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SEDGES ENDEMIC TO MAHARASHTRA STATE WITH THEIR REVISED RED LIST STATUS

D. K. MISHRA AND N. P. SINGH *

Botanical Survey of India, Howrah.

ABSTRACT

A total of 12 species and 1 subspecies endemic to Maharashtra state have been categorised into red list categories according to IUCN's (International Union for Conservation of Nature and Natural Resources) revised recommendations and included in this work with their brief description, flowering & fruiting period, habitat, distribution, red list status, criteria for determining the status and important observations under notes.

INTRODUCTION

The sedge family or Cyperaceae is one of the biggest families and its members are distributed throughout the world. In the world this family is represented by *ca* 4,000 species coming under *ca* 90 genera. In India there are *ca* 580 species and infraspecific taxa under *ca* 39 genera (Karthikeyan, 1999). Out of these, *ca* 58 species and 7 varieties are endemic to Peninsular India (Ahmedullah & Nayar, 1986). From Maharashtra, a total of 174 species and infraspecific taxa under 22 genera have been described so far (Lakshminarasimhan, 1996). Out of these, according to present estimation 12 species and 1 subspecies are endemic to this state and not found outside. Thus it is the third largest family with Fabaceae, just after Poaceae and Asclepiadaceae so far as their endemism to the state is concerned. The genus with the highest representation of endemic species in Maharashtra is FIMBRISTYLIS (with 4 endemic species). The other genera like CYPERUS, MARISCUS and PYCREUS comprise 2 endemic species each. Whereas, SCIRPUS, SCLERIA and ELEOCHARIS consist of only 1 endemic species or subspecies.

Clarke (1893) was the pioneer worker in this field who studied Indian Cyperaceae extensively. His works were included in J. D. Hooker's Flora of British India. Later Cooke (1908) reported many species from Maharashtra in his Flora. Very few Indian Botanists have worked on this family. Govindrajalu (1966-98) was the most important Indian Cyperologist of the recent past. He described many new species from Maharashtra and south India. There are many district and local Floras of Maharashtra and several scientific papers have been published which provide information on this family. Lakshminarasimhan (1996) has compiled all the available data up to that period and published a book on Monocotyledons of the state where all sedge members are included with their distribution and other information. However, after the publication of this book three species have been described by Prasad & Singh (1997 & 1999) as well as two species and one subspecies by Wadood Khan (1998) from this state.

* *Botanical Survey of India, Kolkata.*
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Studies on endemic and threatened sedges alongwith other plants of this state were actually started when Raghavan & Singh (1983) published their paper. Other important papers published in this field are by Raghavan & Singh (1984), Singh & Raghavan (1986), Mistry & Almeida (1990), and Yadav (1997). Ahmedullah & Nayar (1986) have done a comprehensive work on endemic and threatened plants of Peninsular India in which several sedges from this state have been included. Lakshminarasimhan (1996) provided a list of endemic and threatened sedges in his book. Nayar (1996) also enlisted a large number of sedges and other plants endemic to Peninsular India, Nepal and Bhutan.

International Union for Conservation of Nature and Natural Resources (IUCN) has revised their criteria in 1994 to ascertain the red list status of threatened plants. These revised criteria are based on both qualitative as well as quantitative characters instead of only qualitative characters as earlier. Hence, the purpose of the present studies is to categorise the endemic sedges of Maharashtra strictly based on this revised IUCN recommendations which was not done in the past. Mishra & Singh (2000) recently published similar type of work on the genus CEROPEGIA L.

MATERIALS AND METHODS

At first a preliminary list of sedges, endemic to Maharashtra state, was made after critical scrutiny of available literature. This list was checked and information was enriched through consultation of herbarium specimens at different national and regional herbaria. At the next stage extensive field tours were conducted during 1996-1999 to the respective localities to collect the plant specimens as well as to gather actual field information and reasons of rarity of these sedges. Finally, these sedges were categorised according to revised IUCN recommendations (1994). The criteria like extent of occurrence, area of occupancy, nature of distribution and population trends were mainly followed during categorisation. The extent of occurrence was measured by minimum convex polygon method.

ENUMERATION

1. Cyperus decumbens Govind.

Annual herbs; culms caespitose, trigonus, erect or decumbent at base. Leaves shorter than or as long as culms, narrow, flat, glabrous. Inflorescence simple, capitate or subspiciform, consisting of 3-5 spikelets. Nust 7.5-8.5 mm long, biconvex, suborbicular or subelliptical.

