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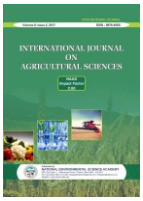

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ASSESSMENT OF IUCN THREAT CATEGORY AND PRESENT POPULATION STATUS OF *AMMANNIA DESERTORUM* BLATT. & HALLB. IN INDIAN DESERT

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Research Article

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ABSTRACT

Extensive field surveys were conducted (2017-2020) in Rajasthan during different seasons to know population status of *Ammannia desertorum*. Results revealed that populations from earlier reported localities were totally depleted. A single new population with 30-40 mature individuals is reported from Akal wood fossil park. Based on its current population data and Area of Occurrence (AOO) it is summarized as regionally critically endangered (criteria- CR/A2ac;B2ab(iii);D1) Also provided its past and current distribution map along with colored Photoplate for its easy identification.

Keywords: *Ammannia desertorum*, Area of Occurrence, Critically Endangered, Indian desert, IUCN, Mapping.

INTRODUCTION

Ammannia (L.), generic name is given in honour of Paul Ammann (1634-1691) who was professor of Botany at Leipzig, Germany (Ascherson and Grabner, 1909). Genus *Ammannia* consist of about 25 species distributed in tropical to warm regions of the world (Cook, 1996). In India it is represented by 7 species (Cook, 1996), while in Rajasthan by 5 species (Shetty and Singh, 1987; Bhandari, 1990).

Ammania desertorum is one of the species reported by Blatter&Hallberg (1918) from type locality Devikot area of Jaisalmer district of Rajasthan. Later on it was collected from other localities such as Vinjorai (Jaisalmer district); Kotda and Badka (Jodhpur district). *A. desertorum* is restricted to desert area of India (Rajasthan, Gujarat) and Pakistan (Sindh) and included in the Indian Red Data Book (Nayar&Sastry, 1988).

During field survey (2017-20) in Indian desert, authors identified a population of 30 – 40 individuals of *Ammannia* species growing on wet and marshy places at Akal wood fossil park, Jaisalmer. Plants were profusely branched with 4 angled stem;cymes compact, sessile with 3 – 7 flowered; whole plant covered with capsules and seeds angular, yellow-brown. Collected herbarium samples deposited at Botanical Survey of India, Jodhpur (BSJO)(Fig. 1). After critical study and scrutiny of literature (Blatt.&Hallb., 1918; Bhandari, 1990; Shetty & Singh, 1991; Kumar & Purohit, 2015) and different herbaria (BSJO, BSA, RUBL, JAC, BLAT, DCH, CAL), it is identified as *Ammannia desertorum* Blatt. & Hallb.

This plant is so far reported from Gujarat and Rajasthan with sporadic collection. After type locality, Santapau (1962) gave remarks on it, “only seed fruits” in Oct. 1945. In 1973 it was collected from Devikot (Jaisalmer). This species is reported as a rare species by various workers i.e. Kothari & Hajra (1983), Pandey *et al.* (1983), Nayar & Sastry (1988), Kumar & Purohit (2015). Since last 30 years its population has declined at alarming rate due to different biotic and anthropogenic factors. Information on its population status as well as its IUCN threat category from Rajasthan is scanty. To fill this gap the study was carried out.

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MATERIAL AND METHODS

Study area and environmental conditions:

The environmental conditions of study area are very extreme, rainfall is scanty, uneven and varies from 200 mm average annual rainfall in Jaisalmer district to 550 mm in Sirohi district across the year. Fluctuation of temperature is very high in Rajasthan i.e. scorching heat (up to 50°C) in summer to very low temperature (-2 °C) in winter. High wind velocity (20-40 km/hr) and harsh sunlight resulting high evapo-transpiration (1500-2000 mm/ year) and soil is mostly sandy, poor fertility and low water retention capacity.

