International Journal of Advanced Research in Education and TechnologY(IJARETY)

| ISSN: 2394-2975 | www.ijarety.in| | Impact Factor: 3.932| A Bi-Monthly, Double-Blind Peer Reviewed & Referred Journal |

|| Volume 8, Issue 3, May 2021 ||

Types of Plants in Thar Desert

Dr. Sanjay Kumar Acharya

Dept. of Botany, Govt. Dungar College, Bikaner, Rajasthan, India

ABSTRACT: The sparse vegetation consists of plants adapted to growing in dry conditions, known as xerophilous plants. These include several kinds of grass and scrub-type vegetation of low trees of Acacia, Prosopis, Tamarix, and Zizyphus. Ravindranath lives in the heart of the Thar desert in India. He and his family are agropastoralists – people who grow crops and rear livestock – in the village of Kalu in Bikaner district, Rajasthan.

But the dry grasslands that people like Ravindranath have depended on for centuries for pasture are slowly being depleted. “Sometimes we have to pay money and buy cattle feed” instead of grazing our animals, he said.

KEYWORDS-plants, thar, desert, scrub, dry, xerophilous

I.INTRODUCTION

The Thar desert have arid climate, therefore, the vegetation of the region is adapted to xerophytic conditions24. The Thar desert has a specific characteristics with a variety of environmental stresses including low precipitation, high temperature, extreme aridity, low availability of nutrients and high evapo-transpiration rate25. The vegetation of the region are adapted to these edaphoclimatic extremities, which helps the plants to grow and sustained in the adverse xerphytic conditions26. It is reported that the Thar desert represents only 5% of the flora of India, which has about 17,500 flowering plants27. It is reported that most of the plants of the Thar desert are having different medicinal properties and therefore, they are being used by tribes for curing their ailments28,29. The isohyets map of Rajasthan shows that the eastern part of the desert receives high rainfall (up to 400 mm) as compared to western part (about 100 mm) and hence, vegetation cover is comparatively dense in eastern part30. Halophytic vegetation The Thar desert has many depressions or ‘Playa’, where salinity is very high. About 7,20,000 ha area of the desert is saline and is used for production of table salt31. Some vegetation is adapted to grow in such saline area

The most common halophytes of the Thar desert are Tamarix aphylla, Tamarix dioica, Trianthema triquetra, Cressa cretica, Portulaca oleracea, Portulaca meridiana, Haloxylon recurvum, Haloxylon salicornicum, Suaeda fruticosa, Sesuvium sesuvioides, Salsola baryosma, Zaleya redimita, and Zygophyllum simplex.32-34 Vegetation on sand dunes The desert of Rajasthan is characterized by semi-stable to frequently shifting sand dunes. Therefore, the vegetation cover on such dunes is very low. The average height of these sand dunes varies between 70-120 m. It is reported that about 44% area of the Thar desert is occupied by sand dunes35. Ephemeral vegetation can be observed here during rainy season .Some common vegetation on sand dunes of Thar desert including Aerva persica, Aerva pseudotomentosa, Aerva javanica, Acacia jacqumontii, Boerhavia diffusa, Calligonum polygonoides, Cenchrus setigerus, Cenchrus ciliaris, Crotalaria burhia, Cyperus rotundus, Gisekia pharnaceoides, Mollugo cerviana, Lasiurus sindicus, Panicum turgidum, Pedalium murex, Tephrosia purpurea can be observed during Monsoon period[1,2,3]

Debulal Bawri, a gram panchayat officer for Kalu, explained that in Bikaner and other districts in the state of Rajasthan, “Rainfall has become unreliable and herders and farmers in the area rely a lot on monsoon rainfall.” As of August 17, this year’s monsoon in Bikaner is 23% deficient.

“Monsoons have been erratic [in this region] over the past few decades and pasture productivity is dependent on good monsoons,” said Sutirtha Dutta, a research associate at the Wildlife Institute of India.

A “good monsoon” in Bikaner means between 200 millimetres-300 millimetres of rain between June and September. More erratic monsoons mean there is often a high amount of rain over fewer days. Another problem, Bawri said, is that “many buildings are coming up on pastures”.

