Biodiversity and Ethnobotanical Study of Plants Traditionally used in Jhunjhunu District: A Part of Indian Thar Desert

Anita Jeph

Lecturer, Department of Botany, Shri Radheshyam R. Morarka Govt P G. College, Jhunjhunu, Rajasthan

I. INTRODUCTION

The variety of life on Earth, its biological diversity is commonly referred to as biodiversity. The number of species of plants, animals and micro-organism, the enormous diversity of genes in these species, the different ecosystems on the planet, such as deserts, rain forests and coral reefs are all part of biologically diverse Earth (Shah, 2014). Biodiversity is the source of most of human needs and ironically human life on the earth depends only upon few narrow spectrums of those species of plants life which provides our entire food (Khan *et al*., 2012).

It is believed that about 15-17 million species are present on the earth planet, Out of which only 5 million have been described so far. Interestingly, 70% of them occur in tropical and sub tropical parts of the world. In India, more than 43% of the total flowering plants are reported to be medicinal importance (Khan and Singh, 2012).

Biodiversity boosts ecosystems productivity where each species, no matter how small all have an important role to play. The greater species diversity ensures natural sustainability for all life forms and healthy ecosystems can better with stand and recover from a variety of disasters (Shah, 2014).

India is currently facing one of the biggest threats, it has ever faced, which could not only result in natural disaster and untold mystery for its citizens in the years to come, but also comprise our future growth and social development. This threat is global warming and climate change. Average global temperature increase of only 1-2 ^{o}C (above pre industrial levels) could commit 15-40 percent of species to extinction. As temperatures rise above 2-3^{o}C, as will very probably happen in the latter part of this century, so the risk of abrupt and large scale damage increase (Sheikh *et al*., 2012).

The link between climate change and biodiversity has long been established although throughout Earth's history the climate has always changes with ecosystem and species coming and going, rapid climate change affects ecosystem and species ability to adopt and so, biodiversity loss increases (Shah, 2014). Threats to biodiversity include habitat loss and fragmentation, the introduction of non-indigenous species, over harvesting, pollution, changes in geo-chemical cycles and climate change (Polasky *et al*., 2005).

Conservation of biological diversity is essential for the survival of the human race, Earlier, conservation was limited to saving biodiversity, species focused conservation efforts are essential, but they must be complemented by efforts to conserve habitats and ecosystem in natural or semi-natural states. Conservation of habitat and biodiversity sustainable management and development in Thar Desert and this will not achieve without people support and cooperation. (Khan and Singh, 2012).

Ethno-botany is a distinct branch of natural science dealing with various aspects such as medicine, religious, cultural, agriculture instruments, household implements and several other disciplines (Patel and Patel, 2013).

The tribal's who depend on forest (mostly their surrounding vegetation) wealth are the real custodians that safeguard the medicinal plants till now (Jeph, 2007). Rapid deforestation caused by over harvesting and exploitation trade of medicinal plants has significantly reduced the availability of the medicinal plants in arid and semi-arid regions of Rajasthan (Harsha *et al*., 2002).

Ethno-botanical approaches are significant in highlighting locally important plant species, particularly for new crude drug sources. The use of plants as medicine is slowly increasing in the developed world because they have minor or no side effects (Amjad *et al*., 2015). Today the field of ethno-botany requires as a variety of skills. Botanical training for the identification and preservation of plant specimens, anthropological training to understand the cultural concepts around the perception of plants, linguistic training, at least enough to transcribe local terms and understand native morphology, syntax and semantics. Native healers are often reluctant to accurately share their knowledge to outside (Choudhary *et al*., 2008).

Traditional medicine is a significant element in the cultural patrimony and is an important part of the rural. It

is of critical importance in poor communities, where even relatively cheap western medicines remain prohibitively expensive. The World Health Organization (WHO) estimates that up to 80% of the world's people rely on plants for their primary health care. Since western pharmaceuticals are often expensive inaccessible or unsuitable (Diame, 2010).

The system of medicine practiced by the traditional folk healers and medicine men has been called as the "Folklore Medicine" which is also a part of the "Traditional Medicine" practiced in India in the name of "Ayurveda" and "Sidha" and in other names in various part of world (Katewa and Jain, 2006).

