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A little known orchid *Habenaria longicorniculata* (Orchidaceae) from Mount Abu wildlife sanctuary, Rajasthan and its IUCN status

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ABSTRACT

During the survey of Mount Abu wildlife sanctuary, Sirohit, Rajasthan, a little known rare terrestrial orchid species *Habenaria longicorniculata* was observed from four locations in this sanctuary. Sharma (2003) reported this species from Phulwari wildlife sanctuary, Udaipur. Mount Abu wildlife sanctuary is newly reported location of this species and also addition for flora of Sirohi district. Based on out observations and assessment using IUCN criteria, this species places under the category Vulnerable regionally [criteria – Vu/B_1b (i, v) D_1 (IUCN version 3.1)]. The identification characters, distribution map along with live macro and microscopic photographs are provided in the present study. The current status of *Habenaria longicorniculata* in Rajasthan with the help of IUCN criteria sheets is also provided.

Key words: *Habenaria longicorniculata*, IUCN, status, terrestrial orchid.

INTRODUCTION

Habenaria Willdenow (1805: 5) is one of the largeest genera of the family Orchidaceae having c. 883 terrestrial species (Govaerts et al. 2018). *Habenaria* has wide distribution throughout the tropical and subtropical regions of the old and new world (Pridgeon et al. 2001; Batista et al. 2013), with centers of diversity in Brazil, southern and central Africa and East Asia (Batista et al. 2013). In India, it is represented by 84 species; 39 of them are found in the Western Ghats, with 22 being endemic (Misra 2007; Nayar et al. 2014, Kumar et al. 2016), while, in Rajasthan 4 species occurs (Choudhary et al. 2011; Sharma 2003; Shetty and Singh 1991; Kulloli and Purohit 2020).

Habenaria longicorniculata J. Graham was first collected by John Graham from Khandala (Graham 1839) and then near Belgaum (Dalzell and Gibson 1861). As per the literature distribution of the species is reported as from Konkan to Travancore (Hooker 1890), Malabar and Konkan (Cooke 1907), Khandala and Deccan (Santapau and Kapadia, 1966). Further it is reported from other districts of

Maharshtra i.e. Akola, Aurangabad, Amravati, Pune, Raigad, Satara, Kolhapur, Ratnagiri and Sindhudurg (Lakshminarasimhan 1996; Almeida 2009; Shivkar and Shinde 2015). From Gujarat state this species was reported from three localities including Dang district (Suryanarayan 1968; Shah and Suryanarayana 1969; Shah 1978; Tadvi 2013), Jessore Wildlife Sanctuary of Banaskantha district (Desai 2013) and recently, from Sabarkantha (Punjani et al. 2019). In Rajasthan, state it was earlier reported from single locality from Phulwari Wildlife Sanctuary, Udaipur (Sharma 2003). While working on the GIS mapping of threatened plants of Rajasthan during 2017 to 2019, authors were conducted field survey of Mount Abu wildlife sanctuary during August, 2019 (Fig.1) and collected unidentified herbarium samples of family Orchidaceae. These collected herbarium samples deposited at Botanical Survey of India, Jodhpur (BSJO). After critical study of literature (Shetty and Singh 1991; Sharma 2003; Choudhary et al. 2011; Nayar et al. 2014, Kumar et al. 2016) and herbaria (BSJO, BSA, RUBL, JAC, BLAT, DCH, CAL, K), it was identified as *Habenaria longicorniculata* J. Grahm. It also noticed that earlier this species was not reported from Sirohi district. So this species is addition the flora of Sirohi district.

Habenaria longicorniculata J. Graham, Cat. Bombay Pl. 202. 1839; Santapau and Kapadia, Orch. Bombay 29, t.1, f.1, 1966; *Habenaria longecalcarata* A. Rich in Ann. Sci. nat. Ser. II 15:71. T 3B. 1841; Wt. Icon t. 925. *Habenaria longecalcarata* A. Rich var. *viridis* Blatt. & Mc Cann in Journ. Bombay nat. Hist. Soc. 36:20, 1932, Shah FLG 658. 1978.

Morphological Description: Terrestrial herb, up to 1m high, subglobose tubers with several slender roots. Leaves clustered at the base of the short stem with amplexicaul sheaths. Inflorescence racemose, few flowered. Flowers pedicellate, green in colour and fragrant. Dorsal sepal green, 3-nerved, ovate, concave. Lateral sepal opened backwards, longer than the dorsal sepal, white with greenish tinge on the margins. Petal greenish, forms hood along with dorsal sepal, somewhat ligulate; Anther pollinia 2, caudicle longer than the pollinia, viscidium inconspicuous. Rostellum little shorter than the anther. Stigmatic processes 2, dark green (darkest in the flower), ovary ribbed. Spur 10-15 cm long, whitish at base becomes darker green at the apex, slightly pointed at apex, bulges at the opening. Labellum white, side lobes slightly larger than the midlobe. Sidelobes deflexed outwards (Fig.2).

