# Ritual Plants Used by Indigenous and Ethnic Societies of District Banswara (South Rajasthan), India

# Shafkat Rana<sup>1</sup>, Dilip Kumar Sharma\*<sup>2</sup> and PP Paliwal<sup>1</sup>

<sup>1</sup>P.G. Department of Botany, S.G.G. Government College, Banswara-327001 Rajasthan, India

# **ABSTRACT**

Rajasthan is one of the largest states located in the North-western part of India. The southern part of Rajasthan state comprises of a large population of tribal communities belonging to various ethnic groups. The tribal community believe that some Gods and deities can be welcomed by some special plants or their parts. So they conserve some plant species due to the traditional ritual ceremonies. These forest dwellers live in forests and possess a vast knowledge on various aspects of plants. An extensive survey of a few tehsils of Banswara was documented to the traditional knowledge of plants used by tribal communities. Tribals like Ninama, Nanoma, Damor, Garasia, Bhagora, Charpota, Singada and Katara are residing in the area. These people have strong traditions, cultural activities, beliefs, taboos, totems, performing religious rituals and valuable information about properties and medicinal uses of plants. Different parts of plant (roots, stem, leaves, bark, fruits, seeds, bulb, etc.) or the whole plant/herb is used for the said purpose of rituals and ceremonies. In this study deals with the documents of 36 plant species used by the rural people of South Rajasthan in ritual ceremonies are reported. Out of 36 plants studied, 31 species belonging to dicotyledons and 05 to monocotyledons, under 32 genera being used traditionally by the tribals.

**Keywords-** Ethnobotany, Indigenous knowledge, Ritual ceremonies, Tribals of Banswara, Natural conservation, Southern Rajasthan.

# INTRODUCTION

India is one of the important biodiversity centers with presence of over 45000 different plant species. Of these, about 15000-20000 plants have good medicinal value. However, only 7000-7500 species are used for their medicinal values by traditional communities<sup>1</sup>. India is a country with the strongest traditions of

ISSN: 2348-9502

Page 26 www.ajethno.com

<sup>&</sup>lt;sup>2</sup>Vardhaman Mahaveer Open University, Kota, Rajasthan, India

<sup>\*</sup>Corresponding author e-mail: <a href="mailto:drdilipsharma12@gmail.com">drdilipsharma12@gmail.com</a>

conservation of nature and land of diverse natural resources. Since time immemorial, conservation of natural resources has been an integral aspect of many indigenous communities all over the world. India has suffered an almost unabated devastation of its natural biological heritage and much of what remains has been preserved through the ages because of a host of conservationsocio-cultural and religious oriented traditions. These tribes move around the forest for their day-to-day requirements, cultural activities, beliefs, taboos, totems and performing religious rituals. These people are largely dependent on their traditional system for their information is passed on from generation to generation through the word of mouth. India has suffered an almost unabated devastation of its natural biological heritage and remains conservation-oriented socio-cultural religious traditions.

The significant tradition of nature conservation is to dedicating patches of forests or groves to some deities and spirits by tribal and rural peoples or sometimes conservation of the rituals. The indigenous people are illiterate but have scrupulously nurtured their traditional customs, folklores, ceremonies and a way of forest life through folk beliefs. Since the Vedic times, the human race has used various plants for ritual purposes. The tribals of South Rajasthan believe that certain plants have good omen characters and some others are ominous. As such, the good omen plants are scared, used in worship and offered to God. They also use them in their social ceremonies to keep themselves fit and prosperous. Very little work has been done on such plants in district Banswara of South Rajasthan. However, ethno-botanical and ethno-medicinal aspects have drawn the attention of several workers in South Rajasthan<sup>2-14</sup>. The Banswara is well known for its scenic beauty, high tribal density, fascinating culture and tradition based on intricate relationship with the

nature. These tribes move around the forest for their day-to-day requirements, cultural activities, beliefs, taboos, totems and performing religious rituals. With this realisation, the recent upsurge of interests in studying rituals or medicinal plants.

