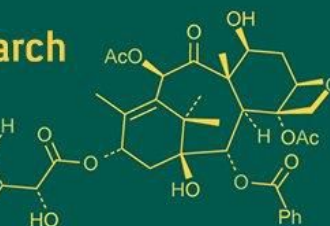
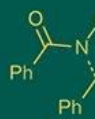
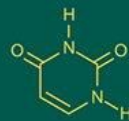
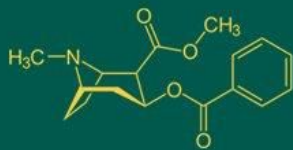


International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2025): 5.29
IJABR 2025; SP-9(9): 2051-2053
www.biochemjournal.com
Received: 20-07-2025
Accepted: 03-09-2025

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Standardization and evaluation of glycerine drying techniques for leaf preservation in fern leaf tree (*Filicium decipiens* L.)

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DOI: <https://www.doi.org/10.33545/26174693.2025.v9.i9Sz.5803>

Abstract

The present study was conducted during 2024-25 at K.D. CHRS, Jagdalpur (C.G.), under MGUHF, Durg, C.G. to evaluate the economic viability of botanical craft products prepared using glycerine-dried foliage of *Filicium decipiens*. Twelve treatments were formulated by combining six glycerine concentrations (0%, 20%, 40%, 60%, 80% and 100%) with two dehydration methods full dip and uptake under a completely randomized factorial design with three replications. Glycerine absorption ranged from 5 to 9 days depending on concentration and method. full dip method enhanced pliability, while uptake method proved more economical. Based on preserved foliage, four botanical products greeting cards, frames, candles, and dhup sticks were developed and evaluated for cost benefit ratio (BCR). The highest BCRs were recorded in 20% uptake treatments: 1:2.40 for greeting cards, 1:1.85 for frames, 1:1.72 for candles, and 1:1.76 for dhup sticks. Treatments with higher glycerine concentrations increased input costs without proportional gains in selling price. The study concludes that moderate glycerine concentrations (20%-40%) combined with the uptake method offer the best balance between product quality and profitability. These findings support the use of glycerine-treated *Filicium decipiens* foliage in sustainable, small-scale botanical craft enterprises, promoting creative livelihoods and value addition in ornamental horticulture.

Keywords: Glycerine, dehydration, botanical crafts, benefit cost ratio (BCR)

Introduction

Ornamental foliage plays an important role in floriculture, floral arrangements, landscaping, and interior decoration (Joyce, 1998; De *et al.*, 2016) [4, 3]. However, fresh foliage is highly perishable and has a very limited shelf life, which restricts its year-round availability (Bhattacharjee and De, 2003) [1]. Glycerine drying has emerged as a reliable preservation technique as it replaces water in plant tissues with glycerol, thereby maintaining colour, texture, flexibility, and structural integrity of foliage for extended periods. Among the various methods, full dip and uptake techniques are widely used, but their comparative efficiency and species-specific standardization remain poorly studied. Fern leaf tree (*Filicium decipiens*) is commonly referred to as the fern leaf Tree or Japanese fern tree, is a medium-sized evergreen ornamental species belonging to the family Sapindaceae, making it a promising candidate for foliage preservation research (Rao *et al.*, 2010, Meena and Sharma, 2016) [8, 6]. Standardizing glycerine drying techniques for this species can enhance its commercial utilization in floral decoration, craft, and long-term storage. Hence, the present investigation was undertaken to compare the two major glycerine application methods (full dip and uptake), optimize glycerine concentrations, evaluate quality parameters such as colour, flexibility, and brittleness, and assess the benefit-cost ratio for commercial viability.

Materials and Methods

The present study was conducted during 2024-25 at the Instructional cum research laboratory, K.D. CHRS, Jagdalpur (C.G.), under MGUHF, Durg, C.G., to evaluate the economic viability of botanical craft products prepared using glycerine-dried leaves of *Filicium decipiens*. Two glycerine dehydration methods full dip and uptake were employed across six treatments with three replications, laid out in a completely randomized factorial design. Mature ornamental foliage was collected from the field, *Filicium decipiens* are

harvested between 8:00 to 9:00 am and kept in water brought to laboratory where they are sorted for pest and disease (Kota *et al.*; 2022) [5]. Data were statistically analyzed using ANOVA as described by Panse and Sukhatme (2000) [7]. Based on the treated foliage, four botanical products greeting cards, frames, candles, and dhup sticks were developed and evaluated for their cost benefit ratio (BCR). The study highlights the potential of glycerine-treated foliage in promoting economically viable, small-scale botanical craft enterprises.

Results and Discussion

Benefit-Cost Ratio (B:C Ratio)

The Benefit-Cost Ratio (B:C Ratio) was calculated to evaluate the economic feasibility of each glycerine treatment. It reflects the return generated per unit cost

invested in the preservation process.

