



Empowering Rural Women through Herbal Colour Making: A Pathway to Sustainable Agriculture and Economic Growth

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INTRODUCTION

Bringing herbal colour production into mainstream agriculture opens up new and meaningful opportunities for empowering farmers, particularly those living in rural and semi-rural parts of India. As the world increasingly shifts toward sustainable lifestyles and conscious consumerism, the demand for natural and ethically produced goods has surged. Herbal dyes—derived from plants—are gaining popularity as a vibrant alternative that bridges the wisdom of traditional practices with today’s environmental and economic goals. Rooted in centuries of indigenous knowledge, the use of plant-based dyes taps into time-tested ethnobotanical traditions. These dyes, extracted from sources like the leaves of *Indigofera tinctoria* (indigo), roots of *Rubia cordifolia* (madder), rhizomes of *Curcuma longa* (turmeric), and flowers of *Tagetes* species (marigold), are biodegradable, non-toxic, and safe for both humans and ecosystems. Their cultivation not only helps preserve biodiversity but also encourages environmentally responsible farming methods such as organic and regenerative agriculture.

Economically, herbal colour production provides a valuable diversification option for farmers. It enables them to reduce their dependence on conventional crop cycles and tap into the growing global appetite for sustainable, artisanal, and culturally authentic products. With the natural dye market projected to reach approximately USD 2.3 billion by 2033, there is significant potential for farmers to earn higher incomes—whether through direct cultivation, small-scale processing, or participation in value-added activities like natural fabric dyeing and craft production. This initiative also aligns closely with several United Nations Sustainable Development Goals (SDGs), such as promoting sustainable consumption (SDG 12), boosting inclusive economic growth (SDG 8), and supporting climate-friendly practices (SDG 13). Importantly, it also helps protect and revitalize cultural traditions, especially in tribal and rural communities where dye-making is deeply interwoven with local heritage and identity.



In essence, integrating herbal colour production into agriculture is more than just a profitable venture—it's a comprehensive approach to sustainable rural development. It strengthens self-reliance among farmers, opens up new income streams through value-added activities, and supports the larger vision of environmentally conscious and culturally respectful progress. This approach not only nurtures livelihoods but also cultivates pride in preserving India's rich heritage and biodiversity.

The Rich Tradition of Herbal Colours in Indian Agriculture

- **Historical Significance and Traditional Knowledge:** The use of plant-based dyes in India is not just a craft—it's a reflection of a rich cultural legacy that has been closely intertwined with agriculture for centuries. Across many regions, traditional communities have carefully passed down the knowledge of how to extract vibrant, lasting colours from a wide range of plants. This time-honoured wisdom reflects a deep connection between people, nature, and farming practices.

For instance, in areas like Central Himachal Pradesh, researchers have identified at least 17 different species of dye-producing plants, spread across 13 plant families and 17 genera. This diversity showcases the ecological richness and traditional ecological knowledge embedded in these practices. These dye-yielding plants have long been grown and used not only for colouring fabrics but also for their medicinal, cultural, and environmental benefits—demonstrating their broader role in sustaining both livelihoods and biodiversity. Through generations, such practices have remained an essential part of India's agricultural and cultural identity.

- **Diversity of Dye-Yielding Plants and Their Applications:** India's tradition of natural dyeing draws from an incredible variety of plants, each offering its own unique shade and cultural significance. From bright reds to deep blues and earthy greens, the natural colour palette created from botanical sources is as diverse as the country's landscapes. Take the *Palash* flower—also known as *Dhak* or *Tesu*—for example. Its fiery orange hue has been used for centuries, especially during festivals like Holi, where herbal colours hold both symbolic and ecological value.

Other common sources include marigolds and yellow chrysanthemums, which yield golden tones, while flowers like hibiscus, rose petals, and the burans (rhododendron) of Uttarakhand are prized for their rich red and pink shades. For blues, plants such as indigo (*Indigofera tinctoria*) and blue hibiscus are commonly used, while greens are often obtained from everyday plants like mehendi (henna) leaves, spinach, mint, and moringa. This vibrant spectrum, entirely derived from farm-grown plants, showcases the incredible versatility and potential of nature-based dyes.

Interestingly, the methods of extracting and preparing these colours can differ significantly from one region to another, depending on the plant species and local traditions. At places like the Uluberia Ashabhaban Centre, for instance, specific formulations are used to



produce herbal *abir*—a traditional dry colour powder. Their method includes blending 750 grams of talcum powder, 250 grams of arrowroot powder (*ararot*), and 500 grams of finely ground flower petals. Such recipes are not random; they are the result of generations of trial, innovation, and refinement by rural and farming communities.

These traditional techniques represent a treasure trove of indigenous knowledge—valuable not just for cultural preservation but also as intellectual property with immense ecological and commercial potential. They are a testament to the creativity, sustainability, and wisdom embedded in India’s agricultural heritage.