A significant contribution has been made by several workers on the ethnobiology from various part of world viz. Meghalaya<sup>15</sup>, Arunachal Pradesh<sup>16</sup>, Bahrain<sup>17</sup>, Nepal<sup>18</sup>, Biligiri Rangan Hills<sup>19, 20</sup> including India<sup>21</sup>. In Rajasthan Ethnobotanical studies have been carried out by several scientists from different parts of the state namely Alwar<sup>22</sup>, Mt Abu<sup>23</sup>, Udaipur<sup>24</sup>, Eastern Rajasthan<sup>26</sup>, Aravalli hills of Rajasthan<sup>27</sup> and Hadoti Plateau SE Rajasthan<sup>28</sup>

### STUDY AREA

Rajasthan is one of the largest states located in the Northwestern part of India (Figure 1). Geographically, it lies between 23°3' to 30°12' longitudes and 69°30' to 78°17' latitudes. Southern part of Rajasthan comprising Banswara, Chittorgarh, Dungarpur and Udaipur districts is the tribal belt. The study area, Banswara district is located in southern Rajasthan with an area of 5,037 square kilometres (1,945 sq mile) in between 23.11° N to 23.56° N latitudes and 73.58° E to 74.49° E longitudes (Figure 2).

The region represents a rugged terrain undulated by short ridges at west. The eastern part of the district is occupied by flat-topped hills of the Deccan trap. The district has the southern end of the Aravali Mountains, the drainage system belongs to the Mahi river and its main tributaries are Anas, Chap, Erav, Hiran and Kagdi. Banswara has plenty of rainfall and on the whole has a salubrious climate. Banswara has high varied physiographic from plateau lands to hilly tracts. Due to heavy rainfall (averaging around 1000 mm per annum)

with plenty of humidity, it becomes one of the richest spot for the growth of varied vegetation includes variety of trees, shrubs, herbs, climbers and grasses. The subtropical evergreen forest of Banswara consists of mixed tree growth with *Tectona grandis* L. f. nom cons. as a predominant species followed by *Anogeissus latifolia* (Rxb. ex DC.) Wall. Ex Guill & Perr., *Diospyros melanoxylon* L. Roxb., *Madhuca indica* J.F. Gmelin, *Dendrocalamus strictus* (Roxb.) Nees. and *Ficus religiosa* L. in this region.

On account of the district's unique location character, an overwhelming majority of tribals, the forest-fringe villages not only depend on the surrounding medicinal plants for home remedies but also protect these plants through village sacred groves and uses in rituals.

# **METHODOLOGY**

The proposed study was based on personal interviews of various groups like village headman, spiritual leader, priest; teachers etc. of tehsil Ghatol, Bagidora, Kushalgarh, Garhi, Anandpuri and Aspur (District Banswara and Dungarpur) who could give correct information and mode of uses. The field tours for study were made at regular intervals in years 2011-2013 in order to cover the tribal areas in different seasons to collect the maximum information at the time of marriage ceremonies, local fairs at Ghotia Amba, VEneneshwar and Local HAATS. The data obtained in local language (Baagri) collected questionnaire from different localities and villages was compared and cross linked so as to ascertain their validity and integrity. During the study, daily activities were closely observed and interpersonal contacts on different rituals ceremonies established by participating in several social and religious ceremonies. The collected specimens were identified taxonomically with the help of Flora of India<sup>20</sup>, Flora of Indian Desert<sup>23</sup>, Flora of North East Rajasthan30, Flora of Upper Gangetic Plain and the Adjacent Siwalic and Sub Himalaya Tract<sup>31</sup>. The verification and authentification of collected data were made in the light of standard literature<sup>32, 33</sup>. In the course investigation two years, the three sacred groves were surveyed. Identification of plants was done on the basis of for local uses, a cross discussion of tribals were interviewed and cross interviewed for final conclusion of study.

# **DISCUSSION**

In the present study of district Banswara (Rajasthan) documented of 36 plant species used by the rural people in ritual ceremonies are reported. Out of 36 plants studied, 31 species belonging to dicotyledons and 05 to monocotyledons, under 32 genera being used traditionally by the tribals (Table 1). To prevent the damaging habitat fast regenerative capacity is needed. So there a great need to in dulge in the doctrine of development through conservation which will lead to development without causing any harm to the resources thus leading to conservation<sup>35</sup>. Many plants species are utilised by Tribals in different Traditional Magico-religious. Plants ways but this does not affect their conservational aspects<sup>12,13,35-37</sup>. Like all other indigenous tribal communities, tribes of Banswara Damor, Garasia, Ninama, Bhagora, Katarahavea close association with nature have developed an indigenous knowledge of environmental protection as well as biodiversity conservation. Various cultural and religious rites and rituals are performed except for medicinal purpose; none of the plant species is harmed in any way<sup>38, 39</sup>. It was observed in this study that different parts of plant (roots, stem, leaves, bark, fruits, seeds, bulb, or their extracts or by-products etc.) or the whole

plant is used as various cultural, religious rites and rituals purpose.

