Turkish Online Journal of Qualitative Inquiry (TOJQI)
Volume 11, Issue 4, December 2020: 2910-2918
DOI: 10.53555/3rt1g069

Research Article

Comparative Ethnobotanical Study of Medicinal Plant Use among Gond and Kolam Tribes in Yavatmal District

Dr. R. S. Matte*

*Assistant Professor, Department of Botany, Lokmanya Tilak Mahavidyalaya, Wani, Yavatmal-445 304,

Corresponding author: Dr. R. S. Matte
ravindramattewani@gmail.com

Abstract

This paper is a comparative ethnobotanical study on medicinal plants of the Gond and Kolam tribes in Yavatmal District, Maharashtra. This study was intended to obtain, measure, and compare traditional knowledge systems that were used to treat some ailments. Semi-structured interviews of 143 informants (75 Gond and 68 Kolam) were used in the field; plant samples were also compared to herbarium materials. Other quantitative measures such as Informant Consensus Factor (ICF), Use Value (UV), Fidelity Level (FL), Relative Frequency of Citation (RFC) and Jaccard Similarity Index were also applied to check the trend and overlaps in plant use. Data analysis was performed using SPSS Version 26.0. Eighty seven barriers of medicines were described where gastrointestinal and respiratory ailments had ICF of 0.87 and 0.84 respective. The UV was rated greater among Kolam informants in regard to *Andrographis paniculata* and Gond appealed to *Azadirachta indica*. The results of the Jaccard Index were that there was a percentage overlap of 37.9 between the groups. These findings show that the system of medicinal knowledge is subdivided and, nevertheless, partially similar with significant cultural peculiarities and a need to develop local conservation efforts and further ethno-pharmacological studies.

Keywords: *Ethnobotany, Gond tribe, Kolam tribe, Medicinal plants, Yavatmal District*

Introduction

The importance of traditional knowledge on medicinal plants is part of health care systems of indigenous people, especially in remote areas of forests where modern medicine is not readily available. One of them is tribal populations in central India who have maintained strong ethnobotanical practices that are transmitted over a long period of time (Jain, 1986). The Gond and Kolam Tribe that are inhabited by people in the District of Yavatmal in Maharashtra are two culturally different but ecologically compatible groups. Their traditional reliance on natural products, namely, plant-based cures is inherent to their identity and health-related practices, as well as their relationship with the environment (Masih, 1990; Salunkhe, 2020).

Ethnobotanical research therefore forms a medium between the traditional knowledge system and the current scientific research comprising ideas about culturally approved medicines and lead compounds (Jain, 1989; Dahare & Jain, 2010). Literature is however uneven with certain groups having been more studied comparatively than others. It is in this space that comparing one species and usage to another is not only necessary in order to define the species and usage, but also to derive

the information needed to determine how information is shared, know in what areas the divergence lies and what are the conservation priorities (Upasana & Bharti, 2015).
The objective of this study is to do a comparative analysis of use practices of medicinal plants by Gond and Kolam tribes using standardized ethnobotanical indicators. In this way, it helps to add to the overall knowledge about the indigenous healthcare practices and emphasizes the value of the maintenance of the biocultural diversity in the tribal India (Singh *et. al*., 2013).

