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A study to demonstrate the traditional value of dye plants collected from Hamirpur district of Himachal Pradesh, India

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Abstract- **The current study was conducted to exploit the traditional knowledge of major dye plants used by the people inhabiting the Hamirpur District of Himachal Pradesh. They prepare these dyes by themselves; which played an important role in their cultural, religious and social life. For example *Curcuma longa* (Haldi) and *Oryza sativa* are widely used as a dye in various traditions and rituals performed by native people. Flowers *of Butea monosperma* (Paplah) are also used in religious holi festival and *Impatiens balsamina* (Teur) are seasonally utilized by local girls to color their palms. Fruits of *Mallotus philippensis* (Kaamal) are used to extract the sindoor (vermillion) by married women. Hence, these dyes uphold the great impact on conventional culture in the life people of Hamirpur district. Moreover, these dyes are very harmonious to the human health as well as to environment due to their nontoxic properties. Unfortunately the traditional and cultural knowledge about these dyes by people from one generation to other generation goes undocumented and highly prone to extinction due to our negligence. Hence the objective of the present study is to document the traditional knowledge about these natural plant products as they provides as an alternatives to synthetics dyes as they are human/environment friendly and cost effective.**

Keywords*: Traditional knowledge, dye, cultural, rituals.*

Introduction:

Use of natural dyes is prehistoric from the Bronze Age in France. First documented record was found in China in 2600 BC. Madder dye (plant dye) traces are seen in the fabrics of Mohenjodaro and Harappa excavation during Indus valley civilization. In Egypt, shrouds of mummies were dyed with plant color and ensembles of madder (alizarin) are also found to be imprinted in tomb of King Tutankhamen of Egypt. Practicing of animal hide coloring, cave drawing with crushed berries, house decoration are centuries old. Plants like woad, henna, madder, weld, and Brazil wood, indigo are inutile from very past as a natural dye. Even Brazil name was designated from a Brazil -wood-red dye plant[1]. Inception of coloring with henna started before 2,500 BC, saffron uses also cited in Bible, wood (wild plant) firstly used to obtain blue dye by Britons in Palestine [1-2]. In ancient time, people used to color themselves and animals for obtaining spiritual and magical power and they believed that it will protect them from the felonious spirits [3]. Accidental invention of dye, today become the part of customs, religion and civilization due their high concordance with environment. Even still today, *Bixa orellana*, *Lithospermum erythrozon*, *Indigofera tinctoria* has been used in natural dye beauty products. Yellow dye from turmeric rhizome has strong antiseptic properties, and indigo (neel) have coolant effect. So these dyes are widely used due their beneficial properties [4].

Our study area is rich biodiversity rich and belongs to tract of Shivalik Himalayas. It has small ethnic groups endowed with culture, customs and traditions. Natural plant products are collected processed to extract the natural dyes which are used for coloring various objects like textile, foodstuffs and papers. Due to their cultural and ethnic value, local people use these traditional dyes in various rituals, festivals, functions or for recreational purposes. *Curcuma longa* (Haldi) and *Oryza sativa* religiously used as dye in marriages rituals and also used in rangoli preparation. These dyes are nontoxic, ecofriendly and even some have medicinal and antibacterial properties. This epochal cultural heritage has integral and intimate part of their life. Evidently, these dye products are used from a long past history but there is lack of proper documentation about the local knowledge particular in Hamirpur district. Moreover; also there lack of appropriate technique of preserving the knowledge about the preparations and inherited uses of natural dyes These natural plant products serve as a better alternative to synthetic dyes which poses harmful effects to human health as well for our environment . So the present study was aimed to explore knowledge these dye plants, including the extraction, preparation and their benefits, and then to documented this information for future prospective.

Study Area and people:

Himachal Pradesh is rich in biodiversity, culture and treasure of beneficial plants. Hamirpur is sub-humid and sub-tropical district of Himachal Pradesh with

1,118 sq. kms geographical area. It lies between 31°25′N and 31°52′N latitude and between 76°18′E and 76°44′E longitude. This smallest district lies in Shiwalik hills with an elevation of 350 meters to 1,100 meters with 1600 mm average annual rainfall. People of this area live with simplicity and they do communicate with pahari dialect. This area is a unique combination of small mounds, valleys and straight stretches. So this area was selected as site field. This domain is treasure of cultures and customs. In villages, houses are made up of clay-straw bricks with slate roofed. Interestingly, walls and floors are painted with coloured cow or buffalo dung. Festivals, fairs, marriages, religious ceremonies are celebrated with amusement. This reflects important portion of their ethical and traditional life. Hardly, any of these rituals celebrated without using of variety of colours. Local people believe these colours are very religious, pure and auspicious.