Distrib.: Satara : Mahabaleshwar.

Status : Data deficient.

Notes : This species was described in 1973 based on earlier collections made during the second decade of the last century. However, there is no further information regarding its distribution pattern and frequency. Efforts were made to collect it during 1996-1999 but in vain. The area needs to be explored again.

2. C. pentabracteatus Govind. & Hemadri

Perennial herbs; culms 70-80 cm high, triquetrous. Leaves 1-5 per culm, 4-6 mm broad, scabrid at margins and abaxial surface. Inflorescence simple, capitate, broadly ovate or subglobose, consisting of numerous spikelets. Nuts 2.8-2.9 × 0.8 - 1 mm, broadly ellipsoid.

Fl. & Fr.: Sept.-Oct.

Distrib.: Pune : Junnar.

Status : Critically endangered.

Criteria : (a) Area of occupancy less than 10 sq km and (b) found only at a single location.

Notes : This species is reported only from its type locality so far where its distribution is very much sporadic.

3. Eleocharis lankana subsp. **mohamadii** Wadood Khan.

Perennial herbs, leafless, densely tufted, 10-30 cm high; stolons 10-30 cm long, bright golden brown; culms terete, distinctly septate, strongly ribbed. Inflorescence a single terminal spikelet. Nuts *ca* 2 × 1.5 mm, obovate-oblong.

Fl. & Fr.: Oct.-Dec.

Habitat : In perennial lakes and ponds.

Distrib.: Kolhapur : Kagal lake.

Status : Critically endangered.

Criteria : (a) Area of occupancy up to 500 sq. m and (b) found only at a single location.

Notes : This taxon has been described very recently. Though, at its type locality it is quite common (15-20 mature individuals per sq m), it has been categorised as critically endangered due to its narrow, restricted distribution. Clearing and fishing at its habitat may cause its extinction. Hence, special care has to be taken to conserve its habitat.

4. Fimbristylis ambavanensis Prasad & Singh

Annual herbs, tufted, glabrous; culms *ca* 25 cm high, compressed. Leaves 6-18 × *ca* 0.1 cm, margins infolded. Inflorescence 0.8-1.5 cm long, with 3-12 spikelets. Nuts *ca* 1 × 0.6 mm, trigonous, obovoid.

Fl. & Fr.: Sept.

Habitat : Top of the fort.

Distrib.: Pune : Ambavane.

Status : Data deficient.

Notes : This species also has been described very recently based on herbarium specimens (collected in 1964) deposited at BSI (Pune). Hence, its type locality is to be explored again to observe its present distribution pattern.

5. F. nagpurensis Prasad & Singh

Annual herbs, tufted; culms *ca* 30 cm high, slender. Leaves 0.7-1 mm broad, shorter than stems. Inflorescence 1.5-2 × 1-1.5 cm, with 3-8 spikelets. Nuts *ca* 0.7 × 0.5 mm, trigonous, broadly obovoid.

Fl. & Fr.: Aug.

Distrib.: Nagpur : College of science premises.

Status : Data deficient.

Notes : This is a newly described species based on herbarium specimens collected in 1961 and deposited at BSI (Pune). As information regarding its distribution pattern is lacking, further explorations are needed in its type locality and adjoining areas.

6. F. ratnagirica Prasad & Singh

Annual herbs, tufted, glabrous; culms 6-10 cm high. Leaves 1.5-5 × 0.3-0.08 cm, linear, abruptly acuminate at apex. Inflorescence usually reduced to a single spikelet, at times with an additional peduncled spikelet. Nuts *ca* 0.8 × 0.5 mm, trigonous, obovoid.

Fl. & Fr.: Aug.

Habitat : On rocks in plateau.

Distrib.: Sindhudurg : Kasal (Osargaon plateau).

Status : Data deficient.

Notes : It is also a newly described species based on earlier collected herbarium specimens. deposited at BSI (Pune). Hence, its type locality is to be explored again to know its present distribution pattern.

7. Fimbristylis unispicularis Govind. & Hemadri

Annual herbs; culms 2.5-5 cm high, fasciculate. Leaves 3-5 × *ca* 0.05 cm, ligulate. Bract solitary, 2-3 mm long. Spikelet solitary at the ends of culms. Nuts up to 1 × 0.75 mm, obovate.

Fl. & Fr.: Sept.-Oct.