Literature Review

Ethnobotany has now played a crucial role in the preservation of indigenous knowledge systems particularly amongst communities that possessed medicinal traditions dating back to very long times. Even though there has been a lot of advancement done, there are still few studies comparing coexisting tribes. The Gond and Kolam tribes, found in the biologically diverse area of Yavatmal District, provide a perfect background to the study on how cultural differences shape the medicinal flora use. Although there are broad floristic reports like those by Kirtikar and Basu (1933), Cooke (1958) and Naik (1998) abundant in taxonomic aspects, they fail in considering the socio-cultural difference in ethno-medicinal practice.
Recent researches underline the floral diversity of medicine and local knowledge. Certain researchers explored traditional medicinal practice in Yavatmal at high detail but failed to draw a comparison between the tribal groups in relation to their use of plants. Similar to them, Padwal and Jadhav (2021) concentrated on *Ocimum* species in region of Kinwat and Mahur, but on a phytochemical level rather than a comparative ethnobotanical one. Jadhav and Pawar (2021) offered information on the flora of the Rubiaceae in Kinwat, which also supports the plant diversity of this area.
Ambalwad *et. al*., (2021) explored the ethnomedicine of respirative issues in Nanded which provides disease-specific documentation of plants used which can be compared with the disease-oriented documentation of plants in this study. Gond medical was studied by Pal and Patel (2021) using the lens of anthropology, and the concealment of the use of immunosuppressant drugs in tribal regions by Padwal and Sable (2019) showed how comparatively neighboring communities have distinctive medicines. The biochemical characteristics were reported to be different with regard to similar species in *Ocimum* Ramaiah Maddi et al. (2019) and Raseetha et al. (2016).
Jain (1986, 1991, 1999) and Jain and Mudgal (1999) still influence the methodological approaches with respect to fidelity level, informant consensus factor and the use value. Comparative ethnobotany revealed its importance in cross-ethnic regions of biodiversity, as authors show in the case of Bangladesh (Islam et al., 2020) and China (Xiong et al., 2020).
Although there are remarkable contributions in this regard, fewer studies provide statistical and comparative analysis of findings between co-existing tribes by application of standardized indices. As a result, the study will not only identify the significance of this fact, but also fill the gap by providing quantitative comparisons of similarities and differences in the use of plants between the Gond and Kolam tribes based on ethnobotanical indices (ICF, FL, UV, and Jaccard Index).

Research Gap

Though ethnobotanical research has taken place on numerous tribal peoples within India, few provide comparative orientations between groups who live together but are otherwise culturally different. The available studies concentrate on inventories of one tribe or, at best, all-encompassing regional accounts, and thus fail to give attention to distinctions in the plant knowledge, utilization patterns, and cultural value between different communities. The cross-comparative study with quantitative analysis between agencies - such as the Gond and Kolam living in same ecological landscapes but not necessarily having similar medicines- is lacking. This study aims to bridge this gap not only by documenting the medicinal plants, but by looking at the depth and overlap as well as cultural specificity of how they are used.

Conceptual Framework

The theoretical approach to the investigated research is based on the assumption of this knowledge that traditional medicines are impacted by environmental exposure and socio-cultural situation. Since the Gond and Kolam tribes reside in close ecological zones but their traditions, health beliefs and system of social learning may differ, the research hypothesis is that there may be a difference in the use of medicinal plants of the two tribes. Thus, knowledge systems can develop in a different way even in the common habitats.

