

Resin embedding in floriculture: a modern sustainable pathway for value addition and income generation

Resin embedding is a modern technique that transforms fragile dried flowers into durable, premium decorative products such as jewellery, paperweights, coasters, trays and candle holders. The article explains standardization of drying methods, characteristics of epoxy resin and the embedding procedure, including sealing, layering, curing and finishing steps. A range of suitable plants has been identified for product development. Economic analysis reveals that resin-embedded products are highly profitable, offering double returns over investment. Beyond profitability, this approach reduces postharvest losses, enhances export competitiveness and creates sustainable self-employment opportunities for rural youth and women. Resin embedding thus represents an innovative and sustainable pathway to value addition in India's floriculture sector.

Keywords: Dried flowers, Employment generation, Epoxy resin, Resin embedding, Value addition

INDIA'S diverse agro-climatic conditions support an impressive diversity of ornamentals, making floriculture one of the fastest-growing sectors in horticulture. Traditionally, value addition has been focused on fresh cut flowers and dried arrangements, both of which serve export and domestic markets. In fact, the global market for dried and preserved flowers already accounts for a majority share of India's floriculture exports. However, the limitations of perishability, fragility, and short shelf life continue to restrict their full commercial potential. In this context, resin embedding emerges as a new milestone in value addition, transforming delicate botanical material into durable, design-driven products. By encasing flowers and foliage in optically clear epoxy, producers can preserve natural beauty in the form of jewelry, coasters, trays, photo frames, and other premium articles. This innovation not only extends the utility of floral resources but also bridges horticulture with craft technology, unlocking new opportunities for entrepreneurship and niche export markets.

Understanding epoxy resin systems

Epoxy resins are thermosetting polymers that cure through crosslinking when mixed with a compatible hardener. Artist-grade systems are specifically formulated for botanical work, offering high transparency, scratch resistance, UV stability, and minimal yellowing over time. Casting resins (low viscosity, long pot life) are suited for embedding larger florals, while coating resins (medium viscosity, faster setting) work well for surface layers and laminations. The choice of formulation governs clarity, depth, and durability of the finished product, making it a foundational aspect of resin-based floriculture value addition.

Why resin-embedded florals matter in floriculture

Resin embedding not only preserves floral beauty but also creates new avenues for entrepreneurship. With modest investment, rural artisans, women self-help groups and small-scale units can turn fragile dried flowers into durable, premium products. The process reduces postharvest



waste, diversifies income and generates jobs across drying, casting, finishing and marketing. At the same time, rising demand for handcrafted and sustainable décor positions resin-embedded botanicals as a contemporary, export-ready product that strengthens India's role in high-value floriculture trade.

Resin systems, mix ratios and processing parameters

Art resins are typically supplied in two components—resin (Part A) and hardener (Part B)—which must be mixed in precise ratios to initiate curing. Two practical formulations dominate botanical applications:

- **2:1 systems** (two parts resin to one part hardener) are commonly used as coating resins, ideal for thin and controlled surface layers.
- **3:1 systems** (three parts resin to one part hardener) are generally formulated as casting resins for deeper pours within molds. Casting resins are optimized for bubble release and crystal-clear finishes in thick sections, while coating resins provide tough, protective layers suitable for frequently handled items such as trays, coasters, and tabletops.

Strict adherence to the manufacturer's technical data sheet ensures product consistency and safety.

Key processing parameters

The performance of resin embedding is governed by several processing parameters:

- **Viscosity:** It plays a key role in determining the ease of handling. Low-viscosity casting resins allow deep pours and effective bubble escape but require moulds to contain the flow, whereas medium-viscosity coating resins spread evenly in thin films and minimize edge run-off.
- **Cure time:** It varies with formulation, pour thickness and ambient temperature; coating resins typically become touch-dry within 24 hours and fully hard within 72 hours, while casting resins cure more slowly to control exothermic heat and preserve clarity.
- **Working or pot life:** Usually takes 30–45 minutes, shortened by high temperature and large batch volumes, making smaller mixes at 24–28 °C preferable for bubble management.
- **Maximum pour depth:** Coating systems are usually limited to 1/8–1/4 inch per layer, whereas casting systems allow deeper pours. Exceeding these limits risks bubble entrapment, exothermic runaway and surface defects; therefore, thickness should always be built up in successive layers.
- **Hardness and Durability:** Once cured, hardness and durability differ by type. Coatings emphasize scratch and abrasion resistance for high-traffic use, while castings retain slight flexibility for decorative objects intended for display.
- **Heat resistance:** Casting resins may soften above 50 °C but re-harden on cooling, whereas tabletop coatings are engineered to withstand higher service temperatures.
- **Bubble control:** Effective bubble control is essential. Slow mixing, sealing porous botanicals beforehand and working within recommended depths reduce

defects, while a quick pass with a flame torch or heat gun can release surface bubbles. Small amounts of isopropyl alcohol may also assist in breaking micro-bubbles, though overheating must be avoided.

