



“STUDIES ON DYE YEILDING PLANTS FROM SOME VILLAGES OF WARORA TAHSIL, DISTRICT CHANDRAPUR.”

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Abstract: Since pre-historic times plants were useful for a human beings to fulfill most of their basic and other needs. Besides basic and important needs plants has been used for natural dyeing before recorded history, colouring properties of various local plants were known to our ancestors to obtain and retain the colour from the plant throughout the past period. Plants from adjoining areas are used to enhance the life of people through the decoration of animal skin, fabric, craft, hair, and even their bodies.

Some of the local plants, when used for dyeing purpose, did not require the addition of any substance for the attachment of dye to fiber. Based on colour properties various types of dye-yielding plants are available like orange dyes, yellow dyes, red dyes, purple/ blue dyes, green dyes, grey dyes, and black dyes. Traditionally these dyes were extracted from various plant parts like bark, stem, leaves, flowers, rhizome, root, and seeds.

The present study includes 35 different plants available from local areas and which are used traditionally for dyeing purposes by the local people. In the present study only plant-based dyes are extracted from various plant parts. In a present study, detailed information regarding the utilization of these plants for purpose of dye is mentioned along with their photographic images.

Index Terms - Dye yielding plants, Fabric Colours, Dye extraction, Sources of Dyes.

I. INTRODUCTION

In China, the first report of natural dye extraction from plant sources dates back to around 2600 B.C. As per the historical review, henna was used even before 2500 BC, while saffron is mentioned in the Bible. During the Indus valley civilization at, Mohenjo-Daro and Harappa (3500 B. C.). The art of dyeing is as old as human civilization. From the historical records, it is learned that natural colorants were available to people during the Greco-Roman periods. Our Vedas, the Atharvaveda carries a description of natural dyes. The use of natural dyeing materials is evident in the wall paintings of Ajanta, Ellora, and Sithannvasal and they still demonstrate the efficacy of dyeing craft that had been inherited from ancient times in India. India has a very rich history of using natural dyes. For long past time plants are used not only for fulfilling the basic needs of life such as food, fiber, fuel, clothes, and shelter but also as sources of natural dyes for dyeing clothes, design and painting purposes. Since the period when man lived in caves, they used available natural dyestuff and pigment for coloring animal skin and their skin during festivals as well as during wars (Rani *et al.* 2002).

Different parts of the plants are used in the extraction of dyes. Some of these dyes are used as mordant's for dyeing different textiles, handloom products, and as a spot of ink, and also for painting. The dyes are supposed to be colored compounds fixed to fabrics and which do not wash out with soap and water or even become fade on exposure to bright sunlight.

India has been considered the leader in the art of natural dyeing, but due to a lack of documentation and precise knowledge of extracting and dyeing techniques not much correct information is available regarding the utilization of various plant-based dyes. The majority of “Koshti” people (Halba Tribal's) are a traditional “Handloom Community” from the vidarbha region but most of them are today well employed in weaving cotton & silk sarees and also in trading fabrics. The present study has aimed to investigate the availability of natural dye-yielding plant species in some areas of the Vidarbha region and collect information on traditional knowledge associated with the extraction and use of natural dyes by the local population.

II. METHODOLOGY

The Present work is dependent on information related to dye-yielding plants collected from different villages of Warora Tahsil of District. Some of these villages are Anandvan, Arjuni, Bembal Tukum, Borda, Chargaon, Jangaon Bk, Marda, Mesa, Salori, and Surla. This survey was conducted from Nov 2022 to March 2023. Methodology for the present work was adopted from some of the earlier workers like Jain, (1987), Jain and Sing (1997) and Gadgil *et.al* (2000, 2005, 2005a), Jakhi and Kalkar, (2013). The methodology has been divided into questionnaires while interactions, GPS photography, and Field walk. To explore the study area frequent visits are arranged with 10 different knowledgeable persons from various villages of study area. Information gathered from various interactions was recorded in the field diary and finally in the table. The field visits and interactions were conducted in the above villages.