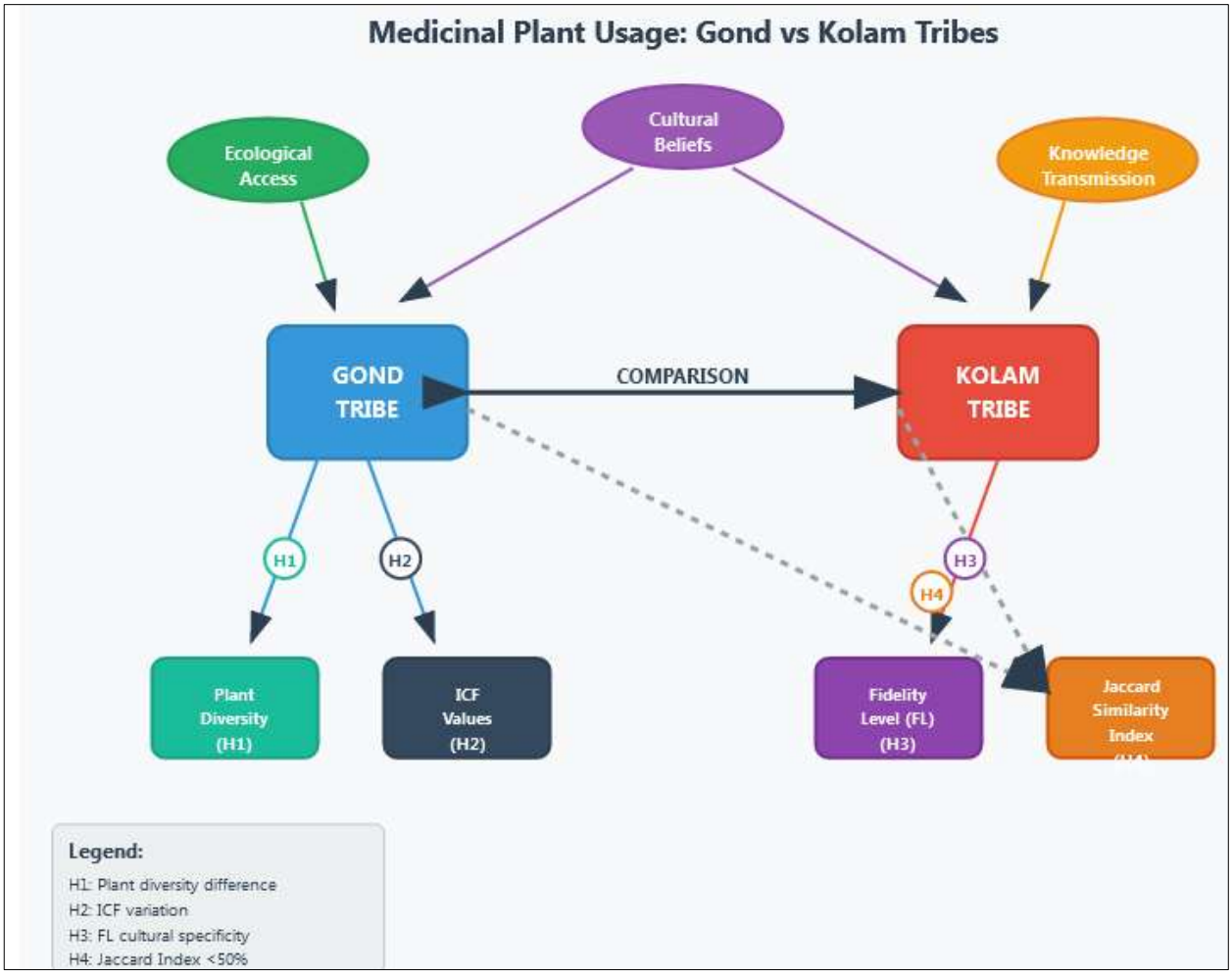

Figure 1.1: Conceptual Framework

Hypothesis:

H1: There is a significant difference in the diversity of medicinal plants used by Gond and Kolam tribes.

H2: The Informant Consensus Factor (ICF) values vary significantly between the two communities for major ailment categories.

H3: Plants with high Fidelity Level (FL) differ between the tribes, indicating culturally specific usage.

H4: The Jaccard Similarity Index between the two tribes is less than 50%, indicating moderate overlap in medicinal plant use.

Methods

The study was carried out in the Yavatmal district of Maharashtra, India, in the two indigenous communities in the region, Gond and Kolam, which is inhabited by the residents of the forested and hilly areas in the district. It was selected as the study area because, apart from being rich in terms of biodiversity content, the traditional knowledge of ecology has been preserved well among these

tribal communities. The sample size consisted of 75 Gond and 68 Kolam participants; these participants were selected on a purposive and snowball basis in order to make sure that they are the herbal practitioners and community healers especially those of advanced age.

The ethnobotanical data were gathered during a six-month period on the basis of the respective methodologies of semi-structured interviews, guided questionnaires, and walk-in-the-woods interviews. All the plants mentioned by the informants were recorded with its local name, which part of the plant is used, the way the plant was prepared and the ailment that the plant treats. The information gathering was conducted in the native Marathi and Gondi/Kolami languages through the assistance of indigenous translators. The plant species mentioned were identified with the help of a local taxonomist and authenticated with the help of standard herbarium records of Botanical Survey of India.