Field Survey

Information on earlier reported localities from published literature, floras, books and deposited herbarium sheets in different herbaria was collected. Based on this information field visits were conducted from 2017 to 2020 in desert area of Rajasthan to confirm its occurrence localities and population status. Occurrence localities were geotagged.

Mapping and IUCN threat category assessment

Current and past distribution map was prepared with the help of GPS locations of earlier reported localities and current occurrence locations (Fig.2). Population data was used to assess IUCN threat category (IUCN, 2010). Online software Geocat (http://geocat.kew.org/.) was used to calculate area of occupancy (AOO) and extent of occurrence (EOO) by keeping grid size2×2 km (Fig.3).

RESULTS AND DISCUSSION

Ammania desertorum Blatt.&Hallb. J. Bomb. Nat. Hist. Soc. 26: 213. 1918.

(Local Name: Moto-Jal-Bhangro)

Identification characters

Erect, rigid, scabrous, papillose herbs, up to 30 cm high. Stem much branched, sharply quadrangular and upper side narrowly winged. Leaves lanceolate, acute or sub-obtuse, up to 7 cm long, auricled at base, feather-veined, mid-rib prominent below, margin reflexed. Flowers red-purple, axillary; calyx up to 2 mm long, leathery, campanulate, 8-nerved; petals 4, up to 1 mm long, obovate, cuneate, pur ple, caduceus.Stamens 8.Capsules up to 3 mm long, crowded, reddish-brown, pericarp transparent, shining. Seeds numerous, semi-globose, yellowish, minute.

Population status and threats:

Extensive field survey in desert area of Rajasthan revealed that, earlier reported populations have totally depleted. But one new occurrence locality from protected area with 30-40 individuals (Akal wood fossil park, Jaisalmer) was recorded (Table.1).

Earlier reported localities were facing different threats such as grazing pressure and access of pond for drinking water by human, cattles, goats, sheeps, wildlife which hamper population growth. Grazing leads to change in flositic composition, plant species richness and regeneration capacity of species (Sun *et al.*, 2011; Cingolani *et al.*, 2013; Deng *et al.*, 2014; Koerner and Collins 2014). Understanding the occurrence localities of rare species is essential to develop conservation action plans (Wiser *et al*., 1998). It was important to locate new occurrences to enhance knowledge of their habitat requirements.

Assessment of IUCN threat category

For implementaion of conservation action plans, threat category assessement of *A. desertorum* was done using IUCN red list guidelines (IUCN, 2010).This species has no longer found from earlier reported locations by different researchers. Due to various threats, earlier reported populations declined drastically. IUCN criteria A is used based on direct observations, decline in AOO, EOO and/or habitat quality (Table. 2). Based on our field observations of last 10 years, its natural population reduced or declined and area of occupancy (AOO) is also declined, placing it under criteria A_2ac of Critical Endangered category.

Criteria B_2 is used for geographis range i.e. AOO (area of occupancy). Online Geocat software used for calculation of exact AOO which resulted 4.00 km^2 (Fig. 3). In IUCN criteria B, AOO is less than 10 km^2 so it placed under B_2 Critical Endangered Category.

Its habitats are also continuously declining, so it placed in $B_2ab_{(iii)}$under Critical Endangered category. It's population size <50 with mature individuals (30 – 40 individuals) should be placed in Category D_1 under Critical Endangered category. Thus *A. desertorum*, is placed under the category Critically Endangered [criteria - CR/A_2ac;B2$ab_{(iii)}$;D_1]. There are some reports for IUCN threat category assessment from Indian desert for differenr species like *Commiphora wightii* (Kulloli and Kumar, 2018); *Ceropegia bulbosa* var. *lushii* (Purohit et al., 2018); *Aloe trinervis* (Kulloli et al., 2020). Therefore there is urgent need to conserve this species rather than becoming extinct very soon. Different conservation action plans can be implemented for restoration oo populations in native habitats.