During field visits to the study area information regarding plants was collected, and photographs were taken by using GPS enabled camera. Photographs of these dye-yielding plants and their parts or processes are shown on plates. (Plate-1,2). Plants were identified by using standard literature (Cooke, 1967; Naik 1998; Singh and Karthikeyan 2000). Authentication of plants made by using local flora knowledgeable persons and with the help of local experts. All collected information is tabulated in the form of a table (Table-1) and figures (Figure 1-4).

III. OBSERVATIONS

Present study includes total of 35 plant species belong to a total of 20 dicots and 3 monocot families of angiosperms. Out of 35 plant species various plant, parts are used for purpose of extraction or preparation, or utilization as a dye.

3.1 Table -1 Information regarding dye yielding plants, collected during study.

Sr No	Botanical Name	Common Name	Family	Monocot / Dicot	Part Used	Colour obtained	Colour application
1.	<i>Acacia catechu</i> (L.f.) Willd.	Khair	Fabaceae	Dicot	B	Br Bl	Used by local people for dyeing of wool, silk, cotton fabrics to give brown colour and also used as ink, wall paintings and for decorating wooden articles.
2.	<i>Acacia nilotica</i> (L.) Del	Babool	Mimosaceae	Dicot	B	P	Used for colouring bamboo items and door panels.
3.	<i>Aegle marmelos</i> (L.) Correa	Bel	Rutaceae	Dicot	Fr	Y	Used for colouring all types of cotton fabrics.
4.	<i>Amaranthus spinosus</i> L.	Chavli	Amaranthaceae	Dicot	R	P	Used to dye cotton fabrics with various fixing agents for setting of colour on fabrics (mordant).
5.	<i>Azadirachta indica</i> A. Juzz	Neem	Meliaceae	Dicot	B	Br	Used to dye silk fabrics.
6.	<i>Bauhinia variegata</i> L.	Aapta	Fabaceae	Dicot	B	Bl	Used for designs printing on cotton fabrics.
7.	<i>Beta vulgaris</i> L.	Beetroot	Amaranthaceae	Dicot	R	PPR	Colouring agent in food, hair dyeing and for cosmetic purposes.
8.	<i>Bixa orellana</i> L.	Sinduri	Bixaceae	Dicot	S	R	Used for dyeing clothes or yarn threads and also for colouring food articles.
9.	<i>Bombax ceiba</i> L.	Semal	Malvaceae	Dicot	B,F I	R	Used to colour cotton fabrics.
10.	<i>Bougainvillea glabra</i> Choisy.	Paper flower	Nyctaginaceae	Dicot	Fl	O, R	Edible dyes, for colouring clothes.
11.	<i>Butea monosperma</i> (Lam) Taubert.	Palash	Fabaceae	Dicot	Fl	O, R	Orange red dye used by local people during celebration of Holi festival.
12.	<i>Catharanthus roseus</i> (L.) G. Don.	Sadabahar	Apocynaceae	Dicot	Fl	M	It has pleasant aroma, used as important spice and dye stuff.
13.	<i>Caesalpinia sappan</i> L.	Sappan wood	Fabaceae	Dicot	B	Y	Used to colour various fabrics.
14.	<i>Clitoria ternatea</i> L.	Aparajita	Fabaceae	Dicot	Fl	B	The dried flower are extracted and filtered with water. Dye from filtrate is used for paintings, also for colouring food and dyeing cotton and woollen clothes.
15.	<i>Cucurma longa</i> L.	Turmeric	Zingiberaceae	Monocot	Rh	Y	Fresh rhizomes are crushed into pieces and soaked into water, by adding citrus it gives a red colour. Used for dyeing wool, silk, and cotton. Important spice and colouring agent in various food preparations. Also used in various skin care product.
16.	<i>Dioscorea bulbifera</i> L.	Mataru	Dioscoreaceae	Monocot	Fr	PY	Used for dying cotton fabrics.
17.	<i>Diospyros peregrine</i> (Gaertn.) Gurke	Temburna	Ebenaceae	Dicot	Fr	Bl	Used by local people for dyeing fishing net and cotton clothes.