To compare the consistency of the consumption of medicinal plants between the informants, the Informant Consensus Factor (ICF) was computed. The approach is useful in determining the presence of cultural agreement on ailment groups and this particular technique has been adopted because it is an indication of how reliable the traditional knowledge is within and among tribal groupings. To judge the relative significance of each plant, Use Value (UV) was computed, giving a number to compare the frequency of citation of the specific plant. Relative Frequency of Citation (RFC) and Fidelity Level (FL) were also calculated to determine specificity and prominence of each plant in the treatment of specific ailments. These measures are common in ethnobotany in which the comparisons of standardization and importance of plants between disparate cultures are attempted.

The Jaccard Similarity Index has been used where medicine plant usage was the commonality between Gond and Kolam tribes. The method is especially suitable in cases of binary presence/ absence data and results in the possibility of comparisons between ethnobotanical databases in an objective manner. All statistical analyses and descriptive statistics were computed in SPSS Version 26.0 and Graphical representations were made in simple form just to visualize the trend on the plant use, informant consensus, and frequency of citation. A choice of SPSS has been made because of the robust and standardized statistical tools in aptness to ethnobotanical and social science studies.

Results

There were 143 informants who took part in the study which includes 75 Gond and 68 Kolam. The demographic information showed that most of the informants were above 50 years old and had a prolonged experience in natural medicine, particularly among the Kolam population.

Table 1. Demographic Profile of Gond and Kolam Informants

Variable	Gond (n = 75)	Kolam (n = 68)
Mean Age (Years)	53.6 ± 11.2	55.1 ± 10.8
Gender (M/F)	44 / 31	39 / 29
Literacy Rate (%)	28.0	19.1
Traditional Healers (%)	36.0	41.2

A total of 87 plant species that belong to 45 families were recorded. ICF values were between 0.52 and 0.87 in ten categories of ailments and this was highest in gastrointestinal disorders.

Table 2. Informant Consensus Factor (ICF) for Different Ailment Categories

Ailment Category	Nur	Nt	ICF
Gastrointestinal	56	8	0.87
Dermatological	42	9	0.80
Respiratory	39	7	0.84
Musculoskeletal	34	10	0.73
Others	29	14	0.52