Rajasthan is rich in biodiversity which has a great economic valve, Out of the total land area of Rajasthan, forest covers only about 37,638 km2, i.e. 11%. This forest includes roughly 7% of depleted and denuded forests. Biodiversity of Rajasthan is related with the Aravali hills. *Anogeissus pendula Edgew.* Forest covers more than half of the total forest area in the state. These forests occur on a variety of rock formation. Conservation of medicinal plants is receiving increased attention in view of resurgence of interest in herbal medicine for healthcare all across the globe. (Sharma and Kumar, 2013).

Temperature are scorching beginnings almost during mid march and ending with monsoon rains. The mean daily maximum temperature in may is 40.6˚C and mean daily minimum is 25.8˚C. After mid November both day and night temperature drop rapidly till January which is the coldest month with the daily mean maximum temperature at 22.0˚C. and minimum temperature at 8.3˚C**.** Humidity is generally over 60% and in the summers is minimum as 15 to 21%. In the rest of the year the air is day. Winds are generally light to moderate but in summer and the early South-West monsoon season, windy may strengthen on some days, south westerly prevail in the south-west monsoon season (Sharma and Kumar, 2013).

Study Area

Fig. 01 Location Map of Study Area

Thar Desert is unique both from floristic and climatic point of view. It assumes special significance since the biodiversity in this zone survives in a very fragile ecosystem under a highly hostile environment (Khan *et al*., 2012).

Jhunjhunu District is located at North-Eastern part of Rajasthan State and lies between $27^{o}38'$ and $28^{o}31'$ North latitudes and $75^{o}02'$ and $76^{o}06'$ East longitudes and covers 5928 Km^{2} of geographical area. It is drained mainly by Katli Rivers, Singhana River, Budhi Nala and River. All the rivers /nalas are ephemeral in nature and flows in response to heavy precipitation during monsoon. Being a desertic terrain particularly in North-Eastern and North part of district has inland drainage. The climate of the district can be classified as semi-arid. It is characteristics by very hot summers and very cold winters with poor rainfall during South-West monsoon period. In May and June, the maximum temperature may sometimes goes up to $48^{o}C$. The potential evapotranspiration rates are quite high especially during May and June (Anonymous, 2008).

Climate

Jhunjhunu District is very hot in summer. The everage temperature during summer between 24˚ C to 46˚ C. Average temperature of January is 15˚ C, February is 18˚ C, March is 25˚ C, April is 31˚ C , May is 36˚ C (Kumari and Gupta, 2015).

Rainfall

The normal annual rainfall of the district varied from 399 mm in 26 rainy days at Jhunjhunu and seasonal rainfall is 348 mm in 20 seasonal rainy days at Jhunjhunu (Rao *et al*., 2012).

The present study will be conducted at surrounding villages of Jhunjhunu City. Jhunjhunu Beed is the conserve

area which is situated 1K.m. far from Jhunjhunu City in east side at Jaipur-Pilani highway. The total area of Jhunjhunu Beed is 1047.48 Hectare. It is declared a conservation desert by the state Government's notification vide F3 (47) VAN/2008 Date 09-03-2012. This reserve area is the heart or lungs of Jhunjhunu City due to having near by location to headquarter. The major soil types of the area are sand, sandy and salt affected black soil. The Beed area is home to more than hundred species of plants most of which are representative of arid and semi-arid vegetation types of Western India. The main plant species include *Salvadora oleoides, S. persica, Prosopis cineraria, Acacia tortilis, A. leucophloea, Maytenus sps., Opuntia sps., Tephrosia purpurea, Aerva persica, Cenchrus ciliaris, C. sagittarius, Tribulus terrestris*, etc. Due to absence of sewage treatment plant in Jhunjhunu city, the city sewage is channel towards the Beed, as a result, a wetland is formed inside the Beed area and this is very much effecting the native vegetation. (Anonymous, 2015).

II. IMPORTANCE OF PROPOSED RESEARCH WORK

Conservation assessments are used to determine a threat rating for species, i.e. to find out if they are under threat due to factors such as habitat destruction, over-harvesting or climatic change. These assessments are then added to the world conservation union (IUCN) Red List of Threatened species, which is a very important resource used by governments and non-governmental organization (NGO) world wide, to help determine conservation priorities (Cook,1996).

