WWJMRD 2021; 7(5): 120-123
www.wwjmrd.com
International Journal
Peer Reviewed Journal
Refereed Journal
Indexed Journal
Impact Factor SJIF 2017: 5.182 2018: 5.51, (ISI) 2020-2021: 1.361
E-ISSN: 2454-6615

B.S.V. Prakash
Department of Botany, Lucknow Christian Degree College, Lucknow, India.

D.J.Godin
Department of Botany, Lucknow Christian Degree College, Lucknow, India

Correspondence:
B.S.V. Prakash
Department of Botany, Lucknow Christian Degree College, Lucknow, India.

Sprouting Arrangement of Different Grasses in Thar Desert Ecosystem

B.S.V. Prakash, D.J.Godin

Abstract
Ecophysiology of water relations is one of the important parameters to judge the adaptability of a particular plant species to the prevailingharsh climatic and edaphic conditions. The grasses viz, Cyperus sp., S. marginatus, P. turgidum and L. sindicus sprouted within 10 days, whereas D. bipinnata sprouted after 30 days, S. marginatus requires less water compared to other species. L. sindicus, P. turgidum and C. jwarancusa required daily watering. Thus, the different pattern of sprouting behavior of grasses in thar desert is that they mostly need regular water supply for establishment and sprouting. Two or three interrupted rains help their quick regeneration, mainly during monsoon season.

Keywords: Thar Desert Ecosystem, Water Supply, Prevailingharsh Climatic

Introduction
Deserts are found on almost all the continents of the world. In India, the Thar, which is perhaps the smallest desert in the world, occupies nearly 385,000 km^2 and about 9% of the area of the country [Mathew 2003; Islam and Rahmani 2004]. The only river that crosses through the Thar is the Luni, which joins the Arabian Sea through the Rann of Kutch in Gujarat. The Aravalli Mountains, starting from northern Gujarat and extending up to Delhi state, form the eastern boundary of the Thar. In the west it joins with the Thal desert of Pakistan and in the south, it extends into the Kutch of Gujarat. The Thar Desert is the eastern extension of the vast Persio-Arabian desert, which joins the great Sahara deserts [Rahmani 1997a; Islam and Rahmani 2004, 2008].[Whyte (1957)]had classified the Indian grasslands into eight types but [Champion and Seth (1968)] recognised only three broad categories. Between 1954 and 1962, the Indian Council of Agricultural Research conducted grassland surveys and classified the grass cover of India into five major types (Dabadghao and Shankarnarayan 1973): (i) Sehima–Dichanthium; (ii) Dichanthium–Cenchrus–Lasiurus; (iii) Pharagmites– Saccharum–Imperata; (iv) Themeda–Arundinella; and (v) temperate and alpine cover. Depending upon the biotic influences and local variations in topography and soil structures, these five broad categories can still be subdivided into several grass associations [Singh and Joshi 1979; Islam and Rahmani 2008].
Distribution of grasslands in India: In India, grasslands are mainly found in Gujarat (Saurahstra), Rajasthan (Thar Desert), Maharashtra (Deccan), western Madhya Pradesh (Malwa plateau), Uttar Pradesh (Gangetic plain) and the Brahmaputra Valley, as shown in the biogeographic zones in India. Montane grasslands are found in Western Himalayas, Sikkim and the Western Ghats [Champion and Seth 1968; Rahmani 1997a, 1997b; Islam and Rahmani 2004]. The climax grasslands are considered to be absent in India [Whyte 1957] but grasslands as secondary stage is common (Champion and Seth 1968). These grasslands are termed as disclimax, or preclimax stages [Champion and Seth 1968] or subclimax [Singh, Hanxi, and Sajusi 1985; Islam and Rahmani 2004]. Most plant ecologists think that the grasslands of India owe their existence primarily to biotic factors, such as fire and grazing [Champion and Seth 1968; Dabadghao and Shankarnarayan 1973; Gadgil and Meher–Homji 1985, M. Zafar-ul Islam and Rahmani 2011].

Fig. 1: Thar Desert in Rajasthan, India

The grasses viz, Cyperus sp., S. marginatus, P. turgidum and L. sindicus sprouted within 10 days when watered daily or alternately, whereas D. bipinnata sprouted after 30 days, S. marginatus requires less water compared to other species. L. sindicus, P. turgidum and C. jwarancusa required daily watering for better establishment and regeneration.