18.	<i>Eclipta alba</i> (L.) Hassk.	Bringaraja	Asteraceae	Dicot	L	Bl	For colouring cotton clothes
19.	<i>Eucalyptus camaldulensis</i> Dehnh.	Nilgiri	Myrtaceae	Dicot	B	Y Br	Colouring of various food preparations, medicines, handicraft items and for toys.
20.	<i>Hibiscus rosa sinensis</i> L.	Jasvand	Malvaceae	Dicot	Fl	R	Dye used in cookery.
21.	<i>Kigelia pinnata</i> (Jacq.) DC	Kajela tree	Bignoniaceae	Dicot	B	Y, Bl	Used in for colouring cotton fabrics.
22.	<i>Lagerstroemia parviflora</i> Roxb.	Jarul, Bondora	Lythraceae	Dicot	B	Bl	Dye obtained from bark is used for dyeing rough weaving and other textile fibres.
23.	<i>Lantana camara</i> L.	Lantana	Verbenaceae	Dicot	Fl	O, R	Used for dyeing cotton and woollen clothes
24.	<i>Lawsonia inermis</i> L.	Henna	Lythraceae	Dicot	L	RB	It is used by local womens to dye skin (mehendi), Hair, finger and nails during various ritual functions, Also used for colouring leather, silk and wool.
25.	<i>Magnifera indica</i> L.	Aam, Mango	Anacardiaceae	Dicot	B, L, R	Y	Used in cosmetic, fibres, and pulp industries for colouring purpose.
26.	<i>Nyctanthes arbortristis</i> L.	Paarijaat	Oleaceae	Dicot	Fl	O	Colouring silk and also useful for printing purposes.
27.	<i>Piper betle</i> L.	Pan	Piperaceae	Dicot	L	Br	Colouring agents in textile industry also used in cooking.
28.	<i>Phyllanthus reticulates</i>	Kanguni	Euphorbiaceae	Dicot	Fr	R	Use of fruits in dyeing of cotton fabrics to produce different shades.
29.	<i>Punica granatum</i> L.	Anar	Lythraceae	Dicot	Fr	Y	Used by the tribal's in Holi and other festival and rituals.
30.	<i>Tagetes patula</i> L.	Zendu	Asteraceae	Dicot	Fl	Y	Yellow dye extracted from flowers used in local handmade papers.
31.	<i>Tamarindus indica</i> L.	Imli	Caesalpiniaceae	Dicot	L, S. coat	Y, R	Natural mordant to fix the colour on textile
32.	<i>Tecoma stans</i> (L.) Juss.ex Kunth	Yellow bells	Bignoniaceae	Dicot	Fl	Y	To colour cotton fabrics.
33.	<i>Tectona grandis</i> L.f.	Teak, Sag	Verbenaceae	Dicot	L, B	Rb	Red dye mainly obtained from young leaves. In earlier times, the dyes were extracted and by soaking the plant parts in water less than 2 hrs, boiling for not less than 15 minutes. The extract was then filtered using for dyeing various types of fabrics.
34.	<i>Terminalia arjuna</i> (Roxb.ex.DC.)	Arjun	Combretaceae	Dicot	B	Rk	Used on textiles such as silk, wool, cotton and nylon.
35.	<i>Zingiber officinale</i> Roscoe.	Adrak	Zingiberaceae	Monocot	Rh	Br	Used for dyeing of cotton, wool or other protein fibers.