It was also reported that these plants or plant parts used in various cultural and religious rites and rituals are of medicinal uses also and tribals try to live in contacts of these plants for their better health as well the spiritual promotions. The use of such plants in ethnomedicine was reported previously<sup>40</sup>, <sup>41</sup>. The conservation and protection of medicinal plants against over exploitation by domestic and foreign commercial interest without benefits accruing to the nation are clearly our priorities<sup>42</sup>. The uses of such plants in various cultural and religious rites and rituals are a mode of conservation of natural wealth of earth. As we are trying to conserve by different ways as in situ, botanical gardens, germplasm banks etc<sup>43-46</sup>. The present note is prescribed here to focus on good omen plants.

# **CONCLUSION**

Various religious beliefs and myths are attributed to conserve the biodiversity of the region. Tribal communities of Banswara have a cultural ecological heritage in the form of this in-situ conservation practice, the knowledge of which needs to be preserved and appreciated. Their presence in agricultural lands; grazing, fragmentation of the grove-owning families and erosion of cultural and religious beliefs and taboos are the major reasons. Therefore, there is an urgent need not only to protect rare, endangered and medicinal plants, but also to revive and reinvent such traditional practice of nature conservation and environmental management.

### **ACKNOWLEDGEMENT**

Authors are grateful to Prof. B.L. Chaudhary, Ex-Vice Chancellor, M.L.S. University, Udaipur, Rajasthan for their constant help throughout the progress of this work. We are also thankful to Prof. Ashok

Sharma, vice-chancellor, VMOU, Kota, Prof. RS Khangrot, Principal, Agrawal P.G. College, Jaipur and P.G. Department of Botany, Shri Govind Guru Government College, Banswara (Rajasthan) for valuable support and academic guidance. Authors are highly thankful to the traditional knowledge and technical assistance provided by Sh. Bhoodeo Bhatt, villagers of area especially Sh. Mavji, Sh. Partha, Sh. Maniya, Sh. Kodarmalji, Sh. Nathu and Sh. Prabhu and forest officials during the course of studies.

# REFERENCES

- Subbu, R.R. and Prabha, A.C. (2009). Medicinal plant diversity of Virudhnagar district, Tamil Nadu. *Current Biotica*, 3(3): 373-385.
- 2. Joshi, P. (1995). Ethnobotany of the primitive tribes in Rajasthan. Printwell publishers, Jaipur, pp- 313.
- 3. Katewa, S.S. and Guria, B.D. (1997). Ethnomedicinal observations on certain wild plants from southern Aravalli hills in Rajasthan. *Vasundhara*, 85-88.
- 4. Sinha, S. (1999). Ethnobotanical and biodiversity studies of plants used in traditional medicines in Jaipur (Rajasthan), Ph.D. Thesis, University of Rajasthan, Jaipur.
- 5. Katewa, S.S. and Galav, P.K. (2005). Traditional herbal medicines from Shekhawati region of Rajasthan. *Indian Journal Traditional Knowledge*, 4(3): 237-245
- 6. Katewa, S.S. (2009). Indigenous people and forests: Perspectives of an Ethnobotanical study from Rajasthan (India)-Herbal Drugs: *Ethnomedicine to Modern Medicine* (Springer, Berlin), 33-56.
- 7. Meena, K.L. and Yadav, B.L. (2010). Some traditional ethnomedicinal plants of Southern Rajasthan. *Indian Journal of Traditional Knowledge*, 9(3): 471-474.
- 8. Sharma, L. and Khandelwal, S. (2010). Traditional uses of plants as cooling agents by the tribal and traditional communities of Dang region in Rajasthan, India. *Ethnobotanical Leaflets*, 14: 218-224.

