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Journal of Advanced Scientific Research

Available online through http://www.sciensage.info/jasr

ISSN
0976-9595
Short Communication

EXTRACTION OF NATURAL DYE (XANTHOPHYLL) FROM MARIGOLD FLOWER

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ABSTRACT

Marigold flower [*Tagetes erecta* L.], a major source of carotenoids and Lutin, is grown as a cut flower and in addition being grown for its medicinal values. Marigold flowers [Tagetes], which are yellow to orange red in colour, are a rich source of lutein, a carotenoid pigment. Nowadays, Lutein is becoming an increasingly popular active ingredient used in the Food Industry and Textile coloration.This pigment has acquired greater significance because of its excellent colour value. Although marigold flower extract has been used in veterinary feeds, the potential use of marigold as a natural textile colorant has not been exploited to its full extent. This is due to the lack of information on its safety, stability, and compatibility in textile coloration. In this study, an experiment was conducted to study the use of an extract isolated from marigold as a natural dye. The dye potential of the extract was evaluated by dyeing, using the flower, in 100 % cotton fabrics under normal dyeing conditions. Studies of the dye concentration and pH were undertaken. The surface colour was not affected by washing, and the quality of the flower was maintained even washing at 60°C for 30 minutes. Studies have indicated that the change of some of the colors have been noticed after washing with soap. These findings reveal that the extract of marigold flower can be used for coloration of 100 % cotton, silk, and wool fabrics. This article deals with the chemistry, processing, and stability of the pigment and its applications in textile coloration and medicinal values.

Keywords: Flower, floral dye, dying, *Tagetes erecta*.

1. INTRODUCTION

Dyeing is an ancient art, which predates written records. It was practiced during the Bronze Age in Europe. Primitive dyeing techniques included sticking plants to fabric or rubbing crushed pigments into cloth. The methods became more sophisticated over time and techniques were developed using natural dyes from crushed fruits, berries and other plants, which were boiled into the fabric and gave light and water fastness [resistance]. In many of the world's developing countries, however, 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.

Many dyes are available from tree waste or can be easily grown in market gardens. In areas where synthetic dyes, mordants [fixatives] and other additives are imported and are therefore relatively expensive, natural dyes can offer an attractive alternative. Presently there is an excessive use of synthetic dyes, estimated at around 10,000,000 tons per annum, the production and application of which release vast amounts of waste and unfixed colorants, causing serious health hazards and disturbing the eco-balance of nature.

Currently, ecological considerations are becoming important factors in the selection of consumer goods all over the world. Since the mid-1980s, more interest has been shown in the use of natural dyes and a limited number of commercial dyes, and small businesses have started to look at the possibility of using natural dyes for colouration of commercial dyes, and small businesses have started to look at the possibility of using natural dyes for colouration. At present, large and small-scale industries have begun exploring the use of natural colorants as a possible means of producing an ecologically sound product which would also appeal to the "Green-minded" consumer. In this study, colour pigments were isolated from the marigold flower [*Tagetes erecta*] and studied in order to understand the processes taking place during its usage in textile coloration.

2. MATERIAL AND METHODS

Material

A dark yellow variety of marigold flowers were collected.

Substrates

Desized and scoured cotton, bleached, and silk fabrics were used for dyeing.

Chemicals [1]

Alum, copper sulphate, stannous chloride and ferrous sulphate.

Methods [2]

The dyeing of cotton and silk with marigold flower was carried out in four stages; Pre-Treatment, Extraction of dyes from flower, Mordanting (fixing dye with fiber) and dyeing. We carried out the extraction in two methods; they are conventional method and soxhlet extraction method.

Coventional Method [3]

The basic extraction process we carried out in our experimentation was using conventional method that was the sample (flowers) from which dye was to be extracted was taken in round bottom flask, which was a measured quantity and solvent (methanol/ethanol) was taken in the same round bottom flask and heated in water bath for about 30min, 60min, 90min &120min respectively. A condenser was fitted over the round bottom flask in order to condense the vapors coming out while healing. After the extract time was completed, the residue with solvent was taken out and cooled and the filtration was carried out to separate the residue and solvent. The residue was then weighed and dried and once again weighed. This residue can be used as feeding material for plants (bio fertilizer).