Abbreviations used-

- **Part Used-** B – Bark, Fr – Fruit, R – Root, S – Seed, Fl – Flower, Rh – Rhizome, L – Leaf, S. coat – Seed coat.
- **Colour obtained** – Br- Brown, Bl- Black, P- Pink, Y- Yellow, PPR- Purplish red, R- Red, O- Orange, M- Magenta, B- Blue, PY- Pale yellow, Rb- Reddish brown Rk-Reddish khaki

3.2 Plates

PLATE: I

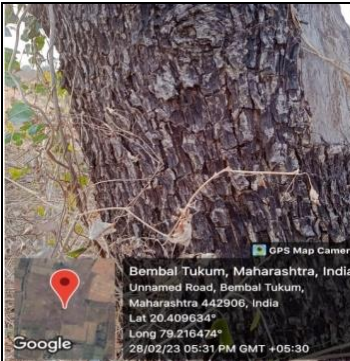
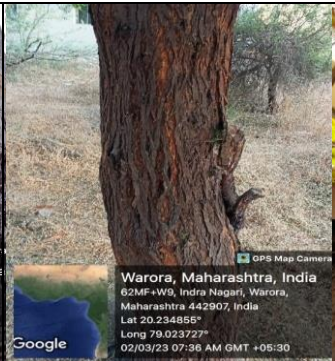












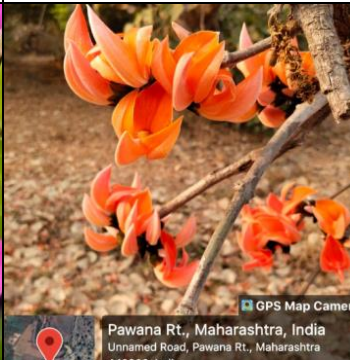






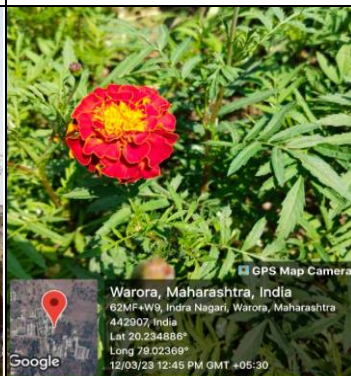




 <p><i>Acacia catechu</i> (L.f) Willd.</p>	 <p><i>Acacia nilotica</i> (L.) Del</p>	 <p><i>Azadirachta indica</i> A. Juzz</p>	 <p><i>Bombax ceiba</i> L.</p>
 <p><i>Eucalyptus camaldulensis</i> Dehnh.</p>	 <p><i>Kigelia pinnata</i> (Jacq.) DC</p>	 <p><i>Lagerstroemia parviflora</i> Roxb.</p>	 <p><i>Azadirachta indica</i> A. Juzz</p>
 <p><i>Cajanus cajan</i> (L.) Millsp.</p>	 <p><i>Eclipta alba</i> (L.) Hassk.</p>	 <p><i>Lawsonia inermis</i> L.</p>	 <p><i>Piper betle</i> L.</p>
 <p><i>Bombax ceiba</i> L.</p>	 <p><i>Bougainvillea glabra</i> Choisy</p>	 <p><i>Butea monosperma</i> (Lam) Taubert.</p>	 <p><i>Catharanthus roseus</i> (L.) G. Don.</p>

PLATE: II

			
<p><i>Callistemon citrinus</i> L.</p>	<p><i>Cassia auriculata</i> L.</p>	<p><i>Clitoria ternatea</i> L.</p>	<p><i>Hibiscus rosa sinensis</i> L.</p>
			
<p><i>Nyctanthes arborvitae</i> L.</p>	<p><i>Tecoma stans</i> (L.) Juss.ex Kunth</p>	<p><i>Tagetes patula</i> L.</p>	<p><i>Punica granatum</i> L.</p>
			
<p><i>Dioscorea bulbifera</i> L.</p>	<p><i>Diospyros peregrine</i> (Gaertn.) Gurke</p>	<p><i>Tamarindus indica</i> L</p>	<p><i>Phyllanthus reticulates</i> Poir.</p>
			