- 9. Rana, S., Sharma, D.K., Paliwal, P.P. and Nandini Sharma (2014). Ethno-medicinal explorations of some important plants of district Banswara (South Rajasthan) used by tribal community. *International Journal of Bioassays*, 3 (2): 1729-1733.
- 10. Sai Krishna, G., Bhavani Ramesh, T. and Prem Kumar, P. (2014). "Tulsi" the wonder herb (pharmacological activities of *Ocimum sanctum*) *American Journal of Ethnomedicine*, 1(1): 089-095
- Dutta, A., Lal, N., Naaz, M., Ghosh, A. and Verma, R. (2014). Ethnological and ethnomedicinal importance of *Aegle marmelos* (L.) Corr (Bael) among indigenous people of India. *American Journal of Ethnomedicine*, 1(5): 290-312.
- 12. Ahirwar, R.K. (2015a). Diversity of ethnomedicinal plants in Borid and forest of district Korea, Chhattisgarh, India. *American Journal of Plant Sciences*, 6: 413-425. http://dx.doi.org/10.4236/ajps. 2015. 62047.
- 13. Ahirwar, R.K. (2015b). Indigenous knowledge of traditional magico-religious beliefs plants of district Anuppur, Madhya Pradesh India. *American Journal of Ethnomedicine*, 2(2):103-109.
- 14. Arulappan, M.T., Britto, S.J., Ruckmani, K. and Kumar, R.M. (2015). An Ethnobotanical study of medicinal plants used by ethnic people in Gingee Hills, Villupuram district, Tamilnadu, India. *American Journal of Ethnomedicine*, 2(2):084-102.
- Rao, R.R. (1981). Ethnobotany of Meghalaya: Medicinal plants used by Khasi and Garo tribes. *Economic Botany*, 35(4):1-9.
- 16. Gangwar, A.K. Ramakrishnan, P.S. (1990). Ethnobiological notes on some tribes of Arunachal Pradesh, Northeast India. *Economic Botany*, 44: 94-105.
- 17. Abbas, J.A., El-Oqlash, A.A., Mahasneh, A.M. (1992). Herbal plants in the traditional medicine of Bahrain. *Economic Botany*, 46:153.
- 18. Mannandher, N.P. (1995). An inventory of some herbal drugs of Myagdi district Nepal. *Economic Botany*, 49(4): 371-379.
- 19. Hedge, R., Suryaprakash, S., Achoth, L., Bawa, K.S. (1996). Extraction of non-timber

- forest products in the forest of Biligiri Rangan Hills India-1 contribution to rural income. *Econnomic Botany*, 50: 243.
- 20. Sharma, B.D. and Balakrishanan, N.P. (1993). Flora of India (Vol. 1-4). *Botanical Survey of India*, Calcutta.
- 21. Jain, S.K. (1975). Medicinal Plants (2<sup>nd</sup> Edn.). *National book trust of India*, New Delhi.
- 22. Singh, G.S. (1999). A contribution of ethnomedicine of Alwar district of Rajasthan. *Ethnobotany*, 11:97.
- 23. Sebastian, M.K. and Bhandari, M.M. (1984). Medicoethnobotany of Mt Abu, Rajasthan. *Journal Ethnopharmacol*, 12: 233.
- 24. Sebastian, M.K., Bhandari, M.M. (1988). Medicinal plant lore of Udaipur district Rajasthan. Bull Med Ethnobot Res, 5(3-4): 133.
- 25. Katewa, S.S., Arora, A. (1997). Some plants of folk medicine of Udaipur district, Rajasthan. *Ethnobotany*, 9:48.
- 26. Singh, V. and Panday, R.P. (1980). Medicinal plant lore of the tribals of eastern Rajasthan. *Journal Economic Taxon Bot*, 1:137.
- 27. Katewa, S.S., Chaudhary, B.L., Jain, A. and Galav, P.K. (2003). Traditional uses of plant biodiversity from Aravalli hills of Rajasthan. *Indian J Traditional Knowledge*, 2:1.
- 28. Sharma, N.K. (2002). Ethno-medicoreligious plants of Hadoti Plateau (SE Rajasthan)-A Preliminary Survey. In: Ethnobotany, edited by PC Trivedi, (Aavishkar Publishers & Distributors, Jaipur).
- 29. Bhandari, M.M. (1990). Flora of Indian desert, MPS Repros, Jodhpur.
- 30. Sharma, S. and Tiagi, B. (1979). Flora of North East Rajasthan. *Kalyani Publication, New Delhi*.
- 31. Duthie, J.F. (1903-1929). Flora of Upper Gangetic Plain and of the Adjacent Siwalik and Sub- Himalyan tracts. Calcutta. 3 vols. Hooker, J.D. (1872-1897). The Flora of British
- 32. Jain, S.K. (1963). Studies in Indian Ethnobotany-I, Plants used in medicine by tribals of Madhya Pradesh. *Bull Res Jammu*, 1: 126-128.