Habitat : In open, grassy plateau at an altitude of *ca* 1,100 m.

Distrib.: Pune : Junnar (Durga khilla).

Status : Critically endangered.

Crieteria :(a) Area of occupancy less than 10 sq km and (b) found only at a single location.

Notes : This species is reported only from a narrow and restricted place at its type locality so far where its distribution is very much fragmented. Grazing and trampling by domestic animals are the major threats of this species.

8. Mariscus blatteri McC.

Tufted herbs; culms *ca* 70 cm high. Leaves up to 8.8 × 0.6 cm, scabrous on upper surface, margins minutely serrulate. Inflorescence *ca* 2.4 × 1.9 cm, with numerous spikelets. Nuts *ca* 3.5 × 1.3 mm, oblong, trigonous.

Fl. & Fr.: Oct.

Habitat : Grassy plateau at high altitude.

Distrib.: Satara : Mahabaleshwar.

Status : Critically endangered.

Criteria : (a) Area of occupancy less than 10 sq km and (b) found only at a single location.

Notes : This species is known only from its type locality so far where its distribution is very much sporadic. Efforts were made to locate it at the adjacent places but not fruitful.

9. M. konkanensis (T. Cooke) Sedgw.

Perennial herbs, tufted; culm solitary, up to 75 cm high, triquetrous. Leaves *ca* 60 cm long, rigid, folded. Inflorescence a compound umbel, up to 22 cm long. Nuts *ca* 3 mm long, oblong, triquetrous.

Fl. & Fr.: July-Nov.

Habitat : On rocky soils in the crest of ghats.

Distrib.: Dhule, Nagpur, Pune, Ratnagiri, Satara, Thane.

Status : Low risk.

Notes : Earlier this species was believed to be confined to only Konkan region of Maharashtra. However, later its extended distribution was discovered up to Dhule and Nagpur districts. Hence presently it can be considered as a widely distributed species in the state.

10. Pycreus bolei S. M. Almeida

Tufted herbs; culms *ca* 30 cm high striate. Leaves up to 27-30 cm long, glabrous. Inflorescence of compact, sessile, stellate, linear spikes. Nuts oblanceolate, compressed, shortly apiculate.

Fl. & Fr.: Oct.-Nov.

Habitat : In paddy fields, near river banks.

Distrib.: Sindhudurg : Satara.

Status : Critically endangered.

Criteria : (a) Area of occupancy less than 10 sq km and (b) found only at a single location.

Notes : This species is known only from its type locality so far where its distribution is very much scattered. In 1997 efforts were made to locate it in the surroundings of its locality without any success.

11. Pycrous lancelotii S. M. Almeida

Annual herbs, tufted; culms 5-8 cm high. Leaves 8-10 × 0.15-0.2 cm, radicle, glabrous. Scapes 5-7 cm long. Inflorescence of compact

spikes forming heads. Nuts oblanceolate, shortly beaked.

Fl. & Fr.: May.

Habitat : In wet rice fields, near river banks.

Distrib.: Sindhudrug : Charatha.

Status : Critically endangered.

Criteria : (a) Area of occupancy less than 10 sq km and (b) found only at a single location.

Notes : This species is also known only from its type locality so far where its distribution is very much sporadical. Weeding operation in the paddy fields may be one of the main causes of its rarity.

12. Scirpus naikianus Wadood Khan

Annual herbs, tufted; culms 10-30 cm high. Leaf blades of the first sterile leaves 4-5 mm broad, deciduous. Inflorescence pseudolateral, capitate with clusters of 2-10 spikelets. Nuts 1-1.3 mm across, biconvex, broadly obovoid or almost suborbicular.

Fl. & Fr.: Dec.-Jan.

Habitat : Marshes along the margins of tank.

Distrib.: Nanded : Amdari.

Status : Critically endangered.

Criteria : (a) Area of occupancy less than 500 sq m and (b) found only at a single location.

Notes : This species is newly described and quite common at its type locality (30-40 mature individuals per sq m). Still it has been put into threatened category because of its very much localised distribution. Clearing of water tanks along the margins may warrant its extinction. Hence, some measures to protect this species are to be taken at its type locality until new localities are discovered.

13. Scleria poklii Wadood Khan

Annual herbs, culms erect, much branched. Inflorescence of axillary clusters, 3-4 mm long and broad with peduncles often cellularly spongeous papillose. Nuts 0.7-1 mm long and broad, obtusely trigonous, subglobose.