Fig. 1. **Map of Himachal Pradesh**

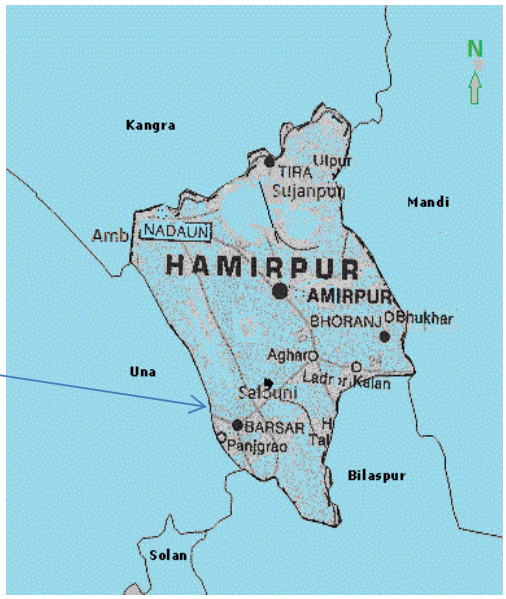

Fig.2. **Map of Hamirpur district**

Material and Method:

Field study trips were organised during the period of March, 2013 to March, 2016 in different ethnic pockets of study area to gain the knowledge about dye plants. People (both males and females of more than 25 years of age) were subjected for unstructured interviews. For this randomly 42 villages were selected viz. Ramera, Kolu, Tikker, Raunee, Nanan, krah, dimmi, mandetar, jharlog, amroh, nagrota gazian, dungrin, rajiar, thuthwani, sasar, markandaya, rohlwin, awahdevi, gwaradu, jharlog, balokhar, chauki, galot khurda, nihalwin, jhaleri, nalti, baroh, rahil, baggi, chehru, sohari, bighri, sudar, mansui, mohin, bhati, bhatwara, bag, bela, chowki, bhalana and baroti. Briefly, people of some particular communities were asked about their religious and cultural belief about the use of dye. These communities are using these particular dyes (for eg. kungu, paplah, Maindi, Kaamal, Dhan, Tuer, Sindhuri) from many generations and entrusting this knowledge to next generation. This information was verified many times from the different people in other different area. Collected dye plant specimens were preserved and mounted on standard herbarium as voucher specimens [5-6]. Identification of specimens has been done with the help of *Concise Flowers of Himalaya*, *Flora of Himachal Pradesh*, *Flora of Kullu district*, *Flora Simlensis, Flora of Sirmaur district* and *Flowers of the Himalaya*. Confirmation of dye plants had been done by comparing them with the authentic samples in Botanical Survey of India (Northern Circle) and Herbaria of Forest Research Institute, Dehradun, India. Information was gathered according to methodology adopted by Jain and Goel [7]. For acquiring adequate documented dye information about 30 field surveys were carried out in the studied area. During eliciting this information people were also asked about the seasonal use of dyes.

Results and Discussion:

This study shows local communities used these dye plants in their social and religious life from very past history. Albeit this knowledge is transferring from one descendent to another still it has been not documented properly. So it provides encouragement to the lineal regime and a new opportunity to industrials to explore less harmful dyes to human society. This document provides whole information about the plants viz. division, habit, reproductive cycle, part used and cultural