Ecophysiology of water relations is one of the important parameters to judge the adaptability of a particular plant species to the prevailingharsh climatic and edaphic conditions [Sen, 1973]. Plant response to water stress varies with species and is modified by environmental and physiological factors. The different plant responses explain as to why one species survives better than the other under limited water avaibility [Larcher, 1975].

Source: https://www.researchgate.net/figure/Overgrazing-in-the-Thar-Desert-photo-by-MZ-Islam_fig6_254214831

Fig 2: Green belt of Thar desert

Methodology

After an extensive survey of desert in Rajasthan, a few grass tussocks, viz. Cymbopogen jwarancusa,Cyperus sp., Sporobolus marginatus, Desmostachia bipinnata, Lasiurus sindicus Panicum turgidum were collected in almost seemingly dead condition (Table 1) and planted in earthen pots at Botanical Garden ,University of Jodhpur ,Jodhpur on 3rd April,1988. These plants were supplied with water in three different frequencies to expose them to water stress of different magnitude for a duration of one month (Sen et al.,1979). The treatments were the following:

A = Watered fortnightly,
B = Watered on alternate days, and
C = Watered daily.

The sprouting of tussocks was noticed daily. The leaf length was measured and expressed as the leaf elongation. The water content on fresh weight basis and water deficit were determined (Stocker, 1929).

Sprouting patterns in most of the grasses observed are probably related with availabiliyu of soil moisture to the plants. The grasses dried up completely in treatment A, probably due to unavailability of water for longer period.

Result And Discussion

The long intermediate dry periods of soil moisture were not suitable for sprouting of tussocks. The water availability in treatments B and C was helpful for establishment and sprouting tussocks. The fluctuations in soil moisture content were mainly due to high ambient temperature, high evaporation rate and sandy loam texture of the soil. The grasses viz.,Cyperus sp.,S. marginatus, P. turgidum and L.sindicus, exhibited sprouting in treatments B and C within 10 days of planting date , while D. bipinnata was the only one which exhibited sprouting after 30 days.

The leaf elongation studies were carried out on well eastablished and sprouted tussocks, viz, Cyperus sp., S.marginatus , and L.sindicus,P .turgidum and C.jwarancusa.The leaf elongation continued in all these species. It is relatively higher in 1st,2nd and 3rd leaves in treatments C than B, while S.marginatus exhibited maximum under treatment B , which indicated that S.marginatus needs lesser water for establishment and sprouting (Table1).

Table 1: Sprouting patterns and leaf elongation of some desert grasses.

Plant species	Place of collection	*Treatments	Sprouting after days **	Leaf extension(cm) Leaf number 1st	2nd	3rd	4th
Cyperus sp.	Khara village (BiKaner)	A	NS	---	----	----	----
		B	<10	3.0	2.6	2.3	-----
		C	<10	4.5	7.0	2.15	-----
C.jwarancusa	Beechwal (Bikaner)	A	NS	----	-----	-----	-----
		B	NS	----	-----	------	-----
		C	S	4.0	5.75	-------	------
D.bipinnata	Didwana	A	NS	------	-------	-------	-------
		B	NS	------	------	-------	-------
		C	<30	Sprouted and dried			
L.sindicus	Stri Dungargarh	A	NS	------	--------	--------	-------
		B	<10	3.55	3.9	3.8	-------
		C	<10	13.00	6.5	7.5	5.5
P.turgidum	Jaisalmer	A	SD	-------	------	-------	-----
		B	<10	3.5	2.8	2.0	------
		C	<10		6.1	5.65	
S.marginatus	Tal chapper (Churu)	A	NS				
		B	<10				
		C	<10				

*A= Watered fortnightly, B= Watered on alternate days, and C= Watered daily.
** S= Sprouted, SD= Sprouted and dried.

The grasses like C.jwarancusa, S. marginatus and D.bipinnata showed more water content at field level they sprouted under watered treatments. Other grasses did not respond to daily watering treatment and they showed comparatively more water deficit at field level. However, L. sindicus (Bikaner) responded to daily watering treatment even though water defecit was more at field level (Table 2).

