Journal on New Biological Reports
JNBR 10(1) 16 – 19 (2021)

ISSN 2319 – 1104 (Online)

Published by
www.researchtrend.net

Conservation Assessment of Endemic Plant *Euphorbia jodhpurensis* Blatt. & Hallb. (*Euphorbiaceae*) in Indian desert, Rajasthan

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| **Received**: 24 November 2020 | **Accepted**: 9 March 2021 | **Published Online:** 13 March 2021

How to cite: Purohit CS, Kumar R. 2021. Conservation Assessment of Endemic Plant *Euphorbia jodhpurensis* Blatt. & Hallb. (*Euphorbiaceae*) in Indian desert, Rajasthan. J New Biol Rep 10 (1): 16 – 19.

ABSTRACT

The present paper delt with *Euphorbia jodhpurensis*– an endemic species collected from Todgarh-Raoli wildlife sanctuary by Purohit (2019) after Blatter & Hallberg (1921) other than its type localty Jodhpur. Calculate its assessment using IUCN criteria placed it under the category Endangered [criteria- EN/ B_2ab(iii); D_1 (IUCN, 2020)]. The distribution, habitat, ecology, conservation measures taken, observations on common threats and IUCN status as per different IUCN assessment critarias are discussed in the present communication.

Key words: Conservation Assessment, *Euphorbia jodhpurensis*, Indian desert, Rajasthan

Euphorbia jodhpurensis belonging to family Euphorbiaceae was published as a new species by Blatter & Hallberg (1921) without designated type, originally collected from a rocky area in Jodhpur (Rajasthan). In 1959, Santapau designated a lectotype of Blatter & Hallberg's specimen (92281), collected in November 1917 (deposited at BLAT). After that Purohit *et al.* (2019) reported this as range extension from Todgarh-Raoli wildlife sanctuary and excluded from Pakistan country & declared endemic for Indian desert (Rajasthan state), India.

Identification characters: *E. jodhpurensis*is is closely allied to *Euphorbia clarkeana Hook.f.*, but differs in few morphological characters i.e. *E. clarkeana* is prostrate herbs with normal branches, leaf margins entire or toothed only at the tip and limbs of glands of same size as the glands whereas *E. jodhpurensis* is erect in habit with dichotomous branches, leaf margins spinulose-serrate throughout and limbs of glands larger than the glands (Bhandari, 1990; Shetty & Singh, 1991; Narain & Renu, 2017; Purohit *et al.*, 2019; Purohit, 2020; Purohit *et al.*, 2020).

Distribution: INDIA: Rajasthan, Jodhpur (Jodhpur), Barmer (Chohtan), Ganganagar (Suratgarh), Ajmer (Katarghati). Endemic.

Habitat and Ecology: This species has its typical habitat in arid to semi-arid rocky and gravelly areas in the buffer zone of the Todgarh-Raoli wildlife sanctuary, Rajasthan, associated with *Acacia nilotica* subsp. *indica*, *Anogeissus pendula*, *Annona squamosa*, *Cardiospermum halicacabum*, *Chloris virgata*, *Commelina erecta*, *Commiphora wightii*, *Digitaria pennata*, *Enicostema axillare*, *Glossocardia bosvallia*, *Justicia simplex*, *Moringa concanensis*, *Pavonia zeylanica*.

Conservations measures taken: During the course of field exploration, we were able to locate it only two localities at Jodhpur and Todgarh-Raoli wildlife sanctuary. Its seeds were collected in August, 2017. After shade dried, 30 seeds were sown in polythene bags with soil and Farm Yard Manure mixture. Seedlings were watered daily, avoiding water logging and protected by wire mesh cages or dry spinous tree branches for 20-30 days better growth. Saplings of 25-

30 days old were transplanted in pots having Farm Yard Manure mixture treated with fungicide (Bavistin) and termiticide (Eldrin). Pots were watered at regular interval.