significance index. Overall study includes use of 23 dye plants with 19 families (Table 1&2). Which includes 22 predominant Angiospermic taxa, followed by one pteridophyte. In Angioserms, further there are 19 dicots and 3 monocots (*Curcuma longa*, *Oryza sativa*, *Saccharum officinarum*). Family-wise appraisal of the data indicates that Fabaceae (3genera, 3spp) are the most dominant family used as dye in the study area, followed Euphorbiaceae (2genera, 2spp), poaceae ((2genera, 2spp) and other with one family each (Table 1). Habit wise analysis shows that trees used mostly for dye purposes with 11 species followed by shrubs (8spp) and herbs (4spp) (Fig.4). Data also indicates that dominantly dye plant parts used are fruits (8 spp), flowers (5 spp), leaves (5 spp), bark (3 spp) and and one prop root. Here in this study, cultural significance index Silva *et al*.[8] was also calculated for 10 most used dye species in studied area. For this, maximum informant citations are used 10 with three criteria (dye, edible, medicine) (Table 3). This data signifies that *Curcuma longa* have maximum CSI (24) in the Hamirpur District. Even in modernization, *Curcuma* is still widely used in functions, festivals and marriage ceremony as dye due its unique medicinal properties, easily availability and eco-friendly nature. *Phyllanthus emblica* have second highest CSI (21.6) showing secondly most used cultural species in area followed by *Juglans regia* (15.3) and *Lawsonia inermis* (11.7). These four species are easily available and frequently used by the people.

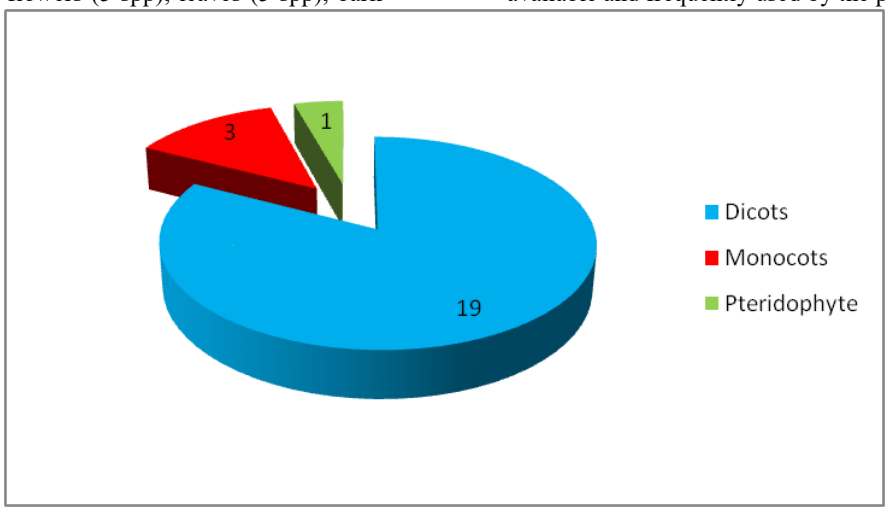

Fig. 3. Showing the number of dye plants in each of the plant division

Table 1: Showing the procedure of preparation of dye and its uses by the local people

Botanical Name	Family	Local Name/s	Part/s Used	Folk Use/s
Acacia catechu Willd.	Fabaceae			Heartwood is grinded into powder, then mixed and boiled with water at low heat for three hours to obtain a red brown dye. Used for coloring clothes, fibre, and other objects.
Adhatoda zeylanica Medic.	Acanthaceae	Basuti		Ropes which are made up of sael [processed fiber of *Grewia oppositifolia* (Bayul))] are rubbed with leaves of *Adhatoda zeylanica* to give a green colour to it.
Aegle marmelos (L.) Corr.	Rutaceae	Bil	Fruits	Rinds of unripe fruit are mashed properly and a yellow color edible dye obtained.
Bauhinia variegata L.	Fabaceae	Karaalein	Bark	Shoe makers has used its bark for dyeing leather and ropes.
Berberis aristata DC.	Berberidaceae	Kashmal	Roots. Stem	Root and stem are boiled for 2-3 hours to yield a yellow colour dye.
Brassica nigra (L.) Koch	Brassicaceae	Kali-rai	Seed oil	Rough threads of *Gossypium* sp. mixed with the mustard oil and rubbed against the carbon powder