Table 2: Water relations of some desert grasses from different localities of western Rajasthan.

Plant species	Locations	At field site PWC	WD	In experimentals pots* PWC B	PWC C	WD B	WD C
C. jwarancus	Beechwal (Bikaner)	79.19±25.2	0.75±0.06	----	23.07	------	29.13
C. jwarancus	Khara village (Bikaner)	24.34±11.57	73.73±10.23	-----	-----	-----	------
D.bipinnata	Didwana	39.5±0.31	62.26±1.59	------	82.97	------	45.02
L. sindicus	Khara village (Bikaner)	13.85±5.27	85.52±8.1	35.8	42.61	53.31	36.4
L.sindicus	Sri Dungargarh	0.72±0.02	100.07	------	-------	-----	-----
L.sindicus	Jaisalmer	26.46±1.11	7.44	------	------	-----	-----
P. turgidum	Jaisalmer	55.06±0.94	28.64---2.58	------	-------	-----	-----
P. turgidum	Churu	4.16----0.43	96.47-----0.5	-----	-------	------	------
Cyperus sp.	Khara village	16.11---8.47	69.09----10.72	------	------	-------	-------

- B= Watered on alternate days, C= Watered daily, PWC = plant water content, WD= water deficit.

Conclusion

It seems that each grasss species has its own time period for establishment and sprouting, L.sindicus,P .turgidum and C.jwarancusa are some of those grass species which need regular water supply for better establishment and regeneration . The different pattern of sprouting behavior of

grasses in thar desert is that they mostly need regular water supply for establishment and sprouting.Two or three interrupted rains help their quick regeneration, mainly during monsoon season.

References

1. Mathew, K.M. ed., 2003. Manorma Year Book 2003. Kottayam: Malayala Manorma.
2. Islam, M.Z., and A.R. Rahmani. 2004. Important Bird Areas in India: Priority Sites for Conservation. Indian Bird Conservation Network: Bombay Natural History Society, BirdLife International (UK) and Oxford University Press.
3. Islam, M.Z., and A.R. Rahmani. 2008. Potential and Existing Ramsar Sites in India. Oxford: Oxford University Press, BNHS, BirdLife International.
4. Rahmani, A.R. 1997a. Wildlife in the Thar. New Delhi: World Wide Fund for Nature.
5. Rahmani, A.R. 1997b. A Study of the Ecology of Grasslands of the Indian Plains with Particular Reference to their Endangered Fauna: Final Report. Mumbai: Bombay Natural History Society
6. Whyte, R.O. 1957. The Grassland and Fodder Resources of India. Scientific monograph. New Delhi: Indian Council of Agricultural Research.
7. Champion, H.G., and S.K. Seth. 1968. A Revised Survey of the Forest Types of India. New Delhi: Government of India.
8. Singh, J.S., and M.C. Joshi. 1979. Primary production. In Grassland Ecosystems of the World, ed. R.T. Coupland, London: Cambridge University Press.
9. Singh, J.S., Y. Hanxi, and P.E. Sajusi. 1985. Structural and functional aspects of Indian and Southeast Asian savanna ecosystems. In Ecology and Management of the World's Savannas, eds. J.C. Tothill and J.J. Mott, Canberra: The Australian Academy of Sciences.
10. Dabadghao, P.M., and K.A. Shankarnarayan. 1973. The Grass Cover of India. New Delhi: ICAR.
11. Gadgil, M., and V.M. Meher-Homji. 1985. Land use and productive potential of Indian savannas. In Ecology and Management of the World's Savannas, eds. J.C. Tothill and J.J. Mott, Canberra: The Australian Academy of Sciences.
12. Larcher, W .1975 Physiological Plant Ecology, Springer Verlag,Berlin,Haidel Berg, New York.
13. Sen, D.N. (1973) vegetation, 27: 201-265.
14. Sen,D.N., Bohr, P.N. and Bhati , P.R.(1979) j. indian bot soc., 58 :120-126
15. M. Zafar-ul Islam and Asad R. Rahmani(2011), Thar Desert, Rajasthan, India: anthropogenic influence on biodiversity and grasslands, Bombay Natural History Society, DOI: 10.1080/14888386.2011.585931