogeographic analysis of the data. The results of this analytical study is presented here.

The genus *Cuscuta* was placed with the other members of the family Convolvulaceae by Linnaeus (1753), in "Species Plantarum", later on Dumortier (1829) erected a separate family Cuscutaceae which was accepted by Hutchinson (1926) followed by Takhtajan (1969) Cronquist (1968) and Dahlgren (1983).

### Materials and Methods

The data given in the family Cuscutaceae (Rajput & Tahir, 1988), in the Flora of Pakistan, and in "An annotated catalogue of the vascular plants of West Pakistan" by Stewart (1972), Yuncker (1932) were used besides the survey of *Cuscuta* specimens from this region present at the Arnold Arboretum of Harvard University, U.S.A.

\*Present Address: Department of Botany, University of Sindh, Jamshoro, Sindh, Pakistan.

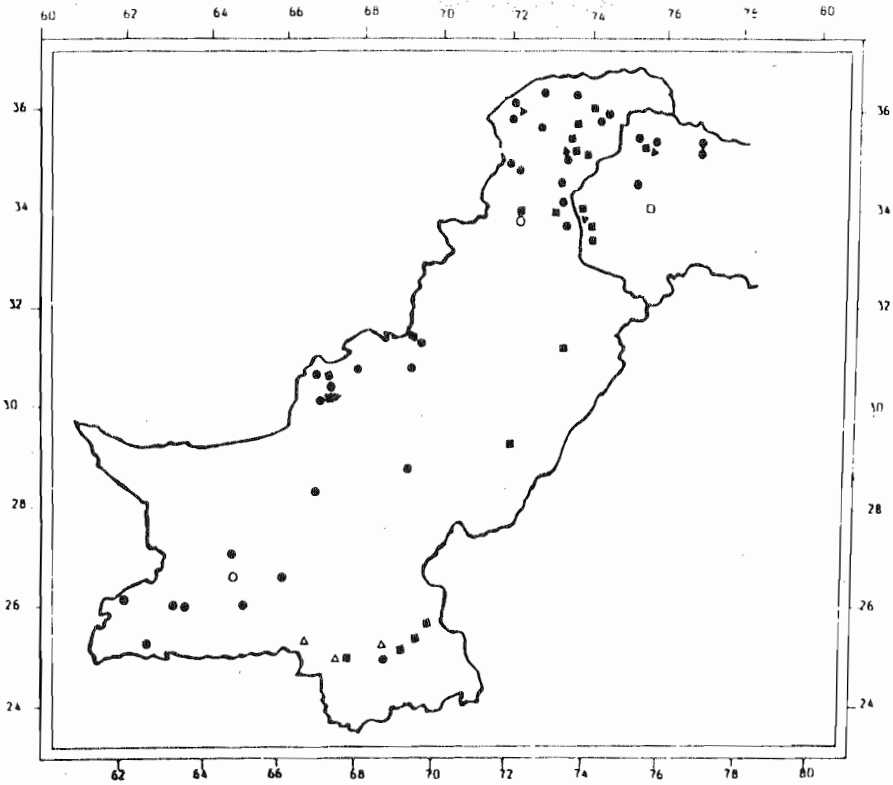


Fig. 1. Map showing the distribution of *Cuscuta* species. *C. europaea* (●); *C. violacea* (+); *C. reflexa* (■); *C. gigantea* (▲); *C. hyalina* (△); *C. epithymum* (○); *C. chinensis* (□).