<p><i>Bixa orellana</i> L.</p>	<p><i>Beta vulgaris</i> L.</p>	<p><i>Cucurma longa</i> L.</p>	<p><i>Zingiber officinale</i> Roscoe.</p>

3.3 Figures

Figures

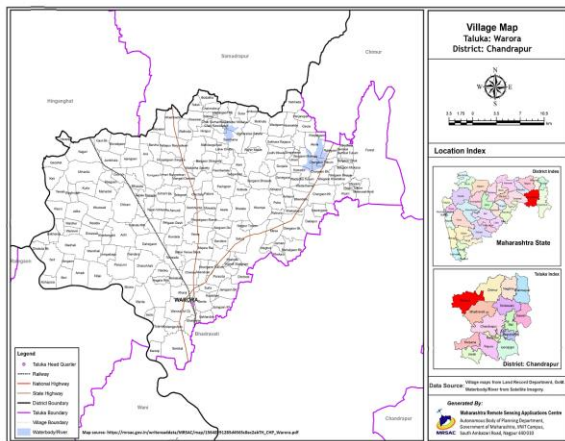


Fig: 1. Location Map of study area

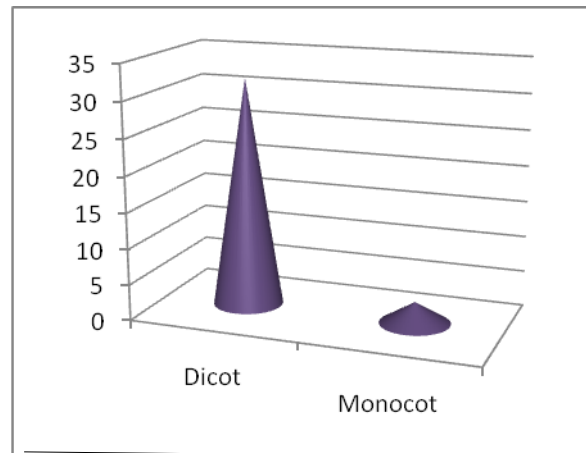


Fig: 2. Proportion of Dicot and Monocot Plants from study area

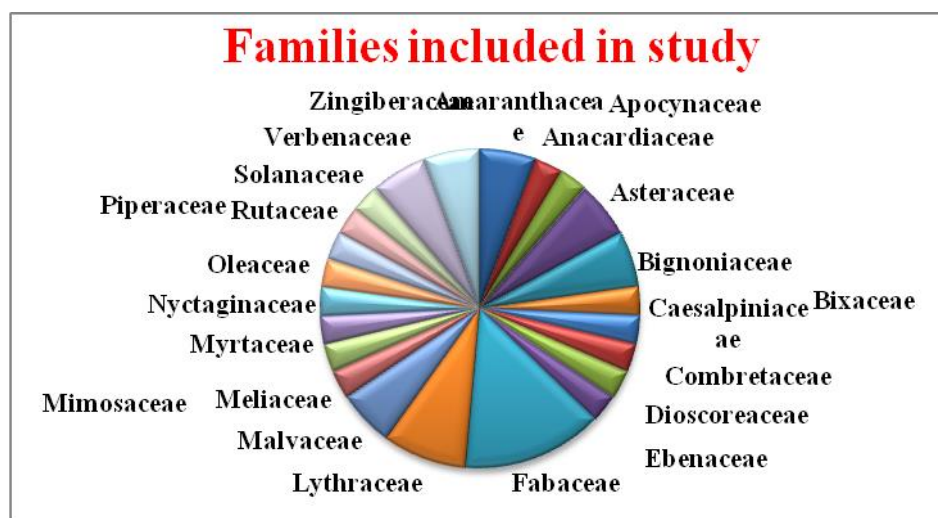


Fig: 3. Representation of Families in study.