Fl. & Fr.: August – September.

Distribution: India: Maharashtra, Karnataka, Andhra Pradesh, Tamilnadu, Goa, Chhattisgarh, Jharkhand, West Bengal, Gujarat (Sabarkantha, Banaskantha, Dang), Rajasthan (Sirohi and Udaipur).

Habitat and Ecology: This species has its typical habitats in rocky and gravelly area and undergrowth in forest areas, often on moist slopes in core zone of Mount Abu wildlife sanctuary (Fig.3), associated with *Carvia callosa* (Nees) Bremek., *Flueggea leucopyrus* Willd., *Lantana camara* L., *Euphorbia neriifolia* L., *Chlorophytum tuberosum* (Roxb.) Baker, *Senna insularis* (Britton & Rose) H.S. Irwin & Ba and *Carissa carandas* L. It prefers high altitudes between 900 – 1200 m.s.l.

Threats: Major threat to decline of this species is consumption of tubers by wild animals like bear and wild boar as food. The remaining population is perpetuating by means of the tubers, having edible and medicinal properties which are collected by local people. Habitat destruction and developmental activities for tourism purpose is also threat to decline the population.

Specimen examined: INDIA: RAJASTHAN: Mount Abu wildlife sanctuary, Adhar Devi, 26 Sept. 2018, C.S. Purohit & R. Kumar 36928 (BSJO).

Status: Based on our observations area of occupancy <500 km^2 (1 km^2) and population size < 1,000 with mature individuals (500-650 individuals at four locations) *Habenaria longicorniculata* should be placed in the Vulnerable threat category of IUCN regionally. This needs to be further confirmation.

Detailed survey of areas of occurrence confirmed its rarity. Hence its assessment using IUCN criteria placed it under the category Vulnerable regionally **[criteria- Vu/ B_1b (i, v); D_1 (IUCN version 3.1)]**. Therefore it needs immediate efforts to rehabilitate this species in nature.

SHEET OF IUCN CRITERIA-A

Use of the criteria A	**Critically Endangered**	**Endangered**	**Vulnerable**
A. Population reduction	Declines measured over the longer of 10 years or 3 generations		
A1	≥ 90%	≥ 70%	≥ 50% **X**
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30% **X**

A1. Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible **AND** understood **AND** have ceased, based on and specifying any of the following		
	Tick right sign.	others
(a) direct observation	**X**	
(b) an index of abundance appropriate to the taxon	**X**	
(c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or	**X**	

habitat quality		
(d) actual or potential levels of exploitation	**X**	
(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.	**X**	

A2. Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased **OR** may not be understood **OR** may not be reversible, based on and specifying any of the following		
	Tick right sign.	others
(a) direct observation	**X**	
(b) an index of abundance appropriate to the taxon	**X**	
(c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality	**X**	
(d) actual or potential levels of exploitation	**X**	
(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.	**X**	

A3. Population reduction projected or suspected to be met in the future (up to a maximum of 100 years) based on and specifying any of the following		
	Tick right sign.	others
(a) direct observation	**X**	
(b) an index of abundance appropriate to the taxon	**X**	
(c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality	**X**	
(d) actual or potential levels of exploitation	**X**	
(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.	**X**	

A4. An observed, estimated, inferred, projected or suspected population reduction (up to a maximum of 100 years) where the time period must include both the past and the future, and where the causes of reduction may not have ceased **OR** may not be understood **OR** may not be reversible, based on and specifying any of the following		
	Tick right sign.	others
(a) direct observation	**X**	
(b) an index of abundance appropriate to the taxon	**X**	
(c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality	**X**	
(d) actual or potential levels of exploitation	**X**	
(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.	**X**	

IUCN Assessment = **----------**

SHEET OF IUCN CRITERIA-B

Use of the criteria B	**Critically Endangered**	**Endangered**	**Vulnerable**
B. Geographic range	Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)		
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km² √
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
B1 OR B2. (a) Severely fragmented, **OR** Number of locations	= 1	≤ 5	≤ 10

B1 OR B2. (b) Continuing decline in any of		
	Tick right sign.	others
(i) extent of occurrence	√	
(ii) area of occupancy	**X**	
(iii) area, extent and/or quality of habitat	**X**	

(iv) number of locations or subpopulations	**X**	
(v) number of mature individuals	√	

B1 OR B2. (c) Extreme fluctuations in any of		
	Tick right sign.	others
(i) extent of occurrence	**X**	
(ii) area of occupancy	**X**	
(iii) number of locations or subpopulations	**X**	
(iv) number of mature individuals	**X**	

