Project title: Utilization of forest biomass through value added application as source of natural dyes
Name of PI : Dr. Y.C. Tripathi
Year of Project duration : 2017-2021
Funding agency's full name : Indian Council of Forestry Research & Education, Dehradun.
(font size-18)

- **Overview of project : This project aimed to identify new plant sources of natural dyes for safe and ecofriendly textile finishing. Globally, plant-based dyes are recognized for their non-toxic, eco-friendly qualities, making them sought-after alternatives to synthetic dyes. Among ten species screened, *Cassia occidentalis, Mimosa himalayana,* and *Prosopis juliflora* were selected for detailed investigations based on their dye yield and performance on silk, wool, and cotton fabrics. Results highlighted these plants as promising natural dye sources, providing vibrant shades with excellent colorfastness. This contributes significantly to the inventory of natural dyes, meeting the escalating demand for eco-friendly alternatives in textile industry, and reinforces the importance of sustainable practices in modern textile production.**

Objectives :

Assessment of selected plant species to explore potential source of natural dye.

Development of natural dyes of varying shades from promising species.

Impact of batch extractions, simultaneous dyeing and herbal mordanting on cost and energy efficiency of process and product quality suitable for textile dyeing.

Significant findings / outcome : Optimized extraction conditions for dyes from *Cassia occidentalis (*CO*), Mimosa himalayana* (MH*), and Prosopis juliflora* (PJ) resulted in high yields (CO 18.50%, MH 19.33%, PJ 16.35%). Optimization of dyeing parameters and appropriate mordanting afforded a range of attractive and acceptable shades on silk and wool with excellent colorfastness. Cotton performance ranged from average to good. Cost analysis revealed simultaneous extraction and dyeing as cost-effective for professional dyers, weavers and cottage industries engaged in weaving and dyeing, while batch extraction suits marketable dye products like dye concentrates or dye powder.

Conclusion: Natural dyes from *Cassia occidentalis, Mimosa himalayana*, and *Prosopis juliflora* demonstrated the ability to produce vibrant shades on silk and wool with excellent colorfastness. The results suggest these plants as potential and commercially feasible sources of natural dyes, expanding the inventory.

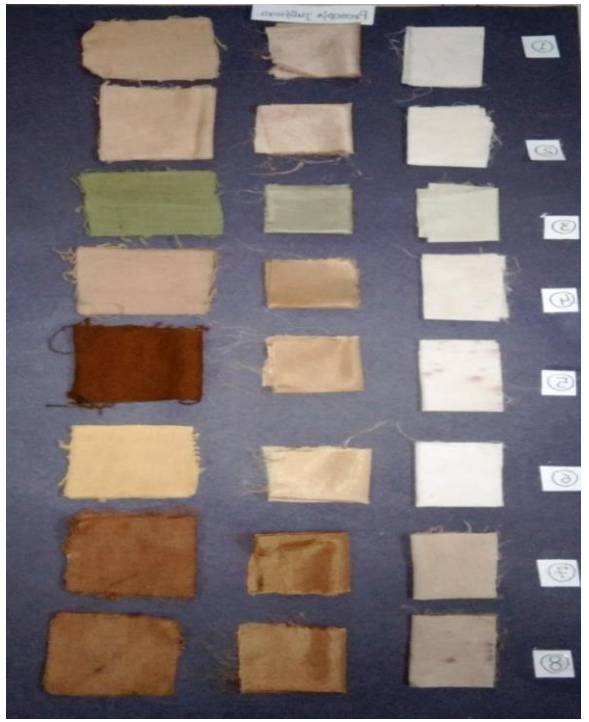
- **Extension aspect / Practical utility of the findings : Research outcomes are field-ready and beneficial for dyers, NGOs, researchers, SFDs and natural dye industries. Encouraging the use of natural dyes from *Cassia occidentalis, Mimosa himalayana,* and *Prosopis juliflora*, organized training programs, and promotional materials can enhance awareness and utilization, benefitting the sector and supporting sustainable practices.**

Any 01 or 02 Images /Graphics (jpeg/png) of the research project

(note : a single image / graphics can be designed to communicate the overall message of the research finding)

Wool, Silk & Cotton Fabrics dyed with *Mimosa himalayana* Dye

Wool, Silk & Cotton Fabrics dyed with *Cassia occidentalis* Dye



Wool, Silk & Cotton Fabrics dyed with *Prosopis juliflora* Dye