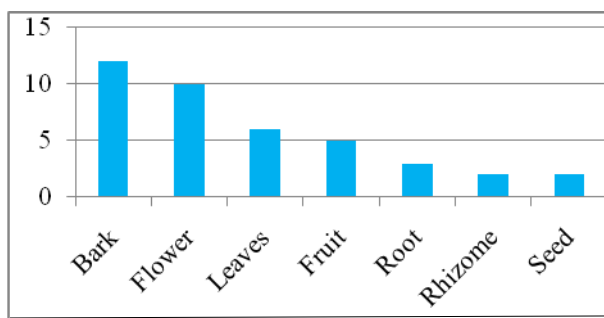


Fig: 4 Different plant part used for preparation of dye

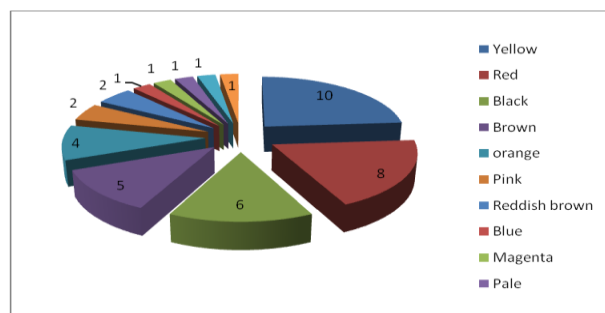


Fig: 5 Representation of Colors from Dye yielding Plants

IV. Result and Discussion

From the present study it has been observed that bark of twelve various plants used by local people as a dye, flowers-10, Leaves-6, fruit-5, root-3, seed and rhizome of 2 plant species each is used for preparation and extraction of dyes by local people of Warora tahsil of Chandrapur district. In some cases, more than one part of plant is also used for the same or different purposes. According to people's perceptions and information collected from interactions with local people during the study. The study area includes plant species like *Cucurma longa* L., *Lawsonia inermis* L., *Tectona grandis* L.f., *Clitoria ternatea* L., *Butea monosperma* (Lam) Taubert. and *Beta vulgaris* L. are widely used by the local people for a purpose of dyeing different types of fabrics, various food items, and during various festivals.

In present study we have documented 35 plants yielding various types of dyes, and given status of natural dyes and dye-yielding Plants. In India some of the plants from study area are mentioned in his study. Chandramouli, K. V. (1995), Krishnamurthy *et.al.* (2002), Gokhale, et al, (2004), Mahantha and Tiwari. (2005), Siva R (2007), Biwajit et. al. (2015) has also mentioned dye yielding plants of Tripura from Northeast India some of the plant and dyes extracted are quite similar in both areas. Most of the earlier mentioned workers also published work related to dye yielding plants of various states and regions of India. Laddimath *et. al.* (2023) has studied various dye yielding plant species of Vijayapur district of Karnataka. Some parts may have more than one colour. Shade of colour may depend on season of plucking plant part, growth conditions of plant, soil conditions and method of dye extraction. While interactions some of the local persons expressed their view as use of natural dyes is slowly increasing in last ten years, Patil P.D, (2012) has also illustrated the importance of Natural dyes making their way back to a golden age for Natural dyes. From this study importance of natural dyes and their role in livelihood of local people is highlighted by local people.

V. Conclusion

- There is urgency for proper collection, documentation, assessment and characterization of dye yielding plants and their dyes, as well as further research to overcome the limitations of natural dyes utilisation and feasibility.
- Natural dyes should be selected with caution – some are neither eco-friendly nor good performer hence proper care should be taken while selecting dye on basis of requirement and purpose of utilisation.
- According to people's perception The most common plant parts used for extraction of dyes are, seed, flowers, leaves, berries, stems, barks and roots.
- From present study it has been observed that due to ease of availability and less expenses chemical dyes are used on large scale in spite of their drawbacks, but there should be awareness among local peoples specifically younger generation regarding utilisation and conservation of plant sources which yield natural dyes.
- In the study area population of Halba Koshti people still using traditional practices of dyeing various types of cloths from natural dye.
- Local people of Warora tahasil and adjoining area have good deal of knowledge regarding natural dyes and their sources but this knowledge should percolated to younger generation.