IUCN Assessment = **Vu/ B_1b(i, v)**

SHEET OF IUCN CRITERIA-C

Use of the criteria C	**Critically Endangered**	**Endangered**	**Vulnerable**
C. Small population size and decline			
Number of mature individuals	< 250	< 2,500	< 10,000 **X**
C1. An estimated continuing decline of at least:	25% in 3 years or 1 generation	20% in 5 years or 2 generations	10% in 10 years or 3 generations
C2. A continuing decline	**(up to a max. of 100 years in future)**		
C2. (a) (i) Number of mature individuals in each subpopulation	< 50	< 250	< 1,000 **X**
C2. (a) (ii) % individuals in one subpopulation =	90–100%	95–100%	100% **X**
C2. (b) Extreme fluctuations in the number of mature individuals.			

IUCN Assessment = **Vu/ B_1b(i, v)**

SHEET OF IUCN CRITERIA-D

Use of the criteria D	**Critically Endangered**	**Endangered**	**Vulnerable**
D. Very small or restricted population			√
Number of mature individuals	< 50	< 250	**D1** < 1,000 √
VU D2. Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time			**D2.** typically: AOO<20 km² or number of locations ≤ 5

IUCN Assessment = **Vu/ B_1b(i, v); D_1**

SHEET OF IUCN CRITERIA-E

Use of the criteria E	**Critically Endangered**	**Endangered**	**Vulnerable**
E. Quantitative Analysis			**X**
Indicating the probability of extinction in the wild to be	≥ 50% in 10 years or 3 generations (100 years max.)	≥ 20% in 20 years or 5 generations (100 years max.)	≥ 10% in 100 years

IUCN Assessment **Vu/ B_1b(i, v); D_1**

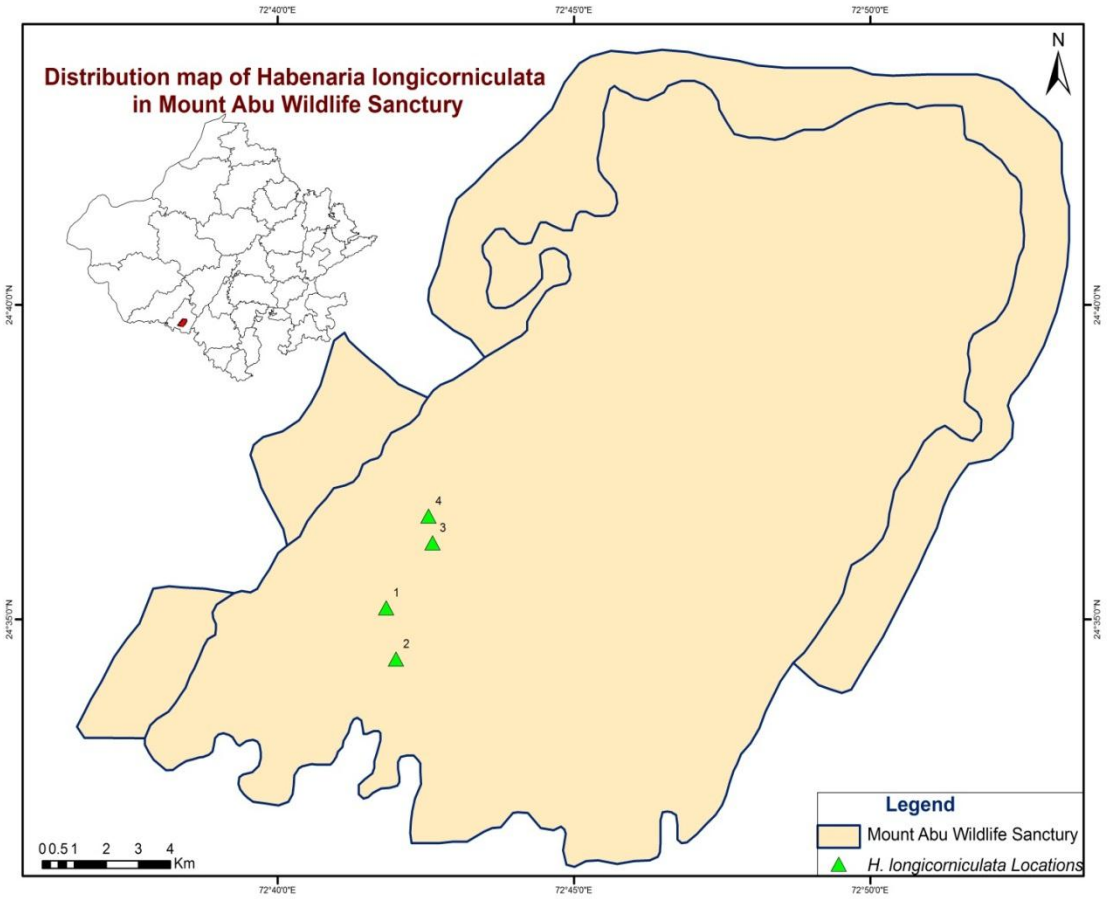

Fig.1 Distribution map of *H. longicorniculata*.