Fig.1: View of habitat & habit; (B) Close up of flowers; (C) Fruit; (D&E) Dorsal and Ventral view of leaf; (F) Quadrangular stem. (Photography and plate by Kulloli R.N.)

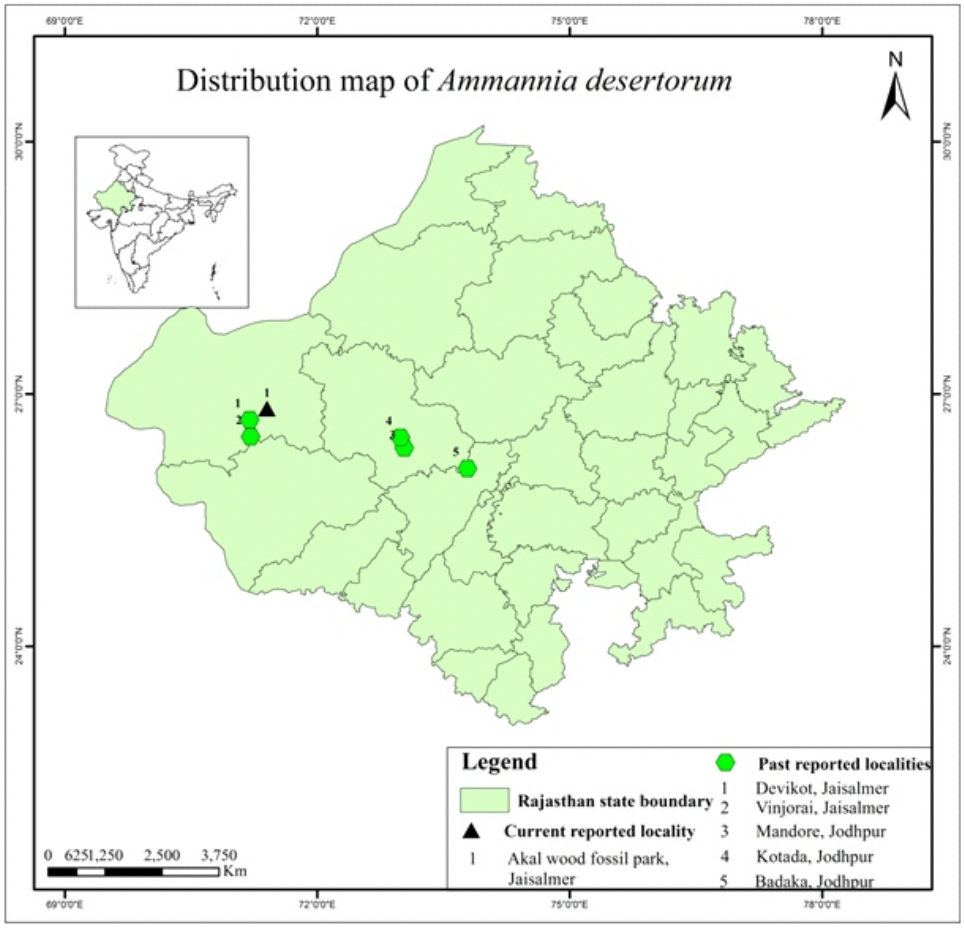

Fig. 2 : Distribution map of *Ammannia desertorum*.