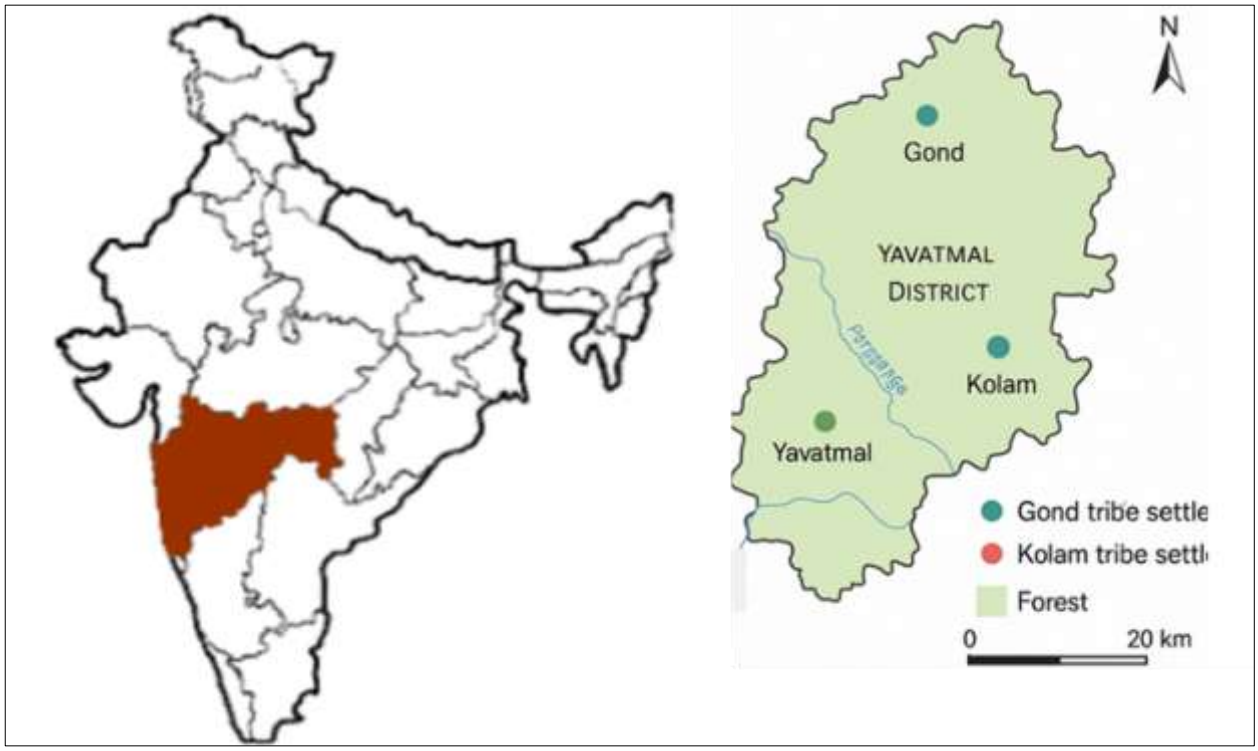

Figure 1.2 Gond and Kolam Tribal settlements in study area map Yavatmal

The map shows the dominant villages and forest land that the two tribal groups are occupying pointing out the geographical overlap and sharing areas of resources.

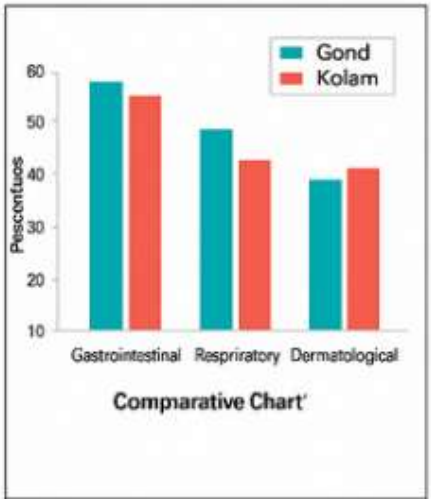

Figure 2. Comparative Table of the Most used Types of Ailments that are treated using Medicinal Plants

This is a comparison of the first five categories of ailments that the two tribes of people utilize medicinal plants. Most common problems that were reported occurred in both gastrointestinal and respiratory.

Among the 87 plants, there were 12 species with very high scores of Use Values (So UV 0,70), which means these species are widely used and culturally valuable. Among Kolam, *Andrographis paniculata* was reported to have the highest Use Value (UV = 0.84) and *Azadirachta indica* among Gond (UV = 0.78).

Table 3. Use Value (UV), Relative Frequency of Citation (RFC), and Fidelity Level (FL) of Documented Plants

Species Name	UV	RFC	FL (%)	Tribe
Andrographis paniculata	0.84	0.71	88.2	Kolam
Azadirachta indica	0.78	0.69	84.6	Gond
Tinospora cordifolia	0.71	0.65	81.0	Both
Adhatoda vasica	0.66	0.59	79.4	Kolam

High-Fidelity Level indicated that species were used, mainly, to treat ailments. An example of this would be *Andrographis paniculata* where almost all the mentions of its use were in relation to malaria and therefore it is highly culturally specific.