Rewant Jaipal, a programme manager at NGO the Urmul Trust, said that pastures across Bikaner are shrinking due to the growth of agricultural farms and the expansion of built-up areas because of population changes.

II.DISCUSSION

Interdunal flats of the desert holds hard and compacted surfaces as compared to sand dunes. These flats retain the rainwater for longer time than sanddunes. The dominant vegetation of such flats are Aristida funiculata, Arnebia hispidisima, Aerva javanica, Aerva persica, Aerva pseudotomentosa, Convolvulus deserti, Crotalaria burhia, Cappais decidua, Calotropis procera, Cymbopogon jawarncusa, Dactyloctenium sindicum, Eragrostis ciliaris, Eragrostis minor, Eragrostis pilosa, Evolvulus alsinoides,Fagonia cretica, Farsetia

hamiltonii, Heliotropium bacciferum, Indigofera cordifolia, Indigofera linnaei, Leptedenia pyrotechnica, Octhocloa compressa, Pulicaria crispa, Tribulus terrestris, Tephrosia purpurea, Zizyphus nummularia13,37. The dominant tree of the Thar is Prosopis cineraria. However, in some areas of the desert,[4,5,6] other tree flora including Salvedora oleoides, Salvedora persica, Zizyphus mauritiana, Tecomella undulata, Balanites aegyptiaca, Acacia senegal, Acacia nilotica, Acacia tortilis etc are in co-existence with Prosopis cineraea13- 15. Some climbers including Asparagus racemosus, Citrullus colocynthis, Cucumis callosus, Cucumis profetarum, Ipomoea pestigridis, Ipomoea eriocarpa Mukia maderaspatana and Pergularia daemia can be observed in the Thar desert5

In December 2019, efforts began to revive pastures in Kalu, as well as the villages of Kelan, Dhani Bhopalaram and Rajasar Bhatiyan in Bikaner. The project focusses on planting trees such as ber, khejri and moringa and grasses like sewan and daman on grazing land.

In cases where local grasses like sewan, daman and phog are already present, the programme ensures that they remain in the landscape, said Jaipal, who has been leading efforts on the ground.

The initiative is part of a programme by the National Rainfed Area Authority. It is being coordinated by India's Union Ministry of Agriculture and Farmers Welfare, the United Nations' Food and Agriculture Organization and the Urmul Trust, with support from the Desert Resource Centre.[7,8,9]

Ravindranath is employed by the programme under the Mahatma Gandhi National Rural Employment Guarantee Act, 2005. This legislation guarantees 100 days of employment per year to every rural household in India.