Fl. & Fr.: Oct.-Nov.

Habitat : In wet, open grasslands, paddy fields and forest clearings on hill slopes.

Distrib.: Gadchiroli : Laheri Road.

Status : Critically endangered.

Criteria : (a) Area of occupancy less than 1000 sq m and (b) found only at a single location.

Notes : This species is also described recently and it is quite abundant (200-400 mature individuals per sq m) at its type locality. Still it has been considered critically endangered due to its narrow and restricted distribution. Weeding operation in paddy fields as well as grazing and trampling may make it extinct and hence these factors have to be controlled.

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REFERENCES

AHMEDULLAH, M AND M. P. NAYAR. Endemic plants of the Indian Region Vol. 1. Peninsular India. BSI, Calcutta. 1986.

ANON. IUCN Red List Categories. Gland, Switzerland. 1994.

CLARKE, C. B. Cyperaceae in J. D. Hooker, Fl. British India 6 : 585-748. London 1893.

COOKE, T. The Flora of the Presidency of Bombay. London, Vol.2. 1908.

GOVINDRAJALU, E. Studies in Cyperaceae X. Novelties in *Cyperus* subgen. *Psycreus* (Beauv.) C. B. Clarke. *J. Indian Bot. Soc.* 72-81. 1973.

—— AND K. HEMADRI. Studies in Cyperaceae-XV. Novelties in *Fimbristylis* (L.) Vahl and *Cyperus* (subgen. *Mariscus*). *Proc. Indian Acad. Sci.* 82 B (6) : 205-210. 1975.

KARTHIKEYAN, S. Flowering plant diversity of India : Monocotyledons. In Biodiversity, Taxonomy and Ecology (Eds. R. K. Tandon & Prithipal Singh), 83-95; Scientific Publishers (India). 1999.

LAKSHMINARASIMHAN, P. In Flora of Maharashtra State, Monocot. (Eds. B. D. Sharma, S. Karthikeyan & N. P. Singh), 270-377, BSI, Calcutta 1996.

MISHRA, D. K. AND N. P. SINGH. Status survey of endemic species of *Ceropegia* L. in Maharashtra. Higher Plants of Indian Subcontinent 9 : 17-32. (Add. ser. of *Indian Jour. Forestry*, No.11) 2000.

MISTRY, M. K. AND S. M. ALMEIDA. Some rare, endangered and threatened plant species from Ratnagiri district, Maharashtra. *J. Bombay Nat. Hist. Soc.* 86(3) : 478-479. 1990.

NAYAR, M.P. Hot Spots of Endemic Plants of India, Nepal and Bhutan. Tropical Botanic Garden and Research Insitute, Palode, Thiruvananthapuram. 1996.

PRASAD, V. P. AND N. P. SINGH. Two new species of *Fimbristylis* (Cyperaceae) from Maharashtra, India. *J. Econ. Tax. Bot.* 21(3) : 670-673. 1997.

—— AND ——. Two new species of *Fimbristylis* (Cyperaceae) from Western Peninsular India. *J. Bombay Nat. Hist. Soc.* 96(3) : 454-458. 1999.

RAGHAVAN, R. S. AND N. P. SINGH. Endemic and threatened plants of Western India. In Plant Conservation Bulletin (Eds. S. K. Jain and A. R. K. Sastry), Vol.3 (1-16) BSI, Calcutta, 1983.

—— AND ——. An inventory of endemic and vulnerable species of Western India deserving conservation. *J. Econ. Tax. Bot.* 5(1) : 153-164. 1984.

SINGH, N. P. AND R. S. RAGHAVAN. Materials for plant conservation in Western India. *J. Econ. Tax. Bot.* 8(1) : 29-38. 1986.

WADOOD KHAN, M. A. A new species of *Scirpus* L. (Cyperaceae) from the Deccan Plateau, India *Rheedea* 8(1) : 71-73. 1998.

—— Novelties in Cyperaceae of Maharashtra. *J. Econ. Tax. Bot.* 22(3) : 555-561. 1998.

YADAV, S. R. Endemic plants of Peninsular India with special reference to Maharashtra. In Flowering Plant Systematics and Diversity, part I. Proc. VII IAAT Meet and Nat. Conf. (Eds. D. S. Pokle, S. P. Kanir & V. N. Naik). 31-51, Aurangabad. 1997.