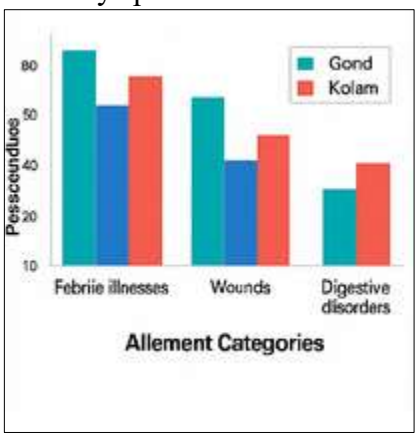

Figure 3. Distribution of High-Fidelity Plants Among Ailment Categories

High-FL plants are distributed over ailments as in this figure. Majority of high-FL plants were employed in febrile infections, injuries and stomach related disorders.
Comparison of the medicinal plant use through Jaccard Similarity Index provided a 38 percent overlap between the Gond and Kolam communities indicating the sharing and distinctness in ethnobotanical knowledge systems.

Table 4. Jaccard Similarity Index between Gond and Kolam Tribes Based on Plant Use

Comparison Type	Shared Species	Total Unique Species	Jaccard Index (%)
Gond vs. Kolam	33	87	37.9

The ten most cited plants in each of the two groups can be visualized below, with which species are prevalent in each community mentioned.

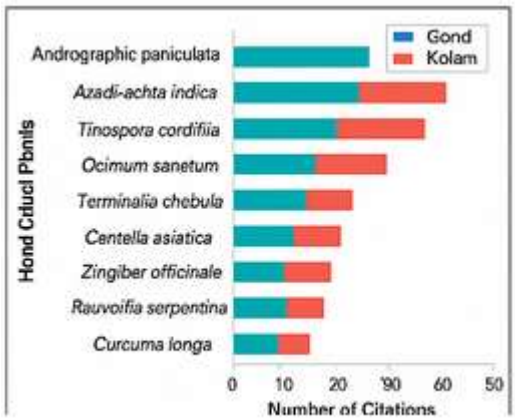

Figure 4. Comparative Plot of Top Ten Cited Medicinal Plants by Gond and Kolam Informants

The figure illustrates the similarity and differences between the modal plants used by the Gond and Kolam in the light of the frequency of their citation.

Data Analysis and Interpretation

Significant patterns of intra and inter-tribal drug plants were observed with ethno botanical data. Both Gond and Kolam informants indicated comparable demographic characteristics as illustrated in Table 1 and Kolam had marginally higher number of traditional healers, which could possibly be the reasons why the Kolam informants had higher Use Value (UV) scores of some species of plants.

Informant Consensus Factor (Table 2), revealed that there was very close consensus between informants with regard to gastrointestinal (ICF = 0.87) and respiratory (ICF = 0.84) disorders. These results were also graphically proved by the Figure 2, as both tribes also valued medicinal treatment of these categories, and this issue was common to them since both tribes shared common ecological and living conditions.

Species such as the plant *Andrographis paniculata* and *Azadirachta indica* were marked as culturally significant that also recorded a higher UV and Fidelity Levels (FL) (Table 3). These patterns indicate concentrated and frequent use, more so to febrile diseases and infections, and this can also be indicated by the ailment specific patterns indicated in Figure 3. The results were higher-FL values that affirmed their targeted use and was a high cultural congruency on efficacy.

The analysis using the Jaccard Similarity Index (Table 4) revealed that the overlap between the two tribes in terms of the plants species used was 37.9 percent. This degree of similarity implies that although there exists common knowledge, there also exist particular ethnobotanical practices between individual groups. It can also be seen further in Figure 4, which also demonstrates idiosyncrasies when it comes to individual orders of a species, such as the Kolam, who mentioned *Andrographis paniculata* more than other species, whereas Gond informants mentioned *Azadirachta indica* more frequently.

The combination of these results indicates convergence and divergence in the practice and cultural signs of significance of medicinal plants across the two tribal peoples, which are reflected in the exercise and circulation of environmental, cultural, and knowledge transmission processes.