III.RESULTS

The Thar desert is very poor in water resources. Permanent water bodies are rare in the Thar desert. Indira Gandhi Canal Project (IGCP) is the major water supply system for both agricultural and drinking water purpose in most of the districts of the desert part of the Rajasthan (8). Recently, the Narmada Canal Project has extended to meet the need of water in some parts of Jalore and Barmer districts. Some rivers in Thar desert of Rajasthan are also prevailing, which has very limited flow during Monsoon period and they remain dry for most of the time of the year. Some lakes including Kaylana (Jodhpur) (9), Kolayat and Gajner (Bikaner), Gadisar (Jaisalmer) are possessing water throughout the year and hence some weeds and aquatic vegetation in the region can be observed. The common aquatic vegetation noticed in the water bodies including canals, major lakes and pond of Thar desert are Ceratophyllum demersum, Hydrilla verticillata, Ipomea aquatic, Eichornia crassipes, Lemna minor, Nelumbo nucifera, Nymphaea nauchii, Pistia stratiotes, Potamogeton crispus, Spirodela polyrhiza, Typha anguistata and Vallisneria Americana38,39 The eastern border of the Thar desert of Rajasthan touches the Aravalli range. It is noticed that the desert has some discontinued hillocks and small hills near Jodhpur (10), Sewana (Jalore), Chohtan and Kiradu (11) (Barmer). The important vegetation noticed on these hills are Acacia senegal, Euphorbia caducifolia, . It was observed that Kolayat lake of Bikaner is dominated by Nelumbo nucifera, while IGNP canal and its minor branches are having Typha anguistata near banks of the canal. It was also noticed that near banks of almost all the water bodies of the Thar was dominated by Cynodon dactylon grass .The eastern border of the Thar desert of Rajasthan touches the Aravalli range. It is noticed that the desert has some discontinued hillocks and small hills near Jodhpur (10), Sewana (Jalore), Chohtan and Kiradu (11) (Barmer). The important vegetation noticed on these hills are Acacia senegal, Euphorbia caducifolia, Grewia tenax, Barleria prionites, Brachiaria ramose, Commiphora wightii, Aristida funiculata, [10,11,12]Asparagus recemosus, Lapidagathis trinervis, Melanocenchris jacquemontii, Pupalia lappacea, Tragus biflorus, Maytenus emarginata, Dicoma tomentosa,Crotalaria medicagenia, Euphorbia hirta, Bidens biternata, Tetrapogon tenellus, Cymbopogon jwarancusa etc. Magras are hard landscape with gravel and stony surface (12 and 13). These surfaces are so stiff that roots of most of the plants do not easily penetrate it. Therefore the vegetation covers on such surfaces are scanty. However, trenches made from runoff during Monsoon period creates the substratum favourable for some grasses and herb including Sporobolus diander, Oropetium thomaeum, Crotalaria medicagenia, Eragostis minor, Eragrostis pilosa, Evolvulus alsinoides, Fagonia cretica, Farsetia hamiltonii, Heliotropium bacciferum, Indigofera cordifolia, Octhacloa compressa, Corchorus depressus, Lapidagathis trinervis, Tragus biflorus etc41 Due to improved irrigation facilities and canal irrigation in the western Rajasthan, many alien vegetation have invaded in the region. It is reported that biological invasion of alien species is the second worst threat after habitat destruction, which is responsible for the loss of native species42. These invasive species have wider range of ecological amplitude. Hence, once they invade in the region, they consistently reproduce and sustain populations over many generations without direct interference by humans43,44. The native flora of the Thar desert of western Rajasthan is facing a severe threat from such invasive alien flora. Prosopis chilensis is the most abundant alien species, which is rapidly spreading in the region and is highly adopted to survive almost in any condition45. The common invasive flora reported from the Thar desert are Prosopis chilensis, Acanthospermum hispidum, Ageratum conyzoides, Alternanthera pungens, Argemone Mexicana, Calotropis gigantea, Calotropis procera, Cassia obtusifolia, Cassia occidentalis, Cassia tora, Chloris barbata, Cleome viscosa, Echinops echinatus, Ipomoea eriocarpa, Ipomoea pestigridis, Lantana camara, Parthenium hysterophorus, Prosopis juliflora / Prosopis chilensis, Solanum surattense, Typha angustata and Xanthium strumarium46. Biological reasons of loss of important flora from desert The Thar desert is one of the most fragile desert biome of the world. Beside anthropogenic activities, there are many natural causes which are responsible for loss of biological diversity. Due to immense biotic interference, about 31 species of total 84 economically important species have become either vulnerable or endangered47. Infestation by insects on flowers, fruits and seeds may causes deformities in them and anomalous physiological changes in the plants themselves48,49. It is reported that about 17 species and 8 botanical varieties are endemic to the Indian Thar Desert31. Some biological indiscretions in such plants are responsible for their reduced distribution. The major biological indiscretions including genetic variation and skimpy seed production may results in crisis in seed germination, e.g. Salvadora persica and Salvadora oleoides50, Commiphora wightii51,52, Withania coagulans and Ephedra foliata47 (Singh, 2004), Tecomella undulata53;

