E-ISSN: 2618-0618
P-ISSN: 2618-060X

NAAS Rating (2025): 5.20
www.agronomyjournals.com
2025; SP-8(9): 50-54
Received: 12-07-2025
Accepted: 13-08-2025

Kusumlata
M.Sc. Department of Floriculture and Landscaping, Mahatma Gandhi University of Horticulture and Forestry, Sankara-Patan, Durg, Chhattisgarh, India

Bharti Sao
Assistant Professor, Department of Floriculture and Landscaping, Mahatma Gandhi University of Horticulture and Forestry, Sankara-Patan, Durg, Chhattisgarh, India

Amit Dixit
Professor, Department of Vegetable Science, Mahatma Gandhi University of Horticulture and Forestry, Sankara-Patan, Durg, Chhattisgarh, India

Neelima Netam
Assistant Professor, Department of Floriculture and Landscaping, Mahatma Gandhi University of Horticulture and Forestry, Sankara-Patan, Durg, Chhattisgarh, India

Rekha Singh
Associate Professor, Department of Agricultural Extension, Mahatma Gandhi University of Horticulture and Forestry, Sankara-Patan, Durg, Chhattisgarh, India

Richa Sao
Assistant Professor, Department of Genetics and Plant Breeding, Mahatma Gandhi University of Horticulture and Forestry, Sankara-Patan, Durg, Chhattisgarh, India

Corresponding Author:
Kusumlata
M.Sc. Department of Floriculture and Landscaping, Mahatma Gandhi University of Horticulture and Forestry, Sankara-Patan, Durg, Chhattisgarh, India

Impact of different compositions on preparation of dhoopbatti from temple flower waste

Kusumlata, Bharti Sao, Amit Dixit, Neelima Netam, Rekha Singh and Richa Sao

DOI: https://www.doi.org/10.33545/2618060X.2025.v8.i9Sa.3721

Abstract
This study investigated the utilization of temple flower waste for the production of eco-friendly incense cones (dhoopbatti) by formulating 10 different combinations of binders and additives, including charcoal, jiggat, cow dung, guggul, orange peel, tulsi, and mint powders. The physical properties (test weight, burning duration, and brittleness), fragrance diffusion, and sensory attributes of the formulations were analyzed using a completely randomized design (CRD) and one-way analysis of variance (ANOVA). Treatment T7 (flower waste 40% + charcoal powder 15% + tulsi powder 20% + jiggat powder 25%) outperformed the other treatments, with the lowest test weight (14.5 g), longest burning duration (29.8 min), least brittleness, slowest fragrance diffusion, and highest sensory score. Treatment T4 (flower waste 40% + charcoal powder 15% + orange peel powder 20% + jiggat powder 25%) ranked second, exhibiting similar improvements in durability, burning time, and aroma retention. Conversely, T1 (flower waste 60% + charcoal powder 40%) exhibited the poorest performance, displaying increased brittleness, shorter burning duration, and rapid fragrance loss. These findings suggest that incorporating Tulsi and orange peels into jiggat significantly enhances the quality of the incense cones. This study demonstrates the potential for converting temple flower waste into value-added products, offering a sustainable waste management solution and promoting the production of high-quality incense for aromatic and cultural applications.

Keywords: Dhoopbatti, temple floral waste, tulsi powder, jiggat powder, fragrance diffusion, orange peel powder