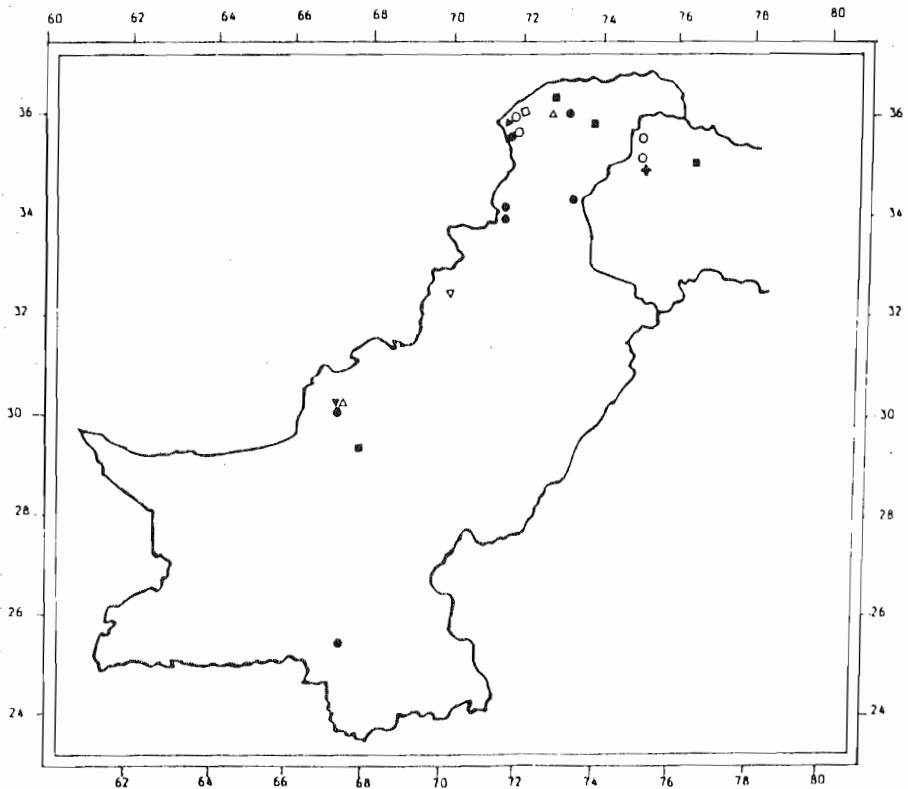


Fig. 2. Map showing the distribution of *Cuscuta* species. *C. capitata* (○); *C. monogyna* (▲); *C. lehmanniana* (■); *C. pulchella* (△); *C. campestris* (●); *C. lupuliformis* (□); *C. australis* (+).

The distribution of the taxa within Pakistan and Kashmir is mapped using almost all the specimens, available in A, BM, E, MICH, K, KUH, NY, RAW, O and SUH.

### Results and Discussion

*Distribution:* The information based on herbarium specimens indicates that the *Cuscuta* species are distributed in Kashmir and all the provinces of Pakistan: The *Cuscuta* species in this region are basically a northern elements, that are generally centred in NWFP, Pakistan and Kashmir (Fig. 1 and 2). In Punjab only *C. reflexa* is reported, which is very interesting, because suitable habitats are available in the Punjab. *C. europaea* has distributed in Sindh, Baluchistan, N.W.F.P. and Kashmir, while *C. campestris* has its distribution in all the provinces of Pakistan except Punjab and Kashmir (Table 1). *C. hyalina* is only found in Sindh. This is the only species of *Cuscuta* in which the staminal scales inside the corolla are absent. Staminal scales are present in all other species of *Cuscuta* found in Pakistan and Kashmir. *C. violacea* characterised by the presence of violet spots on stem and flowers, is endemic to Baluchistan, Pakistan.

*Phytogeographical regions:* Five species including *C. hyalina*, *C. violacea*, *C. capitata*, *C. lupuliformis* and *C. monogyna* are uniregional, i.e. species are more or less confined to one phytogeographical region only. *C. hyalina* is confined to Saharo-Sindian region, *C. violacea* is found in the western sub-region of Irano-Turanian region, *C. capitata*

**Table 1. Distribution of *Cuscuta* in phytogeographical regions.**

Name of species	Saharo-Sindian Region	Indian Region	Sino-Japanese Region	Irano-Turanian Region	
				Western Sub-region	Eastern Sub-region
<i>C. hyalina</i>	+	-	-	-	-
<i>C. reflexa</i>	+	-	+	+	+
<i>C. violacea</i>	-	-	-	+	-
<i>C. lupuliformis</i>	-	-	-	-	+
<i>C. gigantea</i>	-	-	+	+	+
<i>C. monogyna</i>	-	-	-	+	+
<i>C. lehmanniana</i>	+	-	-	-	+
<i>C. epithymum</i>	+	-	+	-	-
<i>C. capitata</i>	-	-	-	-	+
<i>C. europaea</i>	+	-	+	+	+
<i>C. australis</i>	-	-	*	-	*
<i>C. pulchella</i>	-	-	+	+	+
<i>C. chinensis</i>	-	-	*	-	*
<i>C. campestris</i>	+	-	+	+	+

(+) present in the region; (-) absent in the region; (\*) Reported in this region in literature, but specimens were not traced.