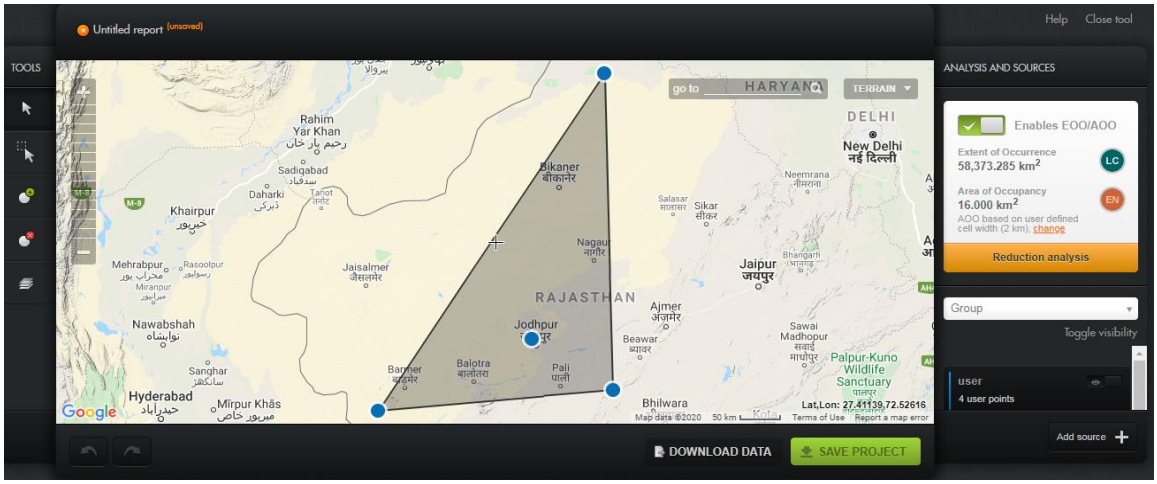

Fig 1. shows Convex hull of occurrence points for analysis of EOO and AOO using GeoCat (online software on website)

Threats: During the seedling preparation [preparation means develop seedlings in nursery via seeds and after 2 months of germination, these seedlings introduced to natural habitats for their conservation and rehabilitation] in our botanical garden, the authors observed that the germination rate of *Euphorbia jodhpurensis* is very low. They also observed that birds i.e. peacock and other animals like squirrels feed on young shoots and young leaves of seedlings of this plant. Therefore the main threat to this species is supposed to be a low germination rate and its natural seedlings are eaten by birds and other animals.

IUCN Status: This species has not been found from earlier reported locations by different researchers. Detailed survey of areas of occurrence confirmed its rarity. Calculation of AOO (area of occupancy) with the help of based on our observations, locations and Geocat online software result 16.00 km^2 (Fig. 1). In IUCN criteria B, AOO is more than 10 km^2 and less than 500 km^2, so it placed under B_2 Endangered category. It's reported from four locations in Rajasthan, is less than 5 locations category, so it placed in B_2a Endangered category. On the basis of our observations of last 10 years, its natural population or mature individuals is continuing decline in numbers, so it placed in B_2ab(iii) under Endangered category. It's population size < 250 with mature individuals (110 – 120 individuals) should be placed in Category D_1 under Endangered category. Due to not available to sufficient data or not study on these category, Criteria A, Criteria C and Criteria E have not followed (Details in Data Sheet A to E). Hence its assessment using IUCN criteria placed it under the category Endangered [criteria- EN/ B_2ab(iii); D_1 (IUCN, 2020)]. 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% **X**	≥ 50%
A2, A3 & A4	≥ 80%	≥ 50% **X**	≥ 30%

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 habitat quality	**X**	
(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	**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**	

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	=	**EN/ B_2ab(iii)**

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 **X**	< 10,000
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 **X**	< 1,000
C2. (a) (ii) % individuals in one subpopulation =	90–100%	95–100% **X**	100%
C2. (b) Extreme fluctuations in the number of mature individuals.			

IUCN Assessment = **EN/ B_2ab(iii)**

SHEET OF IUCN CRITERIA-D

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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 = **EN/ B_2ab(iii); 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 = **EN/ B_2ab(iii); D_1**

ACKNOWLEDGEMENTS

Authors are thankful to Director, BSI, Kolkata and HOO, BSI, AZRC, Jodhpur for providing necessary facilities and encouragement and also to the Forest Department, Rajasthan for extend their co-operation during survey and exploration.

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