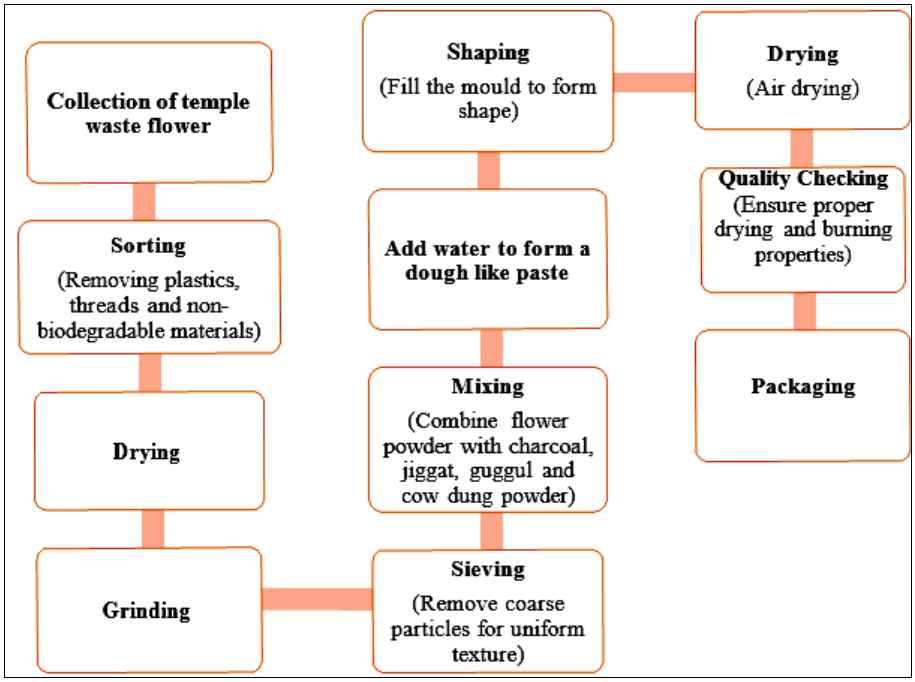
Introduction
In India, religion is a way of life and various religious festivals have been celebrated occasionally. Temples, gurudwaras, churches, dargahs, mosques, etc. host a variety of religious ceremonies, wherein a range of offerings are made to the gods, such as sweets, flower garlands, fruits, etc. Flowers are consumed in enormous quantities during religious festivals that are held across the country. According to recent estimates, over two million tons of flowers are discarded annually throughout India, resulting in a significant amount of floral waste (Ryntathiang *et al.*, 2024) [5]. This includes approximately 800 metric tonnes of flowers supplied daily, most of which are disposed in water bodies. The use of pesticides and other agrochemicals during growth severely pollutes the water (Sharma, 2021) [6]. Unfortunately, the majority of this waste is disposed of in landfills or dumped into rivers and lakes, where it contributes to flooding, water pollution, and harm to aquatic life because of leftover fertilisers and pesticides from flower production (Mishra *et al*., 2023) [4].
Consequently, the amount of flower waste in the temple waste is exceptionally high. Flowers and other trash are discarded into rivers, seas and oceans after serving their purposes, leading to several environmental problems. Common flowers found in many places of worship include hibiscus, marigold, rose, jasmine, and others. Currently, China produces 2785,000 metric tonnes of flowers. The floriculture market is expected to develop at a compound annual growth rate (CAGR) of 20.1% from 2019 to 2024 (Sharma, 2021) [6]. Therefore, floral waste production in India is expected to increase in the future.
If properly recycled, it eliminates the issue of water contaminated or release of greenhouse gases as they rot away. Waste flowers are thoroughly processed so that organic substance can be

utilized to produce agarbatti and dhoopbatti. In India, dhoopbatti, an incense product, is frequently used for meditation, religious ceremonies, and aromatics. In contrast to agarbatti, which is rolled around a bamboo stick, dhoopbatti is formed in a solid cone or cylindrical shape without a supporting stick. Typically, they are created by combining aromatic and flammable materials (Lambole *et al*., 2023). [3] They provide aromatic fragrances, relaxation and stress relief, spiritual and religious uses, insect repellents and air purification. Dhoopbatti is often used in yoga and meditation to create a sacred environment and to strengthen one's relationship with God. Its unique features provide scented traditions and a unique sensory experience (Bhagwat *et al.*, 2024) [2]. Lighting agarbattis and dhoops are common practices in Indian households. Every time an incense is lit, it fills air with a distinct aroma. Incenses are used in all Indian faiths to aid devotion. The natural scents of incense can lift your spirits and help you concentrate.

Incense scents are thought to possess therapeutic properties that are inherently peaceful and soothing. Typically, fragrant ingredients and combustible binder are used to create incense. To make dhoopbatti using tulsi leaves, mint and orange peel powders the components typically include dried and powdered substance, along with other ingredients- such as aromatic resin, essential oils and binding agent such as charcoal powder. These additional components are mixed with raw materials to create the desired fragrance and consistency for dhoopbatti (Bahadur *et al.*, 2020) [1].