- 33. Jain, S.K. (1991). Dictionary of Indian folk medicines and ethnobotany. *Deep Publication, New Delhi*.
- 34. Chopra, R.N. (1982). Indigenous Drugs of India. *Academic Publication, New Delhi*.
- 35. Sexena, H.O. (1986). Observations on the Ethnobotany of Madhya Pradesh. *Bull. Bot. Surv. India*, 28:149-156.
- 36. Singh, N.P., Khanna, K.K., Mudgal, V. and Dixit, R.D. (2001). Flora of Madhya Pradesh (vol. 3). *Botanical survey of India*.
- 37. Verma, P., Khan, A.A. and Singh, K.K. (1995). Traditional phytotherapy among the Baiga Tribe of Shahdol District of Madhya Pradesh, India. *Ethnobotany*, 7: 69-73.
- 38. Jeeva, S., Mishra, B.P., Venugopal, N. and Laloo, R.C. (2005). Sacred forests: Traditional ecological heritage in Meghalaya. *J Scott Res Forum*, 1: 93-97.
- 39. Jeeva, S., Mishra, B.P., Venugopal, N., Kharlukhi, L. and Laloo, R.C. (2006). Traditional knowledge and biodiversity conservation in the sacred groves of Meghalaya. *Indian Journal of traditional knowledge*, 5(4): 563-568.
- 40. Rai, R. (2007). Some traditional medicinal plants used for cold, cough and fever by tribal of Bastar (Chhattisgarh). *Journal of Indian Botanical Society*, 86(1-2): 27-36.

- 41. Sen, A. and Batra, A. (2008). Economically important plant system: *Melia azedarach* L. and its biotechnological approaches. In: National Seminar on Biotechnology in sustainable Agriculture and Environment Management, Jaipur, pp-84.
- 42. Natesh, S. and Mohan Ram, H.Y. (1999). An update of green medicine. *Journal of Indian Botanical Society*, 78: 13-23.
- 43. Borthakur, S.K. (1981). Native phytotherapy for child and woman diseases from Assam in dye stuffs. *Glimpses of Indian Ethnobotany* pp-182-190.
- 44. Negi, K.S., Tiwari, J.K., Gour, R.D. and Pant, K.C. (1993). Notes on ethnobotany of five districts of Garhwal Himalaya, Uttar Pradesh. India. *Ethnobotany*, 5: 73-81.
- 45. Rana, T.S., Bhasker, D. and Rao, R.R. (1994). Strategies for sustainable utilisation of plant resources by the tribals of the Tona valley, western Himalaya. *Ethnobotany*, 8: 96-104.
- 46. Kapoor, B.B.S., Khatri, J.S., Sudan, S. and Bhumika. (2008). Herbal plants of Rajasthan desert: A good source of anti microbial principles. In National Seminar on conservation and utilization of natural resources and their role in sustainable development, Jhunjhunu pp. 87-90.

 Table 1: List of plant species used in rituals in district Banswara of south Rajasthan