Together, these parameters determine the clarity, strength and longevity of resin-embedded florals, making their careful management essential for producing consistent, high-quality outcomes.

Plants suitable for embedding	
Flowering plants	Foliage plants
<i>Viola tricolor</i>	<i>Adiantum capillus-veneris</i>
<i>Helichrysum arenarium</i>	<i>Asparagus adscendens</i>
<i>Ranunculus sp.</i>	<i>Cheilanthes brevifrons</i>
<i>Leucanthemum vulgare</i>	<i>Onychium contiguum</i>
<i>Acer palmatum</i>	<i>Polystichum squarrosom</i>
<i>Prunus avium</i>	<i>Pteris cretica</i>
<i>Syringa vulgaris</i>	
<i>Barleria cristata</i>	
<i>Hypericum perforatum</i>	
<i>Duhaldea cuspidata</i>	
<i>Limonium sinuatum</i>	

Workflow and plant material

Drying the botanicals: Press-dry inside a weighted book/press for 2–4 weeks until flat and crisp.

Surface sealing: Apply a light seal (clear lacquer, hairspray, or diluted PVA glue) to reduce off-gassing and color bleed; allow to dry.

Mold preparation: Use clean silicone molds (preferred for release); ensure they are level and dust-free.

Mixing: Measure resin and hardener accurately by volume or weight per the specified ratio; mix slowly, scraping sides and bottom.

First pour: Cast a thin base layer; rest briefly to release bubbles.

Placement: Position sealed botanicals face-up; gently press to dislodge trapped air.

Build in layers: Add successive pours within the recommended depth until the desired thickness is reached.

Finishing: Demold after cure; trim, sand edges if needed and apply a thin flood coat for a glass-like finish.

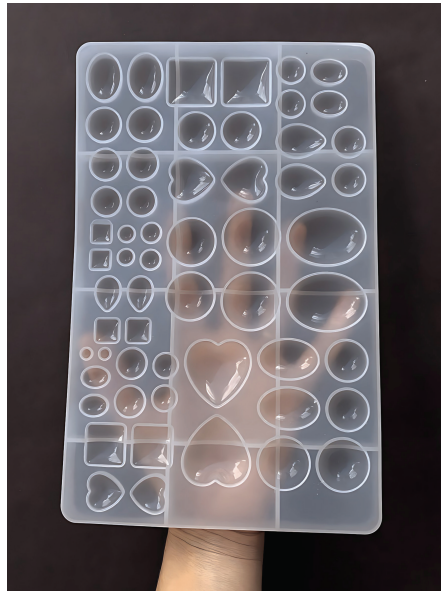
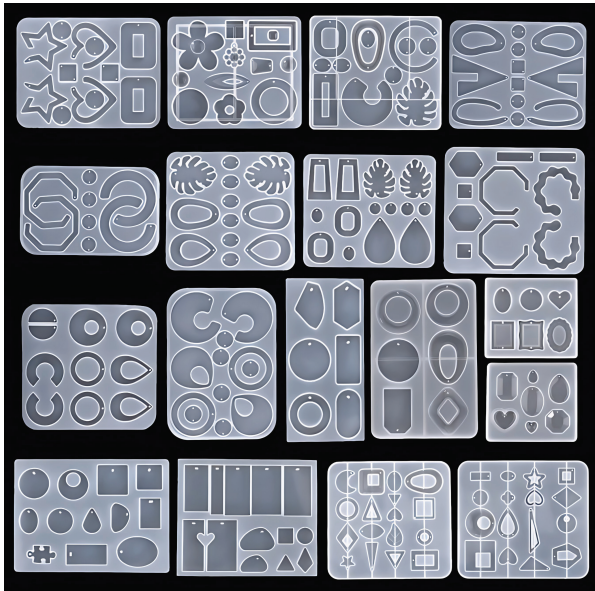
Preventive measures

Wear PPE: Safety glasses, chemical-resistant gloves and a respirator/mask when needed.