Materials and Methods

Flow chart of dhoopbatti making process



Collection and segregation of flowers

The Flowers were collected from various temples across Raipur Chhattisgarh, including Mahadev Ghat Temple, Shree Ram Mandir, Banjari Mata Mandir, and various marriage halls during weddings and festivals. After collection, non-floral and non-biodegradable items- such as plastic threads and wrappers were removed. After being separated and evenly distributed, the viable flower petals were left in the sun for three-five days to fully dehydrate. After drying, the petals were processed into a fine powder using a mixer grinder and stored in airtight containers for use in dhoopbatti preparation.

Fig 1: Flower powder making process

Other ingredients: Charcoal
Charcoal is mostly pure carbon, which is prepared by cooking wood with a low oxygen content. The process can take days and burn off volatile compounds, such as water, methane, hydrogen and tar, leaving approximately 25% of original weight as black lumps and powder. It acts as an adsorbent and is required for proper burning of incense sticks.

Jigat powder
Jigat is a binding substance necessary for the formation of incense cones. The bark of trees- such as *Litsea chinensis*- can be peeled off to separate it. Jigat, which means "sticky" in colloquial language, is used in the Indian state of Karnataka. Currently, 50% of Jigat's demand is met by importing products from Thailand and Malaysia.

Cow Dung Powder
Cow manure contains organic materials with antibacterial properties- such as flavonoids, glycosides, steroids, tannins, and phenols. The medicinal portions of cow waste can be used to treat a wide range of illnesses caused by antibiotic-resistant pathogenic microorganisms.

Guggul Powder
Traditionally, guggul has been used in Ayurvedic medicine as a fragrant resin in incense sticks and perfumes. However, it is not a typical or customary ingredient of dhoopbatti. The specific components of dhoopbatti can vary according to the manufacturer's recipe and the preferred scent.

Orange Peels Powder
Citrus fruits-such as oranges- are members of the Rutaceae family. They are a good source of vitamin C, dietary fibre, and other essential elements. It is rich in flavonoids, essential oils, and other nutrients. Limonene is an oil derived from the peels of citrus fruits, including oranges. Limonene is a widespread ingredient in household items and is commonly used as a natural therapy for various health problems.

Tulsi Leaves Powder
Dried and powdered tulsi leaves are typically used to prepare dhoopbatti. Essential oils, such as eugenol, carvacol, and linalool are among the numerous substances found in tulsi leaves, along with flavonoids, tannins, and other phytochemicals that give them distinct scent and possible health benefits.

Mint Leaves Powder
Mint contains essential oils- such as menthol, which imparts a refreshing and cool fragrance when burned. The inclusion of mint powder enhances the overall aromatic quality of dhoopbatti, making it soothing and pleasant for use during spiritual practices and meditation. Additionally, mint has well-documented antibacterial, antifungal, and insect-repellent properties that contribute to improving air quality and reducing the microbial presence in the environment. Its herbal nature also aligns with the growing demand for natural, non-toxic incense products.

Process of Dhoopbatti Cone Formation Using Flower Waste
The main ingredients for making dhoopbatti were dried and powdered floral waste, which was then mixed with jigat powder as a natural binder, cow dung as a binding and combustible agent, orange peel powder for its aromatic qualities, tulsi (*Ocimum sanctum*) and mint (*Mentha spp.*) leaves for their medicinal and fragrance-enhancing qualities, finely ground charcoal for easier ignition and prolonged combustion, and guggul (*Commiphora mukul*) resin for its scent. To create a smooth, pliable mixture, all dry ingredients were precisely weighed and combined, and water was added gradually. To ensure uniformity in size and weight, the resulting material was formed into cones by using a standardised mold.