				of griddle and it commonly used by carpenters for marking.
Butea monosperma (Lam.) Taub.	Fabaceae	Paplah	Flowers	A yellow –orange coloured dye obtained by crushing its beautiful orange flowers into water and used in holi festival. Local women also used this colour to dye their dupatta's. People believe that plants grew at place where sage blood drop during mythical war and blood red color of flower is due it.
Curcuma longa Wall.	Zingiberaceae	Halder	Rhizome	Rhizome, known as haldi yields yellow dye used for coloring in various religious and social functions. Peel of old rhizome removed and cut into small pieces and mixed with suhaaga (borax) and then soaked into concentrated citrus fruit juice for 5-7 days. Then grind into powder and small rounded tablets prepared popularly called **'kungu**'. Kungu considered religious dye used in various religious ceremonies and vermillion by women.
Ficus benghalensis L.	Moraceae	Badaya	Prop Roots	Tips of prop roots (aerial roots) crushed and mixed with the mustard oil for 3-4 days. Colour of mustard changed into red dye. Then use to colour the hair.
Hibiscus rosa-sinensis L.	Malvaceae	Dunaj-phul	Flowers	A purple-red dye obtained by rubbing the flowers on paper.
Impatiens balsamina L.	Balsaminaceae	Tuer	Leaves. Stem	During rainy season stem and leaves grinded into a paste and applied on sole or palm as substitute of *Lawsonia inermis*. Lemon juice or pomegranate juice (daadu) also added to enhance colour.
Juglans regia L.	Juglandaceae	Akhrot, Khod	Bark. Leaves. Fruits.	Unripe fruits yield a black dye used for coloring the hair. Bark, leaves and fruit rind used by women for coloring lips and gums.
Lawsonia inermis L.	Lythraceae	Maindi	Leaves	Fresh leaves paste has been used for colouring palms of hand, sole, nails and hair. Local people add *Syzygium aromaticum* (laung), *Camellia sinensis* (tea), *Citrus* juice, *Phyllanthus emblica* (Amla) in iron pot to impart more colour to this.
Mallotus philippensis (Lam.) Mull. Arg.	Euphorbiaceae	Kaamal	Fruits	Red powder from fruits used as vermillion by local women.
Mirabilis jalapa L.	Nyctaginaceae	Gulbansi	Flowers	Yield a pink-purple dye used by children for painting wall or paper.
Oryza sativa L.	Poaceae	Dhan	Grain	Fine white coloured aqueous paste

				of powdered rice used for making rangoli in various religious functions (Diwali).
Phyllanthus emblica L.	Euphorbiaceae	Amla	Leaves. Fruits. Bark	Leaves and bark has been used to make leather from hide. Hides arranged in sheets and put into a hard cloth with leaves and small pieces of bark with water for 20-22 days. Bark of *Bauhinia variegata* also added with it. Water added in it time to time. Which finally give a black colour. Fruits used for colouring hair and also mixed with *Lawsonia inermis* leaves for hair dye.
Prinsepia utilis Royle	Rosaceae	Bhekhal	Fruits	Ripe black brownish fruits dipped in mustard oil for a week. Oil colour get turn red used as hair dye.
Punica granatum L.	Punicaceae	Daadu	Fruits. Flowers.	Fresh rind crushed with the flowers and leaves of *Impatiens balsamina* L. for preparing dye. Fruit juice mixed with the jaggery for preparing ink.
Saccharum officinarum L.	Poaceae	Ganna	Stem Juice	After preparing the local sugar (shakkar), impurities remained locally called *late* or *seera* mixed with the carbon powder of griddle (tava) to prepare ink used for writing on wooden plate (patti) by children. Secondly, some communities (barber) put a small piece of local sugar (gudd) on back side griddle and mixed with carbon with constant stirring for 15-20 minutes to make black brownish ink used for writing and drawing the dieties kamdev picture (kandyoh) in the marriage ceremony.
Selaginella chrysocaulos (Hook. & Grev.) Spring	*Selaginellaceae*	Sindhuri	Whole plant	Only those plant which with strobili are picked and dried in sunlight for three to four days upon a dried place. A orange powder obtained used for colouring various object as well as used as Sindoor.
Tagetes erecta L.	Asteraceae	Genda	Florets	Yellow colour obtained from crushed flowers.
Terminalia chebula Retz.	Combretaceae	Harar	Fruits	Crushed fruits soaked in water for 3 days and then alum added and a yellow coloured dye obtained used to dye clothes by local people.

