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Research Paper :

Dyeing of cotton and silk fabrics using stem of *Achras sapota* extract: Effects of mordanting and dyeing process variables on colour yield and colour fastness properties

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ABSTRACT

Eco-friendliness is one of the priority concerned in the textile industry where natural dyes can be used instead of synthetic dyes. The present study deals with an attempt which has been made to obtain dye extract from the stem of *Achras sapota*. Conventionally bleached cotton and silk fabrics have been subjected to pre, post and simultaneous mordanting with selective mordants using myrobolan (harda) and other mordants (metallic salts) followed by dyeing with ethanol extract of stem of *Achras sapota*. It is observed that the application of 3 per cent of $Al_2(SO_4)_3$ and 3 per cent of FeSO₄ have been identified as two better prospective mordanting system. The study on the effect of dyeing process variables on surface colour strength indicates that the 60 min. dyeing time, 60°C dyeing temperature, 1:20 material-to-liquor ratio, 3 per cent mordant concentration, 5 per cent dye concentration and 5g l⁻¹ common salt are the optimum values with minor differences among the different fibre- mordant system studied. This study also includes the comparison of mordanting techniques as well as dying properties and visualizes the effect of myrobolan and metallic mordants. Colour fastnesses to washing, rubbing, light fastness and perspiration of cotton and silk fabrics dyed with and without mordants have also been studied.

KEY WORDS : Achras sapota, Cotton, Light fastness, Mordant, Myrobolan, Perspiration, Rubbing, Silk

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Recently, interest in the use of natural dyes has been growing rapidly due to the result of stringent environmental standards imposed by many countries in response to toxic and allergic reactions associated with synthetic dyes¹. Until about 150 years ago all dyes were natural substances, derived mainly from plants and animals. The natural dyes present in plants and animals are pigmentary molecules² which impart colour to the materials. With the world becoming more conscious towards ecology and environment, there is greater need today to revive the tradition of natural dye and dyeing techniques as an alternative of hazardous synthetic dyes is an extremely crude.

There are several plants/plant parts that provide natural dyes which are used in the textile industry. However, the common drawbacks of natural dyes are their non-reproducible and non-uniform shades, poor to moderate colour fastness and lack of scientific information on the chemistry of dyeing and standardised dyeing methods ^{3,4}. Many reports are available on application of natural dyes on silk^{5,6} and cotton^{7,8}. The present investigation deals with the extraction of natural dyes from the stem extract of the plant *Achras sapota* that grows in all warm and damp parts of India and is considered to be one of the most useful trees in the world.

The aim of present work is to prepare eco-friendly natural dyes from the stem of *Achras sapota* for dying of cotton and silk fabrics. The stem extract of the plant *Achras sapota* produces a brown solution. In the present work an attempt has been made to study the effect of mordanting and dyeing properties⁹ of cotton and silk fabrics such as, washing, rubbing, light fastness and perspiration¹⁰ and also to visualize the effect of myrobolan and metallic mordants which have been undertaken.

EXPERIMENTAL METHODOLOGY

Conventionally designed, scoured and $H_2O_2(1\%)$ bleached plain weave cotton fabric (220 ends/ dm,180