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Studies on Plant based Natural Colours

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Abstract:

Traditional use of plant based natural dyes in India is known since ages. Natural dyes find use in the coloring of textiles, food, drugs, cosmetics, etc. In India, there are several plants which can yield dyes. In addition to their dye yielding uniqueness, some of these plants also possess medicinal value. Natural dyes are colorants obtained from natural resources, used in textiles industries, for colouring of crafts, in cosmetics, etc. A variety of attractive natural colours ranging from yellow to black exists in the nature. These colours are exhibited by various organic and inorganic molecules and their combinations become visible due to the absorption of light in the visible region of 400-800nm Chengaiah, (2010). Although indigenous knowledge system has been practiced over the years in the past, the use of natural dyes has diminished over generations due to lack of documentation. Also there is not much information available on databases of either dye yielding plants or their products.

The study was conducted on 13 plant species grow in Maharashtra. After drying in the shade plant material was mechanically powdered. 100

gm of each powder used for ethanol extraction by using Soxhlet apparatus. The results were incredible that plants shown amazing colours. The studies like, sensitivity of colour at different pH and heat were carried out. Of these, 5 plants have shown change in colour at different pH. Heat sensitivity studies carried out by mixing colours in milk, in this 11 plant colours do not show any change in colour while there was precipitation of milk in case of 2 plants.

The colours obtained were applied on muslin cloth, talcum powder and cheese to observe their applications so as to use these different pigments as coloring agents.

Keywords: Plants, Natural dyes, pH studies, Maharashtra.

Introduction:

Now a day the demand for natural dyes has been growing in the context of environmental safety throughout the globe. In many of the world's developing countries, as natural dyes can offer not only a rich and varied source of dyestuff, but also the possibility of an income through sustainable harvest and sale of these dye plants. Natural dyes have a far superior aesthetic quality which is much more pleasing to the eye. Wearing a natural dyed textile gives a feeling of being with the nature which the consumers are able to enjoy today.

Using of synthetic dye particularly in food, cosmetics and medicine is a possible reason for skin and several other cancers. And due to this the

natural dyes are widely looked for due to its biodegradability and low toxicity and can be employed in the dyeing of natural and synthetic fibres (Cotineli, et al, 2002; Lobato et al., 2001).

In India the art of natural dyeing is known since time immemorial. Natural dyes find use in the colouring of textiles, drugs, cosmetics, etc. Owing to their nontoxic effects, they are also used for colouring various food products. In India, there are more than 150 plants that can yield dyes. In addition to their dye-yielding characteristics, some of these plants also possess medicinal value. Though there is a large plant resource base, little has been exploited so far. Due to lack of availability of precise technical knowledge on the extracting and dyeing technique, it has not commercially succeeded like the synthetic dyes. Although indigenous knowledge system has been practiced over the years in the past, the use of natural dyes has diminished over generations due to lack of documentation. Also there is not much information Natural dyes are now a days in demand not only in textile industry but in cosmetics, leather, food and pharmaceuticals. The rich biodiversity of our country has provided us plenty of raw materials, yet sustainable linkage must be developed between cultivation, collection and their use (Gokhale et. al, 2004).

Natural dyes are preferred because they are non-allergic, non-carcinogenic and have lesser toxicity than the synthetic dyes. On top of their lesser side effects some plants are also used traditionally for medicinal purposes and some of these have recently been shown to possess antimicrobial activity (Hussein, et. al., 1997). In the present work

screening of the plants for the availability of natural dyes, their extraction and some basic applications have been studied.

Methodology:

- Plants based on traditional leads were short listed and collected from different parts of Maharashtra.
- Screening of the material was based on traditional leads and field experiences. Major literature consulted for known uses is, Jain (1991), Sharma, & Patil (2008), Vijigiri &. Sharma (2012), Sharma and Savant (2012), Gayake & Sharma (2012), Mulay and Sharma (2012), Vijigiri, et al (2013) and Karande and Sharma. (2014).
- Plant parts were cut into small pieces and after drying in the shade plant material was mechanically powdered. 100 gm of each powder used for ethanol extraction by using Soxhlet apparatus for extraction.
- Then it was filtered and the filtrate was collected in a separate beaker.
- pH studies: The studies like, sensitivity of colour at different pH by using pH meter and colour change at different pH recorded.
- Heat sensitivity: Tests were carried out by mixing the dye in milk and heated on burner for 5 minutes, if there is precipitation in the milk dye considered as sensitive to heat.
- Applications: The colours obtained were applied on muslin cloth, talcum powder and cheese to observe their applications so as to use these different pigments as coloring agents.