Table 2: Depicts the biological characteristics' of dye producing plants included in present study

S.no	Botanical name	Division	Habit	Reproductive Cycle
1.	*Acacia catechu*			
2.	*Adhatoda zeylanica*			April-November
3.	*Aegle marmelos*	Dicot	Tree	April-July

4.	*Bauhinia variegata*	Dicot	Tree	March-May
5.	*Berberis aristata*			
6.	*Brassica nigra*	Dicot	Herb	October- March
7.	*Butea monosperma*			March-May
8.	*Curcuma longa*	Monocot	Shrub	June - July
9.	*Ficus benghalensis*	Dicot	Tree	February-June
10.	*Hibiscus rosa-sinensis*	Dicot	Tree	February-October
11.	*Impatiens balsamina*	Dicot	Herb	July - September
12.	*Juglans regia*	Dicot	Tree	April-October
13.	*Lawsonia inermis*	Dicot	Shrub	July-October
14.	*Mallotus philippensis*	Dicot	Tree	April-October
15.	*Mirabilis jalapa*	Dicot	Herb	June - September
16.	*Oryza sativa*	Monocot	Herb	July-September
17.	*Phyllanthus emblica*	Dicot	Tree	April-September
18.	*Punica granatum*	Dicot	Tree	April-September
19.	*Prinsepia utilis*	Dicot	Shrub	March-September
20.	*Saccharum officinarum*	Monocot	Herb	July-October
21.	*Selaginella chrysocaulos*	Pteridophyte	Herb	July-September
22.	*Tagetes erecta*	Dicot	Herb	September- October
23.	*Terminalia chebula*	Dicot	Tree	April-June

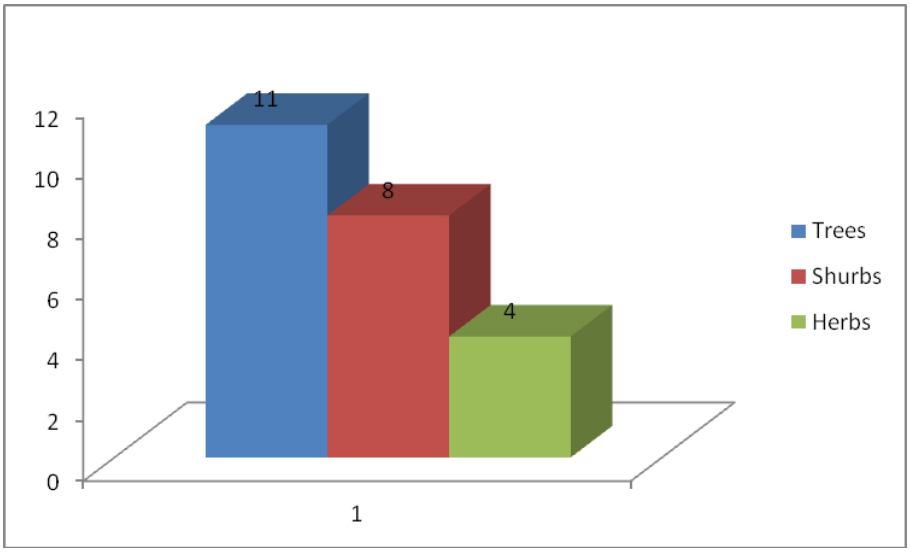

Fig.4. Histogram reflecting the quantitative number of trees, shrubs, and herbs of dye plants.

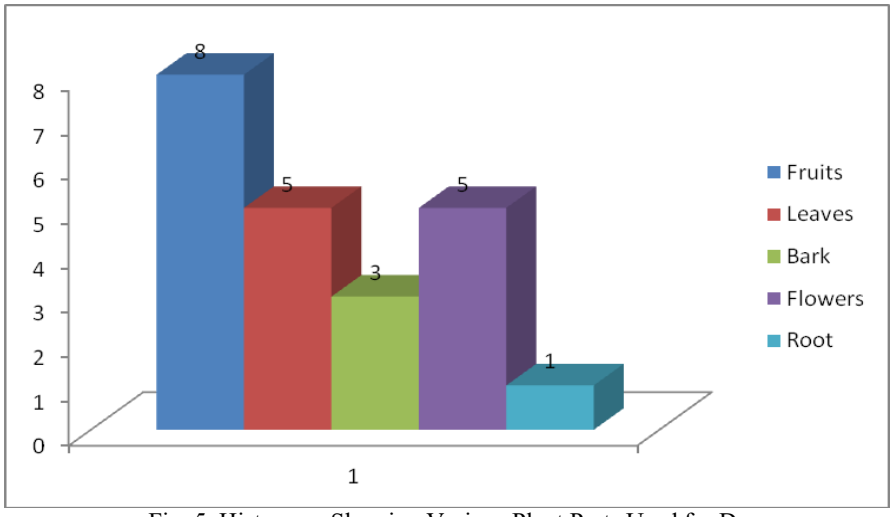

Fig. 5. Histogram Showing Various Plant Parts Used for Dye

Table 3: Calculation of cultural significance index (as revised by silva *et al.* [27] of various species