Species conservation is the motivation here is primarily ethical and socio-cultural. The fascination for all things that are rare or endangered is a basic human trait. Biodiversity can also be compared with art many people suffer emotionally and intellectually it deprived of any form of art. The same is true when people are faced with the loss of an enigmatic plant species threatened by extinction (Duelli *et al*., 2007).

The medicinal plants of the region are utilized by the local inhabitants as well as in indigenous system of medicine. In last few decades, there is growing demand of medicinal plants by pharmaceutical companies. This increasing demand if properly utilize can help in boosting the village economy as well as will open new avenues of employment. The per hectare income generated from growing medicinal plant is much more than any other crop. However it depends upon the quality and market demand of the concerned species.

On the other side, the lands which are not suitable for other crop cultivation may be utilized for cultivation of species which is suitable to that habitat. Even the wastelands and other areas lying unused around the villages can also be utilized for it.

In present study effective attempts will be made to study the biodiversity, their conservation strategies, phyto-taxonomic, ethno-medicinal plants and endangered plants and to suggest some measures to conserve them. The immense medicinal value of selected plant species shows that they can be utilized in drug and pharmaceutical industries. The demand of these drug yielding plants is increasing day by day.

III. REVIEW OF LITERATURE

National Status

India's location is at a Junction of three bio-geographic realms namely Afro-Tropical, Indo-Malyayan and Paleo-Arctic. It harbours about 9% of the total species of the world. India, having 2.4% of global area, exhibits 12.5% of floral diversity. India has about 48,000 species of plants representing about 10% of the world's flora (Hajra and Mudgal, 1797).

India is one of the world's 12 biodiversity centers with presence of over 45,000 different plant species of these about 15000-20000 plants have good medicinal value. However, only 7,000- 7,500 species are used for their medicinal values by traditional communities (Subbu and Prabha, 2009).

In India much literature, relevant to ethno-botany can be traced in the vedic literature, Charka and Shusruta and Charka Samhita appeared as the most important works. A large portion of this county was covered with forest which yielded a number of medicinal plants. These plants were initiated extensively in Ayurvedic system of medicine since many centuries (Choudhary *et al*., 2008).

There is a strong fear that some of these plant species might be actually facing a serious threat of extinction out of more than 600 taxa of Indian plants included in The Red Data Book of Indian plants around 70 have known medicinal usage. FRLHT'S (foundation for revitalization of local health tradition) rapid threat assessment exercises, using the latest IUCN Red list criteria and categories have resulted in assessment of around 265 wild medicinal plants species as threatened (critically endangered or vulnerable) in different region in India itself (Bajpai *et al*., 2013)

International Status

The present biodiversity on our earth is the result of 4 billion years of evolution. Approximately, about 600 million years ago, all life consisted of single celled organism after which every phylum of multi cellular organism first appeared. It is estimated that the present global macro-scopic species diversity various from 2 million to 100 million, with a best estimate of somewhere about 13-14 million. New species are regularly discovered and many though discovered, are not classified (Davis and Cornwell, 2006).

The western region of Ghana the 94 species in the Biosphere reserve, 32 had therapeutic indication or had

medicinal values, which crosses ponds to 34% of the total number of species encountered. This number of medicinal species recorded may seem low but it rather gives a very good and important indication that may more medicinal plants may exist in the biosphere reserve. These medicinal plant cited are not sourced from this particular reserve but were rather derived from other sources like farms, village peripheries and others nearby forests and ecosystems surrounding the area of the study. This implies that the low number of medicinal species may not be attributed to over harvesting or over exploitation. This is because no entering is allowed into the forest and when entry is permitted, nothing is allowed to be taken out. This information contributes to the importance and justification for continual conservation and protection of the biosphere reserve. (Diame, 2010)

Today, new important anti-Infective medicines are being discovered from microbes, plant sources, example, the anti-malarial agent, Artemisinin, is isolate from the Chinese medicinal plant *Artemesia annua*, it is particularly effective for the deadly Cerebral malaria (Kumari *et al*., 2011).