VI. Acknowledgment

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REFERENCES

- [1] Biwajit Sutradhar, Dipankar D.E.B., KoushikMajumdhara and Datta. B.K. (2015), Traditional dye yielding plants of Tripura Northeast India. *Biodiversitas*, Vol 16,121-127.
- [2] Chandramouli, K. V. (1995), Sources of Natural Dyes in India – A Compendium with Regional Names, PPST Foundation, Chennai.
- [3] Cooke T. (1967). The Flora of the Presidency of Bombay. Vol.I, II, III. Botanical Survey of India. Calcutta. (Second Reprint.)
- [4] Gadgil M., Achar, K.P., Bhat, Harish., Bhat, P.R., Deshmukh, Shubhada., Dolke, Ajay., Dolke. Y.N., Edlabadkar, V., Gogulwar, S., Gokhale, Yogesh., Gunaga, Shrikanth., Gundappa, B.V., Heda, Nilesh., Hiralal, M.H. Indiramma, Kailash., Malhotra, C. Naik, M.B., Nalini G., Rekha., Pandharipande, Kaustubh., Patgar, S.G., Ramakrishnappa., Seshagiri., Rao., Sivan, V., Srinidhi, S. Sujitha, S., Subramanian, K.A. Devaji, Tofa and Yetiraju, 2005. People's Biodiversity Register: A Methodology Manual. Available online at <http://ces.iisc.ernet.in/hpg/cesmg/>.
- [5] Gadgil, M., Gokhale, Y. and Seshagiri Rao P.R., 2005a. People's Biodiversity Register. available on line on http://wgbis.ces.iisc.ernet.in/biodiversity/sahyadri_ews/newsletter/issue 15/article.htm
- [6] Gadgil, M., Rao, P.R.S., Utkarsh G., Pramod, P., Chhatre, A. 2000. New meanings for old knowledge: People's Biodiversity Register Program. *Ecological Applications* 10 (5) pp. 1307-1317.
- [7] Jain, S.K. 1987. Ethnobotany-its scope and various sub In manual of Ethnobotany, (Ed.) S.K. Jain, Scientific publishers Jodhpur. 1-11.
- [8] Jain, S.P. and Singh, S.C. 1997. An Ethnomedico- Botanical survey of Ambikapur District, M.P. Scientific publishers, Jodhpur 83-91.
- [9] Jakhi, P.S. and Kalkar, S.A. 2013. Use of participatory method in preparation of inventory of economically and medicinally important plants. *Int. J. of Life Sciences* 1: (3) 216-220.
- [10] Krishnamurthy, K.V., Siva, R. And Senthil, Kumar, T. (2002) Natural Dye-yielding plants of Shervaroy Hills of Eastern Ghats. In Proceedings of Natural Seminar on the conservation of the Eastern Ghats. Environment Protection Training and Research Institute. Hyderabad, 24-26 March 2002, pp 151-153.

- [11] Laddimath Arati, Prashanth P.K.M. and AshwiniBudihal, (2023), Dye yielding plant species of Vijayapur district of Karnataka, India., International Journal of Development Research Vol. 13, Issue, 01, pp. 61442-61445.
- [12] Naik, V.N., (1998), Flora of Marathwada. Vol.I & II, Amurt Prakashan, Aurangabad. - 431003
- [13] Patil P.D, Natural dyes making their way back to a golden age", Textile Asia, July2012, pp. 29-31
- [14] Rani SS, Murthy RKS, Palliah T.(2002). Dye yielding plants of Andhra Pradesh, India. J Econ Tax Hot 26: 740 749.
- [15] Singh. N.P. and Karthikeyan, S. (2000), Flora of Maharashtra state. Dicotyledones Vol. 1. Botanical Survey of India. Calcutta.
- [16] Siva R (2007), Status of Natural Dyes And Dye-Yielding Plants In India, Currsci, 92(7), 916-925