S. No.	Botanical Name	Family	Local Name	Use of Part	Purpose on celebrations
1	Acacia nilotica (L.) Willd.	Mimosaceae	Babuliyo	Whole plant	Used in Havan, aahuti etc.
2	Adansonia digitata L.	Bombacaceae	Gorakh	Whole plant	Holly plant used in worship
3	Aegle marmelos L. Corr.	Rutaceae	Bel	Leaves	Offered to Lord Shiva
4	Annona squamosal L.	Annonaceae	Seetaphal	Leaves and Fruit	Used in Religious ceremonies
5	Annona reticulate L.	Annonaceae	Ramphal	Fruit	Used in Religious and marriage ceremonies
6	Azadirachta indica A. Juss	Meliaceae	Limmro/ Limra	Leaves	Used in Reception
7	Butea monosperma (Lam). Taub	Fabaceaea	Khakhro	Flowers	Used in worship of loard shiva, Holi/Dhulandi festival
8	Calotropis procera (Ait.)Ait. F.	Asclepiadaceae	Aakro	Flowers	Offered to the Lord Shiva and Hanuman
9	Calotropis gigantia (L.)R. Br.	Asclepiadaceae	SafedAakr o	Flowers	Offered to the Lord Shiva and Hanuman
10	Cannabis sativa L.	Cannabinaceae	Bhang	Leaves	Offered to Lord Shiva in festivals
11	Catharanthus roseus (L.) G. Don	Apocyaneceae	Sadabaha r/Barama si	Flowers	Offered to God and godess Laxmi
12	Citrus aurentifolia (Christm.) Swingle	Rutaceae	Limbu/ Neebu	Fruit	Offered in various festivals
13	Cocos nucifera L.	Arecaceae	Nariel	Fruit	Used in many religious and social ceremonies
14	Cucurbita maxima Duch. Ex Lam.	Cucurbitaceae	Kolu	fruit	Sacrifice after worship
15	Curcuma longa L.	Zingiberaceae	Pitti	Rhizome	Marriage ceremony
16	Cynodon dactylon(L.) Pers.	Poaceae	Dub	Leaves	Ritual, offered to lord Ganesh or different deties (Pooja)
17	Datura innoxia Mill.	Solanaceaea	Dhaturo	Flowers	Offered to the lord Shiva
18	Emblica officinalis Gaertn.	Euphorbiaceae	Amrai	Whole plant	Holly tree is worshiped
19	Ficus benghalensis L.	Moraceae	Vadla	Whole plant	Holly tree, worship of hanuman
20	Ficus religiosa L.	Moraceae	Peeplo	Whole plant	Holly tree and ladies worship on the occasion of Sheetla Saptami
21	Hibiscus rosasinensis L.	Malvaceaea	Jassus	Flower	Offered to goddess Kali

		1			
22	Lawsonia inermis L.	Lythraceae	Mehndi	Whole	Marriage and religious
				plant	ceremony
23	<i>Madhuca longifolia</i> (Koen.) Mac Bride	Sapotaceae	Mahudo	Whole	D.P.C. Label
				plant	Religious belief
24	Mangifera indica L.	Anacardiaceae	Ambo/Ke rry	Leaves	In marriage ceremony and
					Festival auspicious, garland
					hung around gate
25	Musa paradisiaca L.	Musaceae	Kelo	Leaves	Ritual
26	<i>Nelumbo nucifera</i> Gaertn.	Nelumbonaceae	Kamaliyo	Flower	Offered to the lord Shiva
27	Nerium indicum Mill.	Apocynaceae	Kaner	Flowers	Used in Festival and Fairs,
					they wear its flowers at
					ears.
28	Ocimum basilicum L.	Lamiaceae	Marva	Whole	Holly plant to pray loard
				plant	Saligram (loard Vishnu)
29	Ocimum tenuiflorum L.	Lamiaceae	Tulsi	Whole	Holly plant, used in fast
				plant	worship of the lord Vishnu
30	Pandanus fascicularis Lam	Pandanaceaea	Kevdo	Leaves	Ladies worship, holly plant
31	Prosopis cineraria (L.) Druce	Fabaceaea	Khejdo	Stem	Used in Havan, aahuti etc.
			-	Whole	
32	Saccharum officinarum L.	Poaceaea	Ganna	Plant/Ste	Holly plant, used in worship
32	Succitarum Ojjicmarum L.	ruaceaea	Garina	m	of goddess Lakshmi
	Saraca indica / Saraca asoca			111	Used in making Toran in
33	(Roxb.) Wilde	Caeselpiniaceae	Asha-Pala	Leaves	marriage ceremony
					Worshiped in various
34	Santalum album L.	Santalaceae	Sandan	Wood	ceremonies
25	6	D. J.P.	NA I T I	Cl.	
35	Sesamum orientale L.	Pedaliaceaea	Meetu Tel	Seeds	Used in Puja and havan
36	Ziziphus mauritiana Lam.	Rhamnaceae	Ber	Leaves	Used in Festival and
					ceremonies



Fig. 1. Location map of rajasthan and district banswara

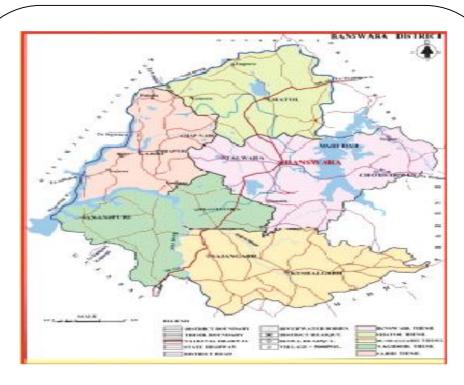


Fig. 2. Location map of study site in district banswara