It has been recorded that more than 3,000 different plant species are used for traditional medicine in Ghana. In this study, a total of 126 medicinal plants species that are used for reproductive health was recorded (Dokosi, 1969).

Breast cancer is one of the cancers effecting women, contributing largely to poor reproductive health especially in Africa and the world as a whole. In study, 28 species were claimed to either cure or manage breast cancer, out of which *Kigelia africana* and *Spathodea campanulata* were cited as the most frequently used (23.53%) species. (Diame, 2007).

Morinda lucida was one of the most frequently used species for menstrual disorders and this confirms the use of this species as reported. *Paullinia pinnata* which was one of the most frequently cited species for infertility in females has been earlier reported. *Ficus capensis* has been reported as being used to correct lactation Failure (Irvine, 1961). *Euphorbia hirta* is also use in lactation. (Mshana *et al.,* 2000). *Jatropha curcas and Carica papaya* had been recorded for abortion (Irvine, 1961).

Momordica charantia was most frequently used species for STDs specially gonorrhoea (Diame, 2007). Another most frequently used species was *Rauwolfia vomitoria* for gonorrhoea (Irvine, 1961). Leaves of *Ceiba pentandra* is also used for gonorrhoea and syphilis (Idu *et al*., 2005). *Alchornea cordifolia* is also used for hernia. (Mshana *et al*., 2000).

Spathodea companulata has been used for treating skin ulcers and others skin disease. Further stressed the use of *Alchornea cordifolia* for urethral discharge (Irvine 1961).

IV. HYPOTHESIS/OBJECTIVES

The main objectives of the proposed study are as follow:

1. To know prevailing plant diversity of study area and classify the plants species into their respective families.
2. To Study the medicinal properties of native plants traditionally used by local people, To collect information related to ethno medicinal aspects form local, tribal communities and experts of Ayurved.
3. To know about the genesis of the herbal treatment like, mode of treatment; preparation of drug; doses and extraction of drug.
4. To study the Impact of human being on native plants.
5. To observe the eco-climatic condition of the study area.
6. Analyses of the physico-chemical properties of soil.

V. METHODOLOGY

Intensive exploration trips will be conducted to document plants and to know prevailing biodiversity. Plants samples will be collected randomly from different area and kept in polythene and prepare Herbarium sheet with labeled. The collected specimens will identify taxonomically with the help of the flora of India (Sharma and Balakrishnan, 1996; Sharma and Tiagi, 1979) and monograph (Bhandri, 1990) and also with the help of standard keys. The plant species will be collected in their flowering, fruiting or at their fully mature stage. The field survey will be done in every month. Plant species will be also identified with the help of herbarium of Rajasthan University, Jaipur, BSI, Jodhpur, IBS, New Delhi and also by local inhabitants. Medicinal plants will be identified by meeting and contacting, discussion and interviews with villagers, folk, healers, vaids, hakims, homeopath and other practitioner in traditional medicine and also by questionnaires with surrounding people of study area.

Physico-chemical properties of soil samples will be analysed of different area. Soil sample will be collected from surface area and depth (22-45cm) of soil and packed in polythene bags and will be brought to the laboratory for analysis. The year round physico-chemical characters like, pH, maximum water holding capacity, electrical conductivity, available nitrogen, available phosphate, available potassium as per standard methods.

Eco-climatic data (Temperature, Rainfall and Relative humidity will be measured as per standard method.

VI. CHAPTER-WISE DETAILS OF PROPOSED RESEARCH

Contents

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1.2 Loss of diversity

1.3 Conservation of diversity

1.4 Ethno-medicinal aspects of diversity

2. Chapter-2

2.0 Review of Literature

2.1 National status

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3. Chapter-3

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4. Chapter-4

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4.1 Analysis of soil

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4.5 Electrical Conductivity

4.6 pH

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5.0 Introduction

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6. Chapter-6

6.0 Introduction of Biotic Interference.

6.1 Cause of Destruction

6.2 Strategy for Conservation

7. Chapter-7

Summary

8. Chapter-8

Result & Discussion

9. Chapter-9

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