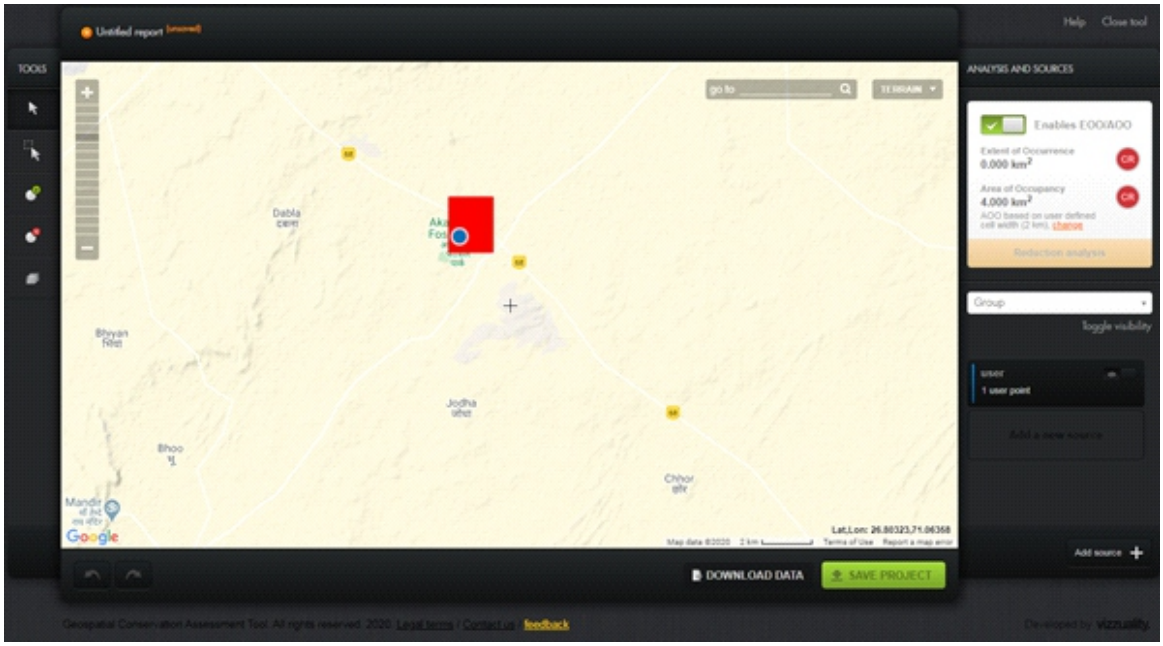

Fig.3 : Estimation of AOO keeping grid size 4 km^2 in Geocat software (prepare this map on shape file of Rajasthan with the help of Arc GIS software).

Table.1 : Previous and current status of *A. desertorum* in Indian desert.

Occurrence localities reported in previous work		**Occurrence localities reported during current work**
Occurrence locality	**Authors**	Current status reported during field survey 2016-2020
Mandore, Jodhpur	Bhandari, 203, 294,1293 (JAC)	Not present
Devikot, Jaisalmer	Blatter&Hallberg, 3341 (BLAT); Tiwari 867 (BSJO)	Not present
Vinjorai, Jaisalmer	Blatter&Hallberg, 3344 (BLAT);	Not present
Kotda, Jodhpur	Blatter&Hallberg, 3345 (BLAT);	Not present
Badka, Jodhpur	Blatter&Hallberg, 3346, 3347 (BLAT);	Not present
Not reported	Not reported	Akal wood fossil park, Jaisalmer

Table 2 : 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%
A2, A3 & A4	≥ 80% √	≥ 50%	≥ 30%

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		
(a) direct observation	Tick right sign. √	others
(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	√	
(d) actual or potential levels of exploitation	X	
(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.	X	
IUCN AssessmentCR/A2ac		

Table 3 : 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	X	
(ii) area of occupancy	X	
(iii) area, extent and/or quality of habitat	√	
(iv) number of locations or subpopulations	X	
(v) number of mature individuals	X	
IUCN Assessment	**CR/A2ac;B2ab(iii)**	

Table 4: Sheet of IUCN Criteria-D

Use of the criteria D	**Critically Endangered**	**Endangered**	**Vulnerable**
D1. 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			**CR/A2ac;B2ab(iii);D1**

CONCLUSION

Earlier reported populations of *A. desertorum* have depleted due to various threats. Based on current population data it has placed under IUCN threat category **Critically Endangered Regionally** (criteria- **CR/A2ac;B2ab(iii);D1**). Hence there is urgent need to restore its habitats and implement species recovery programmes, so as to establish its natural populations.

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