Table 1: Treatment details

Treatments	Combination of Treatment
T_1	Flower waste (60%) + charcoal powder (40%)
T_2	Flower waste (40%) + charcoal powder (15%) + orange peel powder (20%) + cow dung powder (25%)
T_3	Flower waste (40%) + charcoal powder (15%) + orange peel powder (20%) + guggul powder (25%)
T_4	Flower waste (40%) + charcoal powder (15%) + orange peel powder (20%) + jaggery powder (25%)
T_5	Flower waste (40%) + charcoal powder (15%) + Tulsi powder (20%) + cow dung powder (25%)
T_6	Flower waste (40%) + charcoal powder (15%) + Tulsi powder (20%) + guggul powder (25%)
T_7	Flower waste (40%) + charcoal powder (15%) + Tulsi powder (20%) + jaggery powder (25%)
T_8	Flower waste (40%) + charcoal powder (15%) + mint powder (20%) + cow dung powder (25%)
T_9	Flower waste (40%) + charcoal powder (15%) + mint powder (20%) + guggul powder (25%)
T_{10}	Flower waste (40%) + charcoal powder (15%) + mint powder (20%) + jaggery powder (25%)

The experimental data were analysed using one-way ANOVA and CRD was used to analyze the data in the present study. The data were analyzed for the main and interaction effect at probability level of 5%.

Quality Characteristics of Incense Cone
Physical parameters- such as test weight, burning duration, brittleness, and rate of diffusion of fragrance, were determined under ambient room conditions. For the test weight, five packs of incense cones from each treatment group were randomly selected. All incense cone packs were weighed separately and their means were calculated. For the burning duration, five samples of incense cone from each treatment were randomly selected. The duration was recorded using stopwatch. Sensory evaluation of incense cone was assessed by the panel of professors for the colour, appearance and smell quality were attributes for this study. Samples from each treatment group were coded and presented to the panel for the evaluation of sensory attributes. The ratings assigned by the panel were numerical scores ranging from one to five points as outlined.

Results and Discussion
Test weight of incense cone (g)
The minimum test weight 14.5g was observed in treatment T7 (flower waste (40%) + charcoal powder (15%) + Tulsi powder (20%) + jiggat powder (25%). It was found to be statistically at par with treatments “Flower waste (40%) + charcoal powder (15%) + Tulsi powder (20%) + guggul powder (25%) i.e. T6, “Flower waste (40%) +charcoal powder (15%) + orange peel powder (20%) + jiggat powder (25%) i.e. T4” and the maximum test weight is observed in T1 (Flower waste (60%) + charcoal powder (40%).

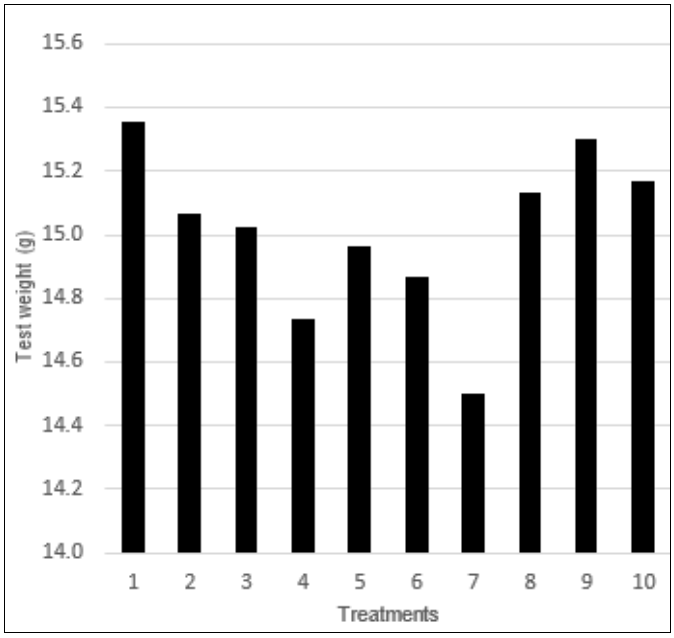


Fig 2: Test weight of incense cone (g)

Burning duration of incense cone (min)

The highest burning duration 29.8 minute was observed in T7 (Flower waste (40%) + charcoal powder (15%) + Tulsi powder (20%) + jiggat powder (25%). However, it was significantly higher than other treatments. A minimum duration 24 min was observed for treatment T1.