Market Potential and Economic Opportunities

- **Economic Potential and Market Growth of Herbal Colours:**The natural dye industry is experiencing impressive growth, signaling strong economic potential for farmers and entrepreneurs alike. As of 2024, the global market for horticultural dyes is estimated at USD 1.2 billion and is expected to nearly double to USD 2.3 billion by 2033. This projected growth—at a steady compound annual growth rate (CAGR) of 8.1%—is largely fueled by rising consumer awareness about the environmental and health risks associated with synthetic dyes. This shift in preference is opening up new avenues for farmers who cultivate dye-producing plants.

The floriculture sector also plays a vital role in this trend. In 2021 alone, the floriculture industry in the United States was valued at around \$4.5 billion, with ornamental plants accounting for a large share. This underscores the growing demand for flowers not only as decorative items but also as raw materials in herbal dye production.

- **High Market Value Through Natural Appeal**

One of the most attractive aspects of herbal colour production is the premium pricing it commands. Natural, plant-based dyes are in high demand in both local and global markets, and consumers are willing to pay more for products that are eco-friendly, chemical-free, and culturally authentic.

Take the example of herbal *abir* (dry colour powder) produced at the Uluberia Ashabhaban Centre. Prices vary by flower source but are consistently high compared to conventional agricultural products. Marigold-based colours are sold at Rs 40 for 100 grams, Rs 175 for 500 grams, and Rs 300 per kilogram. Colours made from *Palash* and *Aparajita* flowers are even more valuable, priced at Rs 50 per 100 grams and Rs 400 per kilogram. Rose-based colours fetch the highest rates—Rs 60 per 100 grams and Rs 500 per kilogram. These figures highlight the significant profit potential through value addition and processing.

- **Diversifying Farmer Incomes Sustainably:**Herbal dye production also offers a practical way for farmers to diversify their income sources beyond traditional crops like



rice, wheat, or maize. By incorporating dye plants into their agricultural systems, farmers can build greater financial resilience, especially in times when staple crop prices are unstable or market demand fluctuates.

Moreover, many dye-yielding plants have seasonal growth cycles that align well with regular farming calendars. This allows for efficient land use throughout the year, without disrupting existing farming routines. Additionally, rotating dye crops with food crops can improve soil health and biodiversity, aligning with sustainable farming principles. In this way, herbal colour cultivation not only supports economic well-being but also promotes ecological balance and long-term sustainability in rural communities.

Sustainable Agricultural Practices through Herbal Colour Cultivation

- **Biodiversity and Ecological Gains from Herbal Dye Farming:** Growing dye-producing plants does more than just generate income—it actively contributes to biodiversity conservation. By cultivating traditional plant varieties used for natural dyes, farmers help preserve species that might otherwise be lost to modern monoculture practices. This enriched plant diversity supports healthier ecosystems by boosting services like natural pollination, pest control, and improved soil fertility. As a result, farming systems become more resilient, productive, and less dependent on synthetic inputs.
- **Eco-Friendly Practices and Reduced Environmental Harm:** One of the key advantages of herbal colour production is its alignment with organic and environmentally responsible farming. Unlike synthetic dyes, which often involve harmful chemicals, herbal dyes are extracted using natural processes that are gentle on the earth. This approach significantly cuts down on chemical use, reducing soil and water contamination and lowering the overall ecological footprint of agriculture. By choosing herbal dyes, both producers and consumers contribute to global sustainability goals and promote cleaner, healthier farming systems.
- **Honouring and Reviving Traditional Agricultural Wisdom:** Reintroducing and supporting herbal dye production also plays a vital role in preserving age-old farming knowledge. Many of the methods used to grow and process dye-yielding plants are deeply rooted in traditional, eco-conscious practices passed down through generations. Encouraging this form of agriculture not only safeguards cultural heritage but also allows these practices to be documented, refined, and adapted to meet today's needs. In doing so, it creates a meaningful bridge between ancestral wisdom and modern agricultural innovation.

Creating Inclusive Value Chains



- **Empowering Marginalized Communities through Herbal Colours:**The herbal colour industry opens up meaningful and inclusive opportunities for communities that are often left out of mainstream economic activities. This includes tribal populations, differently-abled individuals, and rural youth. Initiatives like the one at Uluberia demonstrate how involvement in herbal colour production can uplift livelihoods, foster dignity in work, and promote social equity. By engaging in this sector, marginalized groups are able to build skills, generate income, and contribute to vibrant, community-based economies.
- **Strength in Unity: The Role of Cooperative Models:**Cooperative frameworks play a crucial role in the success of herbal dye production, especially for small-scale farmers. These models allow farmers to pool resources, share knowledge, and work together to maintain consistent quality and meet market demands. Collectively, they gain stronger bargaining power, better market access, and fairer prices for their products. This approach not only supports individual farmers but also encourages sustainable, community-led growth throughout the entire value chain.

Training, Technology, and Academic Partnerships:For the herbal colour sector to grow sustainably, continuous skill development and technology support are essential. Workshops like the one held by Jadavpur University in Uluberia highlight how academic institutions can empower local producers by providing training, technical guidance, and research-based innovation. Expanding such partnerships can significantly improve the efficiency, product quality, and market competitiveness of herbal dye enterprises—while still honoring and preserving the traditional knowledge that forms the foundation of this industry.

Improving security, advancing environmental sustainability and cutting production costs all depend on minimizing losses and waste in the vegetable industry.

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