Soxhlet Extraction Method [2]

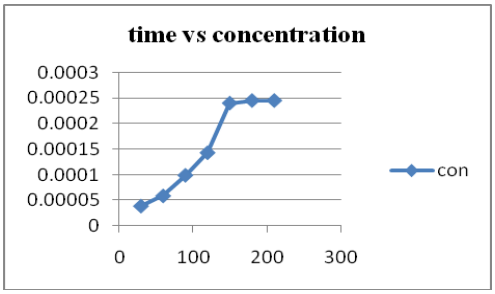
We carried out this extraction method in order to avoid the filtration of the solvent and residue and also to obtain better efficiency of separation .in this method, the weighed quantity of feed or raw material and measured volume of solvent were taken in certain F/S ratio [2]. The raw material was kept in thimble of soxhlet extractor and the solvent was poured in the round bottom flask and a condenser with high flow rate of water is fitted over it [1]. For a particular time intervals (say 30 min) the extraction was carried out and the dye solution was then measured and concentration were calculated. We carried out trials of 1:10, 1:15, 1:20 for 30min, 90min, 120min &180min [4] respectively and the reduction in the weight of sample taken was measured as the amount of xanthophyll extracted (assumed only xanthophylls is extracted) because of me re quantity of other compound in it and the concentration were measured.

3. RESULTS AND DISCUSSION

The values of concentration were calculated and a graph was drawn between time and concentration.

Time (minutes)	Concentration (gmol/lt)
30	0.000038
60	0.00005868
90	0.000099
120	0.000143
180	0.00024
210	0.00024

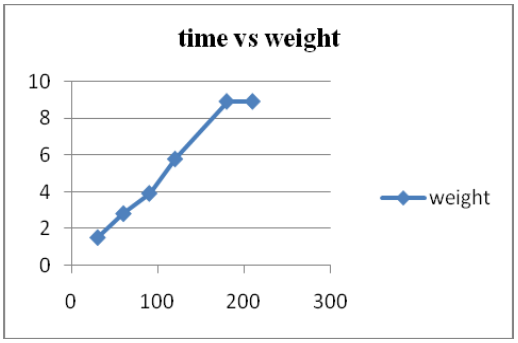
The graph shown below indicates time on x-axis and concentration on y-axis. This also indicates the effect of time with concentration.



We also measured the weight of the dye sample during each stage and tabulated.

TIME (minutes)	WEIGHT (gm)
30	1.5
60	2.8
90	3.4
120	5.77
180	8.9
210	8.9

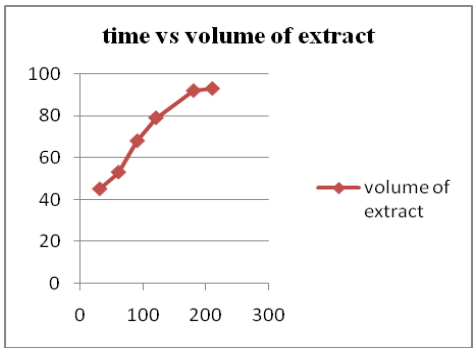
The graph shown below shows time on x-axis and weight of the dye on y- axis.



We also measured the volume of extract for each period as shown below.

Time (minutes)	Volume of the extract (ml)
30	45
60	53
90	68
120	79
180	92
210	93

The graph shown below indicates that x axis is time and y axis is volume of extract.



As we stated above, the tabulations and graphs clearly shows that the maximum concentration, maximum weight of the dye and maximum volume of the extract were obtained at three hours (180 minutes). And it also shows that no extraction takes place after 180 minutes. The pH of the dye sample obtained is also found to be around 6.77 and It is also found that the residue left after filtration in the conventional method [5] and the flower sample left after extraction can be used as fertilizer and animal feed. And more over the dye which is obtained is applied to the fabric [6], which is treated with the suitable mordant like ferrous sulphate and alum. The fabric after drying also showed better withstanding properties such as colour fastness and light fastness.

4. REFERENCES

1. Bhattacharya Shah, *Journal of society for dyers and chemicals*. 2000.
2. Ghorpade, Darvekar and vankar, *Eco friendly cotton dying with marigold flower* (2000).
3. Salikhov, S.A.Idrikhodzhadev. *Prospective colouring for the food industry* (1998).
4. Vankar, Chemistry of natural dyes (2000).
5. Stead, *Recent advances in dye stuffs chemistry, chem Britain* (2001).
6. Indian Standards Institution, Handbook of textile testing, Manak Bhawan, New Delhi.