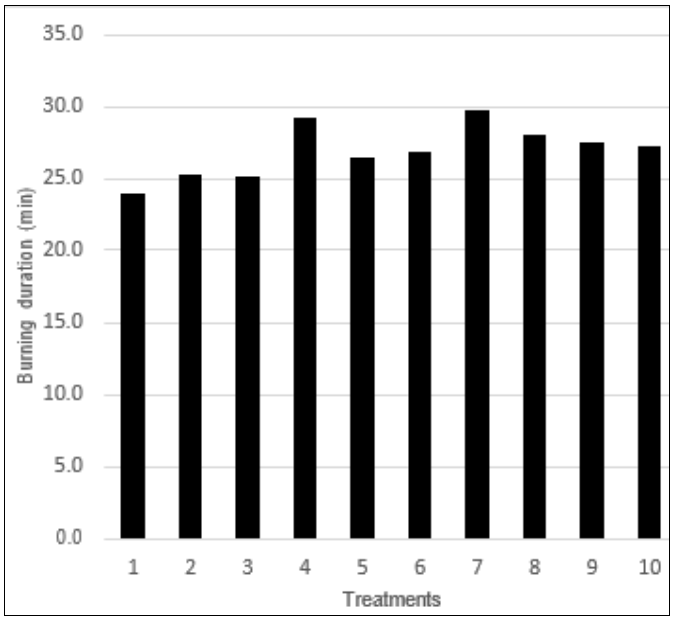


Fig 3: Burning duration of incense cone (min)

Rate of diffusion of fragrance (min)

The treatment comprising (Flower waste (40%) + charcoal powder (15%) + mint powder (20%) + guggul powder (25%)" (T9) was found to have the minimum rate of diffusion of fragrance.

It was found to be statistically at par with treatments "Flower waste (40%) +charcoal powder (15%) + orange peel powder (20%) + jiggat powder (25%)" T4 and "Flower waste (40%) + charcoal powder (15%) + Tulsi powder (20%) + guggul powder (25%)" T6. The treatment consisting of "Flower waste (60%) + charcoal powder (40%)" (T1) exhibited the highest rate of fragrance diffusion.

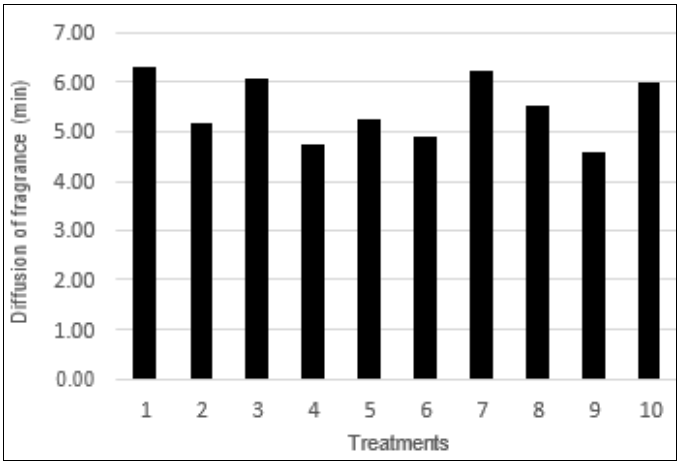


Fig 4: Rate of diffusion of fragrance (min)

Brittleness

The brittleness scores were out of five for different treatments. The treatment consisting of "Flower waste (40%) + charcoal powder (15%) + Tulsi powder (20%) + jiggat powder (25%)" (T7) exhibited the lowest brittleness among all the treatments. The treatment consisting of "Flower waste (60%) + charcoal powder (40%)" (T1) showed maximum brittleness.

