



ORIGINAL RESEARCH PAPER

Home Science

EXTRACTION OF NATURAL DYE POWDER FROM YELLOW LEAVES OF ARTOCARPUS HETEROPHYLLUS (JACK FRUIT TREE)

KEY WORDS: Artocarpus heterophyllus, Antioxidant activity, Carotenes, Yeast and mold count

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ABSTRACT

Dyeing is an integral part of which textile coloration is done to make the fabric lively. Consumers are becoming increasingly conscious to environmental friendly consumer goods and much concerned about green processing. The tendency for eco-friendliness in textiles is important as it comes in contact with the skin for a prolonged period of time. The present study deals with the use of dye powder extract of yellow leaves of jack fruit tree as a dye. The yellow leaves are selected to extract the dye powder. Carotenoids was found to be the coloring pigment of the dye. The different properties dye powder were determined. The dye powder has good shelf life/ durability, when compared to other natural dyes. It has good antioxidant property, which would not cause any harmful effects on living things and to the environment. The extracted dye powder had good amount of carotenoid, the color giving pigment of the dye. The powder extracted from the yellow leaves of Artocarpus heterophyllus, is considered as a natural dye powder without any use of chemicals for preservation. 100g of leaves can produce approximately 6.75g of dye powder.

INTRODUCTION

Natural dyes were the main source of colorants for textiles until the end of 19th century. However, after the discovery of synthetic dyes, natural dyes, were completely replaced by them. Synthetic dyes are produced from cheap petroleum sources. The synthetic dyes are suspected to release harmful chemicals that are allergic, carcinogenic and detrimental to our environment and human body. Natural dyes have better biodegradability with the environment. They are non - toxic, non - allergic to skin, non - carcinogenic, easily available and renewable.

The yellow jackfruit leaves are available widely when green leaves mature and falls. It contains sufficient amount of carotenoid, which is an orange pigment. These pigments impart a brilliant yellow-orange color for the falling leaves. Those leaves can be used as natural dye, for imparting color to textile materials, which would otherwise be considered as a waste. Now a days the prevalence of natural dyes are increasing as the consumers are concerned about green processing. The eco-friendly practices in textile is important as it comes in contact with the skin for a prolonged period of time. Present study focuses on the dye ability of cotton fabric with dye powder extract from the yellow leaves of Artocarpus heterophyllus (jack fruit tree). The extracted dye powder from the yellow leaf of the jack fruit tree (Artocarpus heterophyllus), is used as a natural dye for textile materials.

OBJECTIVES

- To extract dye powder from the yellow leaves of Artocarpus heterophyllus (jack fruit tree leaves).
- To identify the carotenoid amount, antioxidant and antimicrobial properties of dye stuff.
- To introduce a new powdered natural dye for textile material.

2. METHODOLOGY

2.1 Dye powder

The extracted dye powder from the yellow leaf of the jack fruit tree (Artocarpus heterophyllus), is used as a dye. It is a powder having dark maroon, color. Carotenoids are found to be the coloring matter in the extracts.

2.2 Dye powder extraction

The yellow jackfruit leaves are available widely when the green leaves mature and falls. Good yellow leaves are collected, which are not dried. The selected ripen jack fruit leaf is washed properly. They are cut in to small pieces and damage leaves were removed. The leaf pieces are grinded in the mixer jar along with one fourth amount of water. The grinded leaf solution are collected in a container. Boil this mixture very well, until the color changes to dark red. Then it is kept for dry. Then this solution want to filter adequately. The filtration is to be done primarily with a ordinary

sewer to separate large sized impurities (large plant residues) and the secondary filtration is done in a muslin cloth, to separate the small sized impurities (finely powdered plant matter). The colored water filtrate is poured in several flat containers and dried in sunlight. After the evaporation of water, the color along will stick hardly on the container. After that the sticky color, is scraped out using a knife. The powder is collected and stored in a air tight container.

3. TEST METHOD

3.1 Determination of total yeast and mold count of the dye powder

This test is done to know the durability of the dye powder. As it is a natural dye powder extract from the leaves without any preservatives, there is a chance of bacterial growth, which leads to the decaying of the dye power. It is done according to USFD BAM 8th edition, April, 2001, chap 18, in an analytical laboratory. It is FDA's bacteriological analytical manual.