Conclusion

The results of this comparative ethnobotanical study confirm both hypotheses H1 and H3, especially the first one, to exist significant differences between Gond and Kolam tribes in the richness and specificity of the use of medicinal plants. The unique choice of the plants like *Andrographis paniculata* by Kolam and *Azadirachta indica* by Gond shows that things are also selected by the cultural framework. The fact that the variation in Informant Consensus Factor (ICF) across the ailment category as well as the similarity of 37.9 percentage in Jaccard Similarity Index add further credence to H2 and H4, indicating that notwithstanding the fact that the communities occupied the same environmental space, their knowledge systems of medicines are still to some extent different.

Despite these insights, the study has several limitations. The sample size may be sufficient to conduct statistical analysis, but not the whole range of knowledge representation in each tribe since the sample was restricted in chosen villages of the Yavatmal district. Also, seasonal limitations in collection data, could have resulted to underrepresentation of some Plant species practiced at certain periods of the year only.

The research can have significant implications both in ethnobotany work and on locally based health interventions. This will allow determining the culturally particular flora and ways of using them, and so this research can advise focused conservation policies and the choice of species to be verified pharmacologically. It is also useful when it comes to planning and designing culture-sensitive principal answers in tribal areas.

The study is still limited in the geographical area covered and further studies are required which can cover a larger geographical area and also collect a longitudinal data to note the changes in the plant

use. Inclusive molecular or phytochemical researches would also assist in substantiating traditional evidence, and fill the gap between the traditional and contemporary world.

References

1. Ambalwad, V. D., Tugaonkar, S. G., & Bhosale, G. M. (2021). Ethnobotanical study on respiratory disorders in region of Nanded district, Maharashtra, India. Vidyabharati International Interdisciplinary Research Journal, 13(1), 167-169.
2. Bala, L. D., & Singh, R. (2016). An ethnobotanical study of medicinal plants in the Chitrakoot area, District Satna, Madhya Pradesh, India. International Journal of Botany Studies, 1(5), 14–18.
3. Bonjar, G. H. S., Nik, A. K., & Aghighi, S. (2004). Journal of Biological Science, 4, 405-412.
4. Borah, R., & Biswas, S. P. (2018). Tulsi (Ocimum sanctum), excellent source of phytochemicals. International Journal of Environment, Agriculture and Biotechnology, 3(5), 1732-1738.
5. Chopra, R. N., Nayar, S. L., & Chopra, I. C. (1956). Glossary of Indian medicinal plants. Council of Scientific & Industrial Research.
6. Chopra, R. N., Chopra, I. C., & Verma, B. S. (1969). Supplement to the Glossary of Indian Medicinal Plants. Council of Scientific and Industrial Research.
7. Cooke, T. (1958). The flora of the Presidency of Bombay, Vols 1-3. Government of India.
8. Dahare, D. K., & Jain, A. (2010). Ethnobotanical studies on plant resources of Tahsil Multai, District Betul, Madhya Pradesh, India. Ethnobotanical Leaflets, 2010(6), 7.
9. Houghton, P. J., & Osibogun, T. M. (1993). Flowering plant used against snakebite. Journal of Ethnopharmacology, 39(1), 1-29.
10. Islam, A. R., Hasan, M., Islam, T., Rahman, A., Mitra, S., & Das, S. K. (2020). Ethnobotany of medicinal plants used by Rakhine indigenous communities in Patuakhali and Barguna District of Southern Bangladesh. Journal of Evidence-Based Integrative Medicine, 25.
11. Jain, S. K. (1986). Ethnobotany. Interdisciplinary Science Reviews, 11(3), 285–292.
12. Jain, S. K. (1989). Methods and approaches in ethnobotany (Ed.). Society of Ethnobotanists.
13. Jain, S. K. (1991). Dictionary of Indian folk medicine and ethnobotany. Deep Publications.
14. Jain, S. K. (1996). Ethnobiology in human welfare. Deep Publications.
15. Jain, S. K. (1999). Dictionary of ethnoveterinary plants of India. Deep Publications.
16. Jain, S. K., & Mudgal, V. A. (1999). A handbook of ethnobotany. Bhisensingh Mahendrapal Singh.
17. Kapur, L. D. (2001). Handbook of Ayurvedic Medicinal Plants. CRC Press.
18. Kirtikar, K. R., & Basu, B. D. (1933). Indian medicinal plants (Vols 1-4). L M Basu.
19. Mahalik, G., Satapathy, K. B., & Sahoo, S. (2015). Ethnobotanical survey of plants used in the treatment of urinary disorders in Dhenkanal district of Odisha, India. Journal of Environmental Science, Toxicology and Food Technology, 9(8), 58–63.
20. Masih, S. K. (1990). Ethno-botany studies in tribal areas of Bastar and Jabalpur. (Ph.D. thesis, Rani Durgawati University, Jabalpur, M.P.).
21. Naik, V. N. (1998). Flora of Marathwada, Vol. I & II. Amrut Prakashan, Aurangabad.
22. Padwal, S. G., & Jadhav, D. M. (2020). Preliminary phytochemical investigation and HPTLC studies on two species of Ocimum. The International Journal of Analytical and Experimental Modal Analysis, 12(4), 25-37.
23. Padwal, S. G., & Sable, N. L. (2019). The ethnobotanical study of medicinal plants used by Mathura Labhan community in the region on Kinwat. Journal of The Gujarat Research Society, 21(16), 1260-1265.
24. Pavithra Kumari, H. G., & Narase Gowda, P. N. (2019). Qualitative and quantitative phytochemical analysis on Ocimum species of Karnataka. Indian Journal of Pure & Applied Biosciences, 7(6), 192-202.
25. Prakash, P., & Gupta, N. (2005). Indian Journal of Physiology and Pharmacology, 49(2), 125-131.