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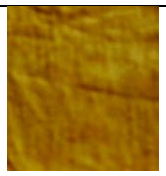
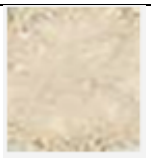
Results:

Following is table showing extracted dye applied on fabric, talcum poder and 'chakka'.

Plant Name	***Plant Part***	***Application / Appearance of colour on***			
		In Ethanol	***On muslin cloth***	***On Talcum powder***	***On Cheese***
Hibiscus sabdariffa	Red colour calyx				
Lawsonia innermis	Leaves				
Azadirachta indica	Bark				
Tectona grandis	Tender Leaves				
Clerodendrum viscum Vent.	Root				

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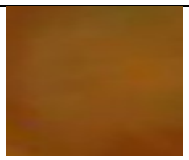
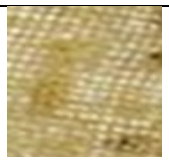
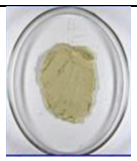
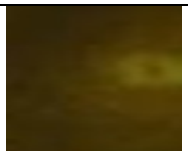
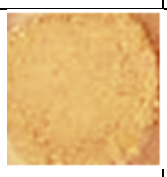
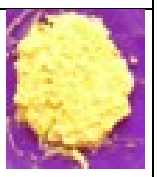
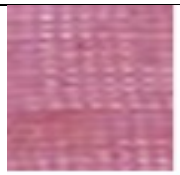
Holarrheana pubescens (Buch.-Hom.)	Fruit				
Argemone mexicana L.	Stem				
Nyctanthes arbor-tristis	Flower				
Hygrophilla schulli (Buch. - Ham.) M.R.	Root & Stem				
Bridelia retusa (L.)	Fruit rind				
Cassia uniflora Mill.	Seed				
Chrozophora rottleri (Gies.) Juss.	Root & stem				
Calotropis gigantea (L.) Ail.	Root				

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pH Studies: Following 6 plant species shown change in colour at different pH.

Sr. No.	Plant Code No.	PH	Colour
1.	*Clerodendrum viscum* Vent.	6.94*	Brownish
		4.0	No change
		8.9	Dull Yellow
2.	*Holarrheana pubescens* (Buch.-Hom.)	5.9*	Brown
		4.0	No change
		9.0	Yellow
3.	*Cassia uniflora* Mill.	4.2*	Yellow
		7.0	No change
		9.0	Yellowish-pink
4.	*Calotropis gigantea* (L.) Ail.	6.9*	Dull yellow
		4.0	No change
		9.0	Bright yellow
5.	*Hygrophilla schulli* (Buch. - Ham.) M.R.	4.0*	Brown
		6.6	No change
		9.0	Grayish-brown

(Star (*) mark denotes the actual pH of the extract)

Discussion:

Out of the total 13 plant materials mentioned in the paper, bark of *Azadirachta indica,* seed of *Cassia uniflora,* root of *Calotropis gigantea* and stem of *Argemone mexicana* show yellowish colour in ethnol.

The calyx of *Hibiscus sabdariffa* and calyx of *Hibiscus sabdariffa*, flower of *Nyctanthes arbor-tristis* show orange shade.

Bark of *Azadirachta indica,* root of *Clerodendrum viscum, Root and stem of Hygrophilla schulli* and fruit of *Holarrheana pubescens* show brownish shade.

While Tender leaves of *Tectona grandis, Lawsoni innermis* show dark ochre to grey shades.

pH studies revealed that *Hibiscus sabdariffa, Lawsonia innermis, Azadirachta indica, Tectona grandis, Argemone mexicana , Nyctanthes arbor-tristis, Bridelia retusa* and *Chrozophora rottleri show no any change in colour. While remaining plants show change in colour at different pH.*

In case of heat sensitivity studies the plant colours were mixed in the milk at heated for 5 minutes in boiling condition the plants *Argemone mexicana* and *Bridelia retusa* species show precipitation.

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