3.2. Evaluation of antioxidant activity of the dye powder

Ic50 value for DPPH radical scavenging assay method is used to determine the antioxidant activity of the dye powder extract. The test is carried in an analytical laboratory. The DPPH free radical scavenging activity of dye powder extracts was determined using a 2x10⁻⁴m DPPH solution.

3.3. Determination of carotenoids in the dye powder

The test method used to determine the carotenoid is CKL/ANL/UV-007. The test is carried out a laboratory. This method is based on solvent extraction followed by UV-V spectrometric detection.

4. RESULT AND DISCUSSION

4.1 The dye powder extracted from the yellow leaves of Artocarpus heterophyllus[jack fruit tree

The dye powder extracted from the yellow leaves of Artocarpus heterophyllus can be used for fabric dyeing, as the leaf contains a color giving pigment called carotenoids. It is also considered as a natural dye, because no chemicals are used in any step of its production.



Dye powder extract

4.2 Test results of the dye powder

Sl.no.	Parameters	Result	Test method
1	Antioxidant activity	6.33mg/L	CKL/ANL/UV-004
2	Carotenes	1.48mg/gm.	CKL/ANL/UV-007
3	Total yeast and mold count	1500cfu/g	USFDA BAM 8 th Edition, April 2001, chap18

4.3 The total amount of yeast and mold in the dye powder

The result proves that, the dye powder has good self-life and it can also be increased by applying some sterilization methods like autoclaving (it is a laboratory method, killing microbes by hydrolysis and coagulation of cellular proteins), dry heat (kill microbes by oxidation of cellular components) etc.

4.4 Antioxidant activity

Antioxidant activity of the dye powder is determined, to prove that it would not cause any cell damage or any other harmful effects on the living things. An antioxidant is a molecule that inhibits the oxidation of other molecules. Oxidation is a chemical reaction that can produce free radicals, leading to chain reactions that may damage living cells. So it is proven that the dye powder contain antioxidants.

4.5 Total amount of carotenoid

In the present study, it is determined that Carotenoids are the color giving pigments of the dye powder. So it is necessary to estimate the amount of carotenoids present in one gram of dye powder. It is proven that, the amount of carotenoid is 1.48 mg/gm.

SUMMARY AND CONCLUSION

Consumers account for a major impact on green growth by purchasing products that have desirable environmental properties such as recyclability, and energy efficiency, and by modifying their behavior to support environmental goals. Unlike synthetic dyes, natural dyes are not dependent on non-renewable resources. With the current increase in environmental awareness people are more inclined to wear natural fibers and natural Color. Dye powder obtained from the yellow leaves of the *Artocarpus heterophyllus* (jack fruit tree), which otherwise is a waste, is proving its application in dyeing. Apart from being an ecofriendly product, its production and use is economical and helps sustainable development. The present study deals with the use of dye powder extract of yellow leaves of jack fruit tree as a dye. The yellow leaves are selected to extract the dye powder. The different properties of dye powder are determined. The color of the dye powder is dark maroon color. From the result of the dye powder property evaluation, it is determined that the dye powder extract contain only small amount of yeast and mold, so the durability/shelf life of the dye powder extract is very high. As antioxidant property is determined for the dye powder, it is proven that it would not cause any harmful effects on the living beings and as well as to the environment. It is evaluated that, there is a sufficient quantity of carotenoid in the dye powder extract which would not be destroyed as aging occurs.

The dye powder extracted from yellow leaves of *Artocarpus heterophyllus* (jack fruit tree) had good shelf life/ durability, when compared to other natural dyes. It has good antioxidant property, which would not cause any harmful effects on living things and to the environment. The extracted dye powder had good amount of carotenoid, the color giving pigment of the dye. The powder extracted from the yellow leaves of *Artocarpus heterophyllus*, is considered as a natural dye powder without any use of chemicals for preservation. 100g of leaves can produce approximately 6.75g of dye powder.

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