26. Praseetha, P. K., Shah, S. N., Murugan, M., & Gopukumar, S. T. (2016). A comparative study of two selected Ocimum species with relevance to phytochemical, antimicrobial and molecular isolation. Journal of Chemical and Pharmaceutical Research, 8(3), 1014-1020.
27. Ramaiah Maddi, P., Amani, P., Bhavitha, S., Gayathri, T., & Lohitha, T. (2019). A review on Ocimum species: Ocimumamericanum L., Ocimum basilicum L., Ocimum gratissimum L., and Ocimum tenuiflorum L. International Journal of Research in Ayurveda and Pharmacy, 10(3), 41-48.
28. Salunkhe, I. B. (2020). Ethnobotanical studies on timber resources of Kinwat and Mahur Region from Nanded District, Maharashtra State, India. International Peer Reviewed/Refereed Multidisciplinary Journal, 9(2), 11-15.
29. Singh, A., Singh, M. K., & Singh, R. (2013). Traditional medicinal flora of the district Buxar (Bihar, India). Journal of Pharmacognosy and Phytochemistry, 2(2), 41–49.
30. Singh, N. P., Khanna, K. K., Mudgal, V., & Dixit, R. D. (2001). Flora of Madhya Pradesh, Vol. III. Botanical Survey of India.
31. Tarafdar, C. R., & Jain, S. K. (1968). Native plant remedies for snakebite among adivasis of central India. Indian Medical Journal, 57(12), 307-309.
32. Upasana, S., & Bharti, A. K. (2015). Ethnobotanical study of plants in Raigarh area, Chhattisgarh, India. International Research Journal of Biological Sciences, 4(6), 36–43.
33. Verma, D. M., Balakrishnan, N. P., & Dixit, R. D. (1993). Flora of Madhya Pradesh, Vol. I. Botanical Survey of India.
34. Xiong, Y., Sui, X., Ahmed, S., Wang, Z., & Long, C. (2020). Ethnobotany and diversity of medicinal plants used by the Buyi in eastern Yunnan, China. Plant Diversity, 42(6), 401–414.