seed infestation by insects e.g. Acacia Senegal54; low seed viability e.g. Anogeissus pendula55 Increasing population and their growing demand for food, grains, vegetable, fruits etc from limited land resources has pose a severe threat on biological diversity. Regular assessment of biological diversity in any ecosystem is very necessary for collecting valuable information on current status of species for frequency, density, abundance, distribution, environmental stress on them, results of conservational efforts etc. Some natural causes that affect the innate distribution of floral species must be recognised. It is also required that along with the anthropogenic activities, some natural aspect responsible for the loss of biological diversity should also be identified and mitigated to conserve the biological diversity of the Thar region. Infestation by insects on flowers, fruits and seeds may causes deformities in them and anomalous physiological changes in the plants, which are responsible for less and immature seed production. Therefore, efforts to study the seed physiology and reproductive biology of threatened and endangered plants are the need of the time to select and propagate resistant plants. Application of biotechnology and bio-engineering are playing a vital role in conserve and preserve the germplasm of threatened and endangered flora. [12,13,14]Some conventional methods (preservation of seeds and pollens) and nonconventional methods (Cryo-preservation of embryo, callus, shoot tips) must be used to preserve and conserve the germplasm of endangered and threatened species. Conclusion Thar desert is possessing fair biodiversity of flora as well as fauna. To meet the needs of increasing population, there are severe threats exerting on biodiversity.

Chetan Misher, a PhD scholar at the Ashoka Trust for Research in Ecology and the Environment, said that restoring grasslands is beneficial for both pastoralists and biodiversity.

Misher stressed that while tree species like ber and khejri are native to the region and have evolved to survive with historically scant rainfall, the same is not true for non-native ones like moringa.

“During monsoons, we hardly get 15-20 days of rainfall and this year has been worse,” he added. Other experts also warn that moringa, which might not survive in the region, should not be planted because it is not native.

Dutta, from the Wildlife Institute of India, also supported the planting of native vegetation. He said that native grasses and shrubs like sewan and capparis in low densities can support livestock while maintaining the integrity of the desert ecosystem.

“The Thar is a climatic desert,” said Ninad Munagi, another researcher at the Wildlife Institute of India. This means that the region is very hot, with very low precipitation.

Historically, policies have sought to “green” the desert and its surrounding areas via cultivation and plantations. This was rooted in the thinking that deserts were inherently “unproductive”. Colonial rule was focussed on higher revenues, and farms were easier to tax.[14]

IV.CONCLUSION

Land resources are limited and anthropogenic factors such as industrialization, infrastructural developments, colonization, highways and railways development etc alter habitat, fragment landscapes and threaten biodiversity. Therefore, assessment of biological diversity on regular basis is the need of the time. The valuable information on current status of different species, their distribution, frequency, density, abundance, environmental stress on them, etc may be helpful for the conservation of natural resources including flora and fauna of the region. Application of biotechnology and bio-engineering may also boost up the conservation of threatened and endangered species. The findings of the study will also be helpful for researchers and policymaker for further improvement and development of effective policies on conservation of the biological diversity of Thar desert

Under British colonial rule in the 19th and 20th centuries, Dutta said, irrigation was introduced to turn arid and semi-arid ecosystems into cropland. The right to graze animals was limited to those who owned the land and used it to cultivate crops. “This is how nomadic pastoralists turned into sedentary agropastoralists,” Dutta said. The problem, Misher said, is that “greening started with people thinking, ‘How do we make deserts productive?’ not, ‘Let’s understand what a desert is.’”

“Planting trees in deserts is as bad as cutting trees in a rainforest since it changes the basic nature of the ecosystem,” said Abi Vanak, a senior fellow and convenor at the Centre for Biodiversity and Conservation at Ashoka Trust for Research in Ecology and the Environment. He added that the purpose and scale of plantation activities should always be scientific and specific.

Greening has largely occurred on arid scrub savannahs that also functioned as pastures. As well as hurting herders’ livelihoods, many species of animals and plants that have adapted to such climates are now threatened.

The trend is also linked to recent locust outbreaks, as large quantities of vegetation provide food for locust swarms. The greened areas act as pit stops in deserts, allowing them to reach previously unfrequented regions like Delhi, Maharashtra and Madhya Pradesh.