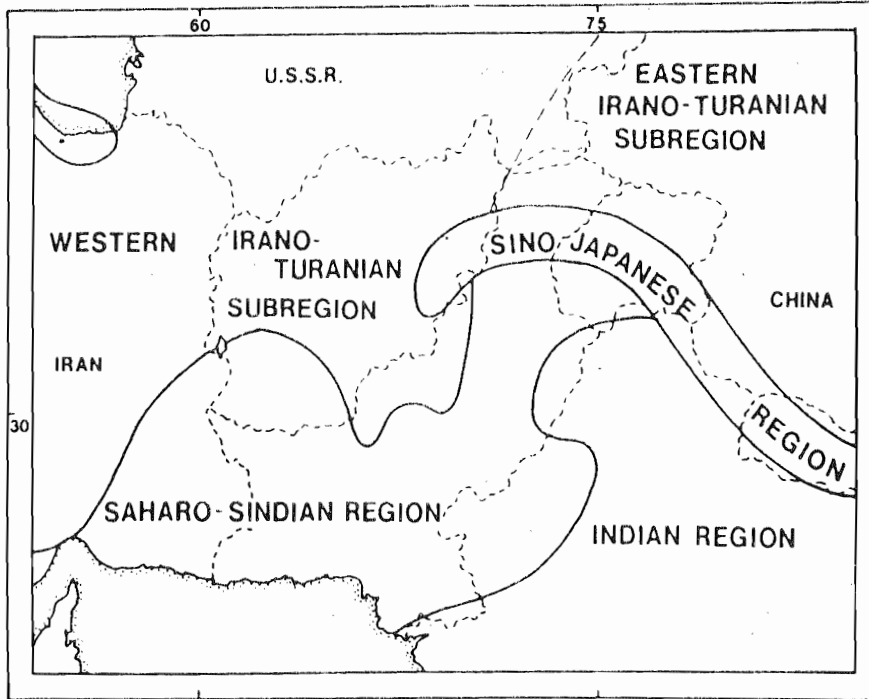


Fig. 3. Phytogeographical regions of Pakistan and Kashmir, used in *Cuscuta* analysis, (after Ali & Qaiser, 1986).

and *C. lupuliformis* are confined to Eastern sub-region of Irano-Turanian region. On the other hand, *C. monogyna* also a uniregional species, is distributed in both Eastern and Western Irano-Turanian sub-region. It may be pointed out that these two sub-regions of Irano-Turanian region were recognised by Zohary (1973) and Ali & Qaiser, (1986), for details see Fig. 3 in Ali & Qaiser (1986).

Seven species of *Cuscuta* are pluriregional i.e., species are present in more than one phytogeographical regions. *C. gigantea*, *C. lehmanniana*, *C. epithimum* and *C. pulchella* are found in two phytogeographical regions, whereas *C. reflexa*, *C. europaea* and *C. campestris* are found in three phytogeographic regions. *C. chinensis* and *C. australis* are not analysed for phytogeographical regions, because no collection was available.

The maximum phytogeographical distribution of *Cuscuta* species is in Eastern Irano-Turanian sub-region in which 9 species occur. In Saharo-Sindian region, Sino-Japanese region, and Western Irano-Turanian sub-region, have more or less equal distribution of *Cuscuta* spp. No element of *Cuscuta* is recorded from Indian region. The distribution of *Cuscuta* elements in different phytogeographical regions are given in Table 1 with detail of distribution in various provinces of Pakistan in Table 2.

*Cuscuta* elements are also distributed in Sino-Japanese region. In Pakistan this phytogeographical region separates the Eastern- Irano- Turanian sub-region, from Saharo-Sindian region, and Indian region. According to Kitamura (1960), Hara (1966), Zohary (1973), and Hedge & Wendelbo (1970), the Western limits of this region extends through Pakistan into Afghanistan. Although *C. reflexa*, *C. gigantea*, *C. epithimum*, *C. europaea*, *C. pulchella* and *C. campestris* are reported from Sino- Japanese region but they have also their distribution in other phytogeographical regions.

Table 2. Distribution of *Cuscuta* in the provinces of Pakistan and Kashmir.