Species	# informant citations		Dye	Edible	Medicinal	Sum (i.e.c)	CF	CSI
Butea monosperma	5	Management (i)	2	1	2			
		Preference (e)	2	1	2			
		Frequency (c)	2	1	1			
		(i*e*c)	8	1	4	13	0.5	6.5
Curcuma longa	10	Management (i)	2	2	2			
		Preference (e)	2	2	2			
		Frequency (c)	2	2	2			
		(i*e*c)	8	8	8	24	1	24
Impatiens balsamina	8	Management (i)	2	1	2			
		Preference (e)	2	1	2			
		Frequency (c)	2	1	1			
		(i*e*c)	8	1	4	13	0.8	10.4
Juglans regia	9	Management (i)	2	2	1			
		Preference (e)	2	2	1			
		Frequency (c)	2	2	1			
		(i*e*c)	8	8	1	17	0.9	15.3
Lawsonia inermis	9	Management (i)	2	1	2			

		Preference (e)	2	1	2			
		Frequency (c)	2	1	1			
		(i*e*c)	8	1	4	13	0.9	11.7
Mallotus philippensis	6	Management (i)	1	1	1			
		Preference (e)	2	1	2			
		Frequency (c)	2	1	1			
		(i*e*c)	4	1	2	7	0.6	4.2
Oryza sativa	7	Management (i)	2	2	1			
		Preference (e)	2	2	1			
		Frequency (c)	2	2	1			
		(i*e*c)	8	8	1	17	0.7	11.9
Phyllanthus emblica	9	Management (i)	2	2	2			
		Preference (e)	2	2	2			
		Frequency (c)	2	2	2			
		(i*e*c)	8	8	8	24	0.9	21.6
Saccharum officinarum	4	Management (i)	1	2	1			
		Preference (e)	2	2	1			
		Frequency (c)	1	2	1			
		(i*e*c)	2	8	1	11	0.4	4.4
Selaginella chrysocaulos	3	Management (i)	1	1	1			
		Preference (e)	2	1	1			
		Frequency (c)	2	1	1			
		(i*e*c)	4	1	1	6	0.3	1.8

Cultural Significance Index (CSI (as revised by Silva *et al*. [27]

A= no of informant citations for a particular taxon

B= no of informant citations for the most cited taxon X

Correction factor (CF)=A/B

CSI= ∑ (i*e*c) X CF

Species management Variables for a particular species i.e managed= 2, not managed=1

Preference for particular use=2, nonpreference for particular use=1

Frequency for use i.e effective use of species =2, cited use for species =1

Although, the natural dyes have been replaced by the synthetic ones due to fragility, unredeemed colour and less durability. Despite of this, even some natural dyes considered so pure and sacred, that they are used tremendously in various ceremonies and rituals in Hindu culture. This shows great impact on their ethnic life and become indiscernible part of culture. While natural dyes are eco-friendly, non-toxic and less allergic to the human skin. This depleting traditional knowledge required a proper documentation and conservation strategy. Hopefully, the data collated on dye plants in Hamirpur District would be utilized by society due to their least harmful effects.

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References:

1. ML Gulrajani, Introduction to Natural Dyes. Indian Inst. of Tech., New Delhi, 1992
2. MLGulrajani. Present status of natural dyes. *Indian J. Fibre Text. Res.,* 2001
3. R Siva. *Current Science* 92(7), 2007; 916-925.
4. D Mahanta; SC Tiwari. *Current Science 88*, 2005;1474-1480.
5. D Bridson; L Forman. The Herbarium Handbook, Royal Botanic Gardens, Kew, Richmond, Surrey, U.K., 1998.
6. SK Jain; RR. Rao. A Handbook of Field and Herbarium Methods. Todays and Tomorrows Printers and Publishers, New Delhi, 1977..
7. SK Jain; AK Goel. Workshop Exercise-1. Proformafor Field Work. In: Jain, S.K. (Editor). A Manual of Ethnobotany. Scientific Publisher, Jodhpur, 142-147; 1995.
8. VA Silva; L Andrade, UP Albuquerque. Field Method 18 (1), 2006; 98-108.