The type of plants in the desert has also changed. Under colonial rule, the British planted woody species because of the demand for timber – which is still strong today.

| ISSN: 2394-2975 | www.ijarety.in| | Impact Factor: 3.932| A Bi-Monthly, Double-Blind Peer Reviewed & Referred Journal |

|| Volume 8, Issue 3, May 2021 ||

"In the case of deserts, we know that planting woody species leads to retention of soil moisture in the ground substrate. In the long term, this can facilitate colonisation by many other species," the Wildlife Institute of India's Munagi said.

After India gained independence in 1947, successive governments continued these irrigation, cultivation and plantation policies. In the 1980s, the Indira Gandhi Canal project, a vast irrigation scheme, led to extensive crop cover in the Thar.

Many areas that were irrigated under the project are now infertile. "There's no natural outflow of water," Misher said. This has led to waterlogging and land becoming too saline for agriculture.

One of the biggest reasons for pastures shrinking across Rajasthan and surrounding areas in the Thar is the practice of planting invasive species.

The most notorious among such species is *prosopis juliflora*, a tree from Central America, likely introduced to the Thar between 1980 and 2000. The plant is a "nitrogen-fixer", said Vanak. This means that it increases nitrogen levels in the soil, so they are not ideal for native plants adapted to nutrient-deficient soils.

Vanak explained that by planting *prosopis juliflora* and enriching the soil with nitrogen, "you are allowing plants that thrive in such soils to come in and outcompete local species".

Another example is *acacia tortilis*, a tree native to the African savannah. This was planted in Rajasthan in the name of "sand dune stabilisation". But this failed to consider animals like sand grouse and certain lizards, which prefer to burrow in loose sand.

Species like prosopis juliflora and acacia tortilis are not compatible with the wildlife of arid and semi-arid regions. The blackbuck, great Indian bustard, chinkara gazelle and spiny-tailed lizard "prefer open habitats to detect predators and prey… the numbers of these wildlife species started decreasing," Dutta said.

He added that in areas where plantations took hold and where water seepage from irrigation was prominent, "species like the nilgai [Asia's largest antelope] that prefer wetter conditions expanded… this disrupts ecological balance".

Dutta said that the removal of invasive species "will open up tremendous amounts of land" that could be restored into grasslands.

Does greening bring rain?

"In deserts, 'green' is usually considered divine," Munagi said. Due to this belief, greening programmes are undertaken even at the local, village-council level.

"Our forefathers have told us that greening brings rainfall," Bawri said.

But a direct link between greening and rainfall in arid and semi-arid regions in western India has not yet been proven.

"Large-scale greening in Sahel [the region south of the Sahara in Africa] has feedback impacts on rainfall in the region," said Jagdish Krishnaswamy, a senior fellow at the Suri Sehgal Centre for Biodiversity and Conservation, Ashoka Trust for Research in Ecology and the Environment.

But there is no evidence yet that it has an impact on rainfall in the arid and semi-arid regions of north-west India, Krishnaswamy said.[14]

REFERENCES

1. https://www.sahapedia.org
2. https://www.jatland.com
3. https://m.timesofindia.com>jpr
4. https://en.m.wikipedia.org
5. https://www.frienvis.nic.in>
6. www.ecoindia.com
7. www.cazri.res.in
8. https://www.indiawaterportal.org> "The desert that blooms" by Manu Moudgil.
9. Floral Diversity of Thar Desert of Western Raj, India" by P.D Charan and K.C.Sharma.
10. Vedanta : " Know your flora: A Glimpse of Thar Ecosystem" Desert flowers by Keith Douglas.
11. Flora of the Indian Desert, Jodhpur : MPS Reports, 1991" , Laxman Burdak.
12. Botany " , Khanna Publishers, New Delhi, 2019.
13. Avasthi and Pancholi (2019), "Mumal- Rajasthan, 2020", Moomal Publication, Jaipur.
14. Dr. Hari Mohan Saxena (2019), " Rajasthan Ka Bhugol " , Rajasthan Hindi Granth Academy, Jaipur.