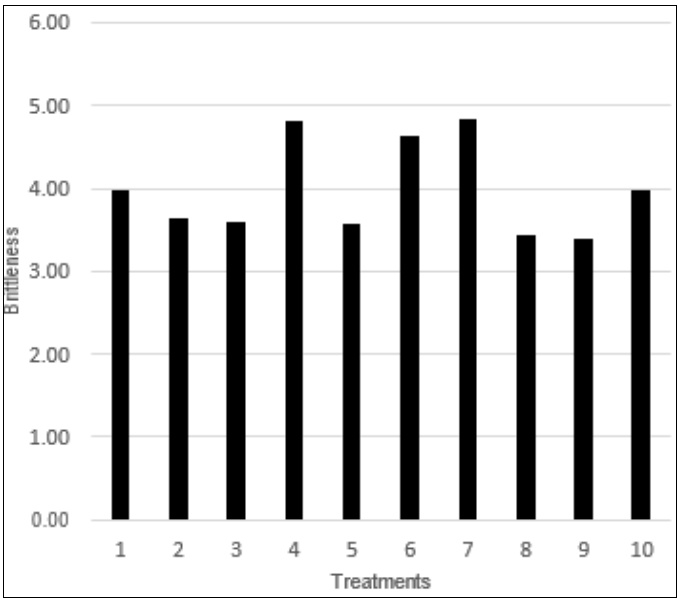


Fig 5: Brittleness

Sensory Evaluation of Colour and Smell

Sensory evaluation was performed to assess the colour a n d s m el l of incense cone, and score from 1 to 3 were assigned to all treatments. Treatments T7 (flower waste (40%) + charcoal powder (15%) + Tulsi powder (20%) + jiggat powder (25%)) received the highest score (3) and all treatments were black in color.

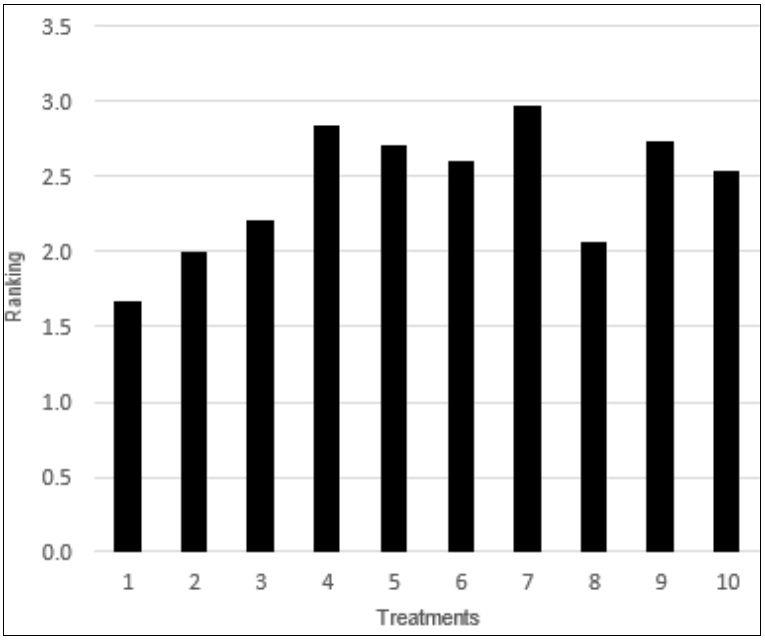


Fig 6: Sensory evaluation of smell

Conclusion

This study revealed how temple floral waste can be effectively transformed into high-quality, eco-friendly dhoopbatti by optimising ingredient combinations. The best treatment, T7 (Flower waste 40% + charcoal powder 15% + Tulsi powder 20% + jiggat powder 25%) had the lowest test weight (14.5 g), the longest burning time (29.8 min), least brittleness, and highest sensory score. The second-ranked T4 (Flower waste 40% + charcoal powder 15% + orange peel powder 20% + jiggat powder 25%) showed comparable benefits in terms of durability, burn time, and aroma retention. T1 (Flower waste 60% + charcoal powder 40%), the worst performing, was the most brittle, had the quickest diffusion of smell, and was burned for the shortest duration.

These findings demonstrate that adding Tulsi and orange peel to jiggat enhances structural integrity, burn performance, and scent longevity. This method provides a sustainable way of using flower waste to create high-quality incense products.

References

1. Bahadur R, Kumar A, Singh P. Utilization of herbal powders in incense production: Aromatic, medicinal, and functional properties. J Med Plants Res. 2020;14(5):215-24.
2. Bhagwat A, Patil S, Deshmukh R. Cultural and therapeutic significance of incense products in India. Asian J Ethnobotany. 2024;12(1):45-53.
3. Lambole VB, Sharma S, Patel H. Traditional binders and aromatic additives in incense manufacturing: A review. Int J Aromatic Plants. 2023;8(3):112-20.
4. Mishra A, Rani S, Gupta R. Environmental hazards of floral waste disposal and potential recycling strategies. Environ Sci Pollut Res. 2023;30(9):12856-64.
5. Ryntathiang M, Boro A, Deka P. Assessment of floral waste generation and management in Indian temples. Waste Manag Res. 2024;42(2):134-42.
6. Sharma N. Trends in Indian floriculture industry and waste generation: A statistical review. Indian Hortic J. 2021;68(4):235-40.