Name of the species	Sindh	Baluchistan	Punjab	N.W.F.P.	Kashmir
<i>C. hyalina</i>	+	-	-	-	-
<i>C. reflexa</i>	+	+	+	+	+
<i>C. violacea</i>	-	+	-	-	-
<i>C. lupuliformis</i>	-	-	-	+	-
<i>C. gigantea</i>	-	+	-	+	+
<i>C. monogyna</i>	-	+	-	+	-
<i>C. lehmanniana</i>	-	+	-	+	+
<i>C. epithimum</i>	-	+	-	+	-
<i>C. capitata</i>	-	-	-	+	+
<i>C. europaea</i>	+	+	-	+	+
<i>C. australis</i>	-	-	-	-	+
<i>C. pulchella</i>	-	+	-	+	-
<i>C. chinensis</i>	-	-	-	-	+
<i>C. campestris</i>	+	+	-	+	-

(+) present in the province; (-) not present in the province.

Six species of *Cuscuta* have been reported from Saharo-Sindian region. In Pakistan Southern Baluchistan, Sindh, and most of the part of the Punjab, and some portion of N.W.F.P. fall in this region, forming the biggest phytogeographical region in this country, but *C. hyalina* is the only species of *Cuscuta*, found in this phytogeographical region in the present survey.

### Acknowledgements

We would like to express special thanks to Professor Peter S. Ashton, the Arnold Professor of Botany of Harvard University, for his guidance during this study, and for providing all facilities during our stay at Harvard University, U.S.A. We are thankful to Dr. Spongberg, and Ms. Betsy Schmidt also at Harvard, for their help in reading the localities mentioned in early collections. Our deep appreciation is also extended to Dr. S.I. Ali and Dr. M. Qaiser for giving permission to use their phytogeographical map, and giving their valuable advice and criticism. We are also grateful to Dr. K.M. Khan and Dr. Rais Ahmed of Sindh University for consultation in the preparation of this manuscript.

The financial assistance received from the council of international exchange of Scholars, Washington D.C. through the USEF in Pakistan, in the form of Fulbright award to the senior author is gratefully acknowledged.

## References

- Ali, S.I. and M. Qaiser. 1986. A phytogeographical analysis of phanerogams of Pakistan and Kashmir. *Proc. Roy. Soc. Edin.*, 89B: 89-101.
- Cronquist, A. 1968. *The evolution and classification of flowering plants*. Nelson & Son, London & Edinburgh.
- Dahlgren, R.M.T. 1983. A revised system of classification of the angiosperms. *Bot. Jour. Linn. Soc. Lond.*, 80: 91-124.
- Hara, H. 1966. *The flora of Eastern Himalaya*, University of Tokyo Press.
- Hedge, I.C. and P. Wendelbo. 1970. Some remarks on endemism in Afghanistan. *Israel Jour. Bot.*, 19: 401-417.
- Hutchinson, J. 1926. *The families of flowering plants*. 1:501. Clarendon Press, Oxford.
- Kitamura, S. 1960. *Flora of Afghanistan*. Results of the Kyoto University Scientific expedition to the Karakoram and Hindukush, 1955, Vol. II, Japan, Kyoto University.
- Linnaeus, C. 1754. *Species Plantarum*, Ray Society, London.
- Rajput, M.T.M. and S.S. Tahir. 1988. In Nasir, E. and Ali, S.I. (Eds.) *Cuscutaceae, Flora of Pakistan*. 189: 1-24.
- Stewart, R.R. 1972. *An annotated catalogue of the vascular plants of West Pakistan and Kashmir*. Fakhri Printing Press, Karachi.
- Takhtajan, A. 1969. *Flowering Plants, origin and dispersal*. Oliver & Boyd, Edinburgh.
- Willis, J.C. 1988. *A dictionary of the flowering plants and ferns*. Cambridge University Press, Cambridge.
- Yuncker, T.G. 1932. *The genus Cuscuta*. Mem. Torrey Bot. Club. George Banta Publishing Company, Menasha, Wisconsin.
- Zohary, M. 1950. *The flora of Iraq and its phytogeographical divisions*. Bulletin Directorate General of Agriculture Iraq No. 31. Baghdad: Government Press.
- Zohary, M. 1973. *Geobotanical Foundations of the Middle East*, Vol. 2.

(Received for publication 31 December 1986)