Work in a well-ventilated area: avoid inhaling vapors. Wash hands after handling resins/hardeners; keep the workspace clean to prevent accidental contact.

Inspect gloves for residue before touching switches, handles or containers.

For spills: clean uncured resin with acetone or isopropyl



Silicone mold for resin embedding

alcohol; hardener spills with isopropyl/denatured alcohol or warm soapy water.

Embedded resin products

- Paperweights and desk accessories
- Jewelry (pendants, earrings, rings, bracelets)
- Keychains and keepsakes
- Serving trays and coasters
- Candle holders and tealight blocks
- Photo frames and display tiles

Economic Potential and Entrepreneurial Scope

Practical cost-benefit assessments indicate that resin-based value addition can substantially enhance returns from low-value or waste floral biomass. Production trials at Dr. Y.S. Parmar University of Horticulture and Forestry recorded a benefit-cost ratio of 1.89, while similar initiatives at CSIR-NBRI reported ratios ranging between 2-5 depending on product type and scale. These findings highlight that dehydration followed by resin encapsulation offers significant value addition and livelihood potential.

Employment opportunities

- **Low entry barrier:** Basic resin embedding requires modest capital (molds, measuring tools, resin + hardener, basic PPE), enabling home-based, women-led micro-units and SHGs to participate without large fixed costs. CSIR-NBRI promotes dehydration + craft value-addition as a livelihood option for rural women and unemployed youth.
- **Skill layers and job types:** Drying/dehydration operators,



Resin keyrings and pendants

floral preparers, mold pourers, finishing/sanding & polishing staff, packers, and marketing personnel (online storefronts, B2B buyers). One small unit can sustainably employ 2-6 people; scaled to a village cluster model, dozens of households can gain additional income.

- **Training and capacity building:** CSR NBRI and extension bodies run trainings in dehydration and floral craft covering materials, drying protocols, and simple preservation techniques. Low-cost programs help build local skills before adopting resin workflows.

Leading enterprises in resin-based value-added floriculture

- The growing interest in resin-embedded botanicals is not confined to theory; a number of Indian ventures have already demonstrated the commercial viability of this craft. These enterprises illustrate how floral preservation can be transformed into a livelihood opportunity and a niche market segment.
- **Resin Arts Jaipur:** Founded in 2018 by Smt. Kavita Dadhich, this initiative creates keepsake products, supplies raw materials and conducts workshops. It also offers consultancy and has built a community of

hundreds of resin artists, positioning Jaipur as a hub of craft innovation.

- **Blissta:** Specializes in jaimala (wedding garland) preservation, Blissta embeds flowers into resin frames and jewelry, blending sentiment with craftsmanship. It also conducts training workshops, expanding awareness of resin techniques.
- **Sumaiya Resin Arts:** Tamil Nadu-based venture offering personalized resin gifts such as keychain, clock and commemorative keepsake. By using online platform for nationwide orders, it shows how small enterprise can harness digital platforms for growth.
- **Flower Preservation India:** Offers a wide product line including resin jewelry, frames, coasters and LED lamps with good prices and delivery across major cities, it demonstrates how resin embedding can scale into a structured consumer service.
- **Sathvik Creations, Mumbai:** Specializes in premium bouquet preservation through deep-casting into resin blocks, frames and lamps. Products, often made for weddings or milestone events, are priced between

₹5,000–15,000, reflecting their high-value market appeal.

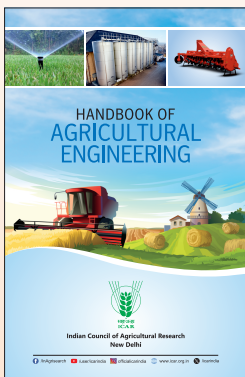
SUMMARY

Resin embedding offers a scientific and creative approach to convert fragile dried flowers into durable, decorative products with strong market appeal. Standardized drying methods and optimized resin parameters ensure consistent quality. Economic analysis proves profitability with a high benefit–cost ratio, while the technique also creates avenues for employment and entrepreneurship. This makes resin embedding a promising innovation for sustainable floriculture and rural income generation.

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