Fig. 2 A. Habitat and B. Habit of *H. longicorniculata* at Mount Abu wildlife sanctuary, Rajasthan.

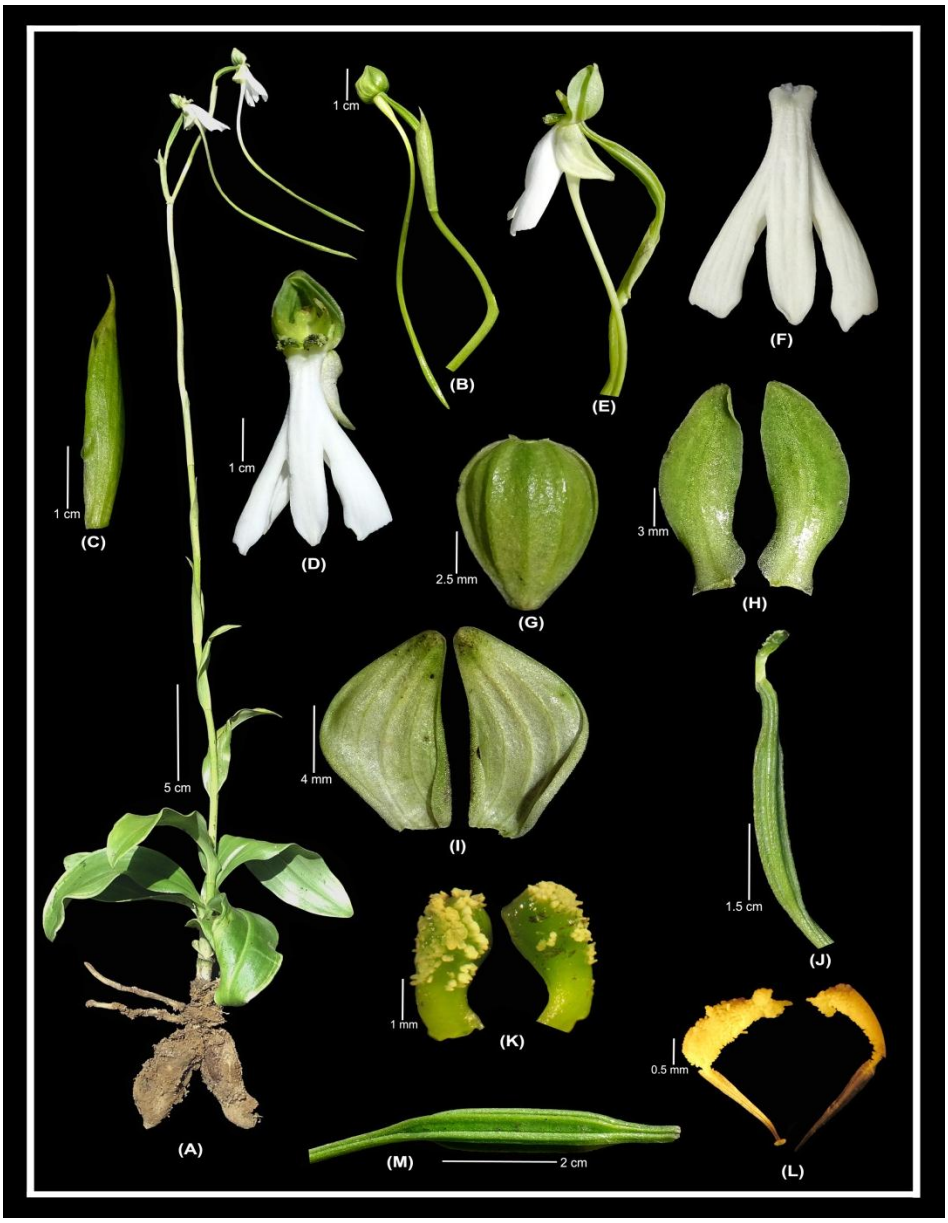

Fig.3. ***Habenaria longicorniculata*** **J. Grahm.** (A) Habit; (B) Bud; (C) Bract; (D) Flower front view; (E) Flower side view; (F) Lip; (G) Dorsal sepal; (H) Lateral sepals; (I) Lateral petals; (J) Gynoecium; (K) Close up of stigmatic lobes; (L) Pollinaria and (M) Fruit- capsule.

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