The formula used was:

$$\text{B:C Ratio} = \frac{\text{Gross returns}}{\text{Total cost of treatment}}$$

Gross Return includes the estimated market value of preserved leaves based on quality, durability, and acceptance scores.

Total Cost includes expenses on glycerine, glue, paper, decorative material and other inputs.

This method was adapted from Dhamu and Sharma (2000) [2], who applied economic analysis under Factorial Completely Randomized Design (FCRD) using MS Excel and ORSTAT software. A B:C ratio greater than 1 indicates economic gain, while less than 1 suggests loss.

Table 1: Shows the cost benefit ratio obtained by making greeting cards by using glycerine dried leaves of *Filicium decipiens*.

Treatments	Paper Cost/Card (₹)	Glue Cost/Card (₹)	Glycerine Cost/Card (₹)	Total Cost (₹)	Selling Price (₹)	Net income (₹)	Cost Benefit Ratio (BCR)
C ₁ M ₁	5	0.5	0	5.5	10	4.5	1:1.82
C ₁ M ₂	5	0.5	0	5.5	10	4.5	1:1.82
C ₂ M ₁	5	0.5	0.5	6	14	8	1:2.33
C ₂ M ₂	5	0.5	0.76	6.26	15	8.74	1:2.40
C ₃ M ₁	5	0.5	1	6.5	14	7.5	1:2.15
C ₃ M ₂	5	0.5	1.33	6.83	15	10.17	1:2.20
C ₄ M ₁	5	0.5	1.5	7	14	7	1:2.00
C ₄ M ₂	5	0.5	1.6	7.1	13	5.9	1:1.83
C ₅ M ₁	5	0.5	1.7	7.2	12	4.8	1:1.67
C ₅ M ₂	5	0.5	1.86	7.36	13	5.64	1:1.83
C ₆ M ₁	5	0.5	2	7.5	12	4.5	1:1.60
C ₆ M ₂	5	0.5	2.1	7.6	13	5.4	1:1.71

Table 2: Shows the cost benefit ratio obtained by making frames by using glycerine dried leaves of *Filicium decipiens*.

Treatments	Frame Base Cost (₹)	Decorative Material Cost (₹)	Glycerine Cost/Card (₹)	Total Cost (₹)	Selling Price (₹)	Net income (₹)	Cost Benefit Ratio (BCR)
C ₁ M ₁	20	5	0	25	40	15	1:1.60
C ₁ M ₂	20	5	0	25	40	15	1:1.60
C ₂ M ₁	20	5	0.5	26	45	19	1:1.73
C ₂ M ₂	20	5	0.76	25.76	45	19.24	1:1.85
C ₃ M ₁	20	5	1	26.5	45	18.5	1:1.70
C ₃ M ₂	20	5	1.33	26.33	45	18.67	1:1.71
C ₄ M ₁	20	5	1.5	27	44	17	1:1.63
C ₄ M ₂	20	5	1.6	26.6	43	16.4	1:1.62
C ₅ M ₁	20	5	1.7	27.5	42	14.5	1:1.53
C ₅ M ₂	20	5	1.86	26.86	43	16.14	1:1.60
C ₆ M ₁	20	5	2	28	42	14	1:1.50
C ₆ M ₂	20	5	2.1	27.1	43	15.9	1:1.59

Table 3: Shows the cost benefit ratio obtained by making candle by using glycerine dried leaves of *Filicium decipiens*.

Treatments	Candle Base Cost (₹)	Decorative Material Cost (₹)	Glycerine Cost/Card (₹)	Total Cost (₹)	Selling Price (₹)	Net income (₹)	Cost Benefit Ratio (BCR)
C ₁ M ₁	15	4	0	19	30	11	1:1.58
C ₁ M ₂	15	4	0	19	30	11	1:1.58
C ₂ M ₁	15	4	0.5	20	34	14	1:1.70
C ₂ M ₂	15	4	0.76	19.76	34	14.24	1:1.72
C ₃ M ₁	15	4	1	20.5	34	13.5	1:1.66
C ₃ M ₂	15	4	1.33	20.33	34	13.67	1:1.67
C ₄ M ₁	15	4	1.5	21	33	12	1:1.57
C ₄ M ₂	15	4	1.6	20.6	32	11.4	1:1.55
C ₅ M ₁	15	4	1.7	21.5	31	9.5	1:1.44
C ₅ M ₂	15	4	1.86	20.86	32	11.14	1:1.53
C ₆ M ₁	15	4	2	22	31	9	1:1.41
C ₆ M ₂	15	4	2.1	21.1	32	10.9	1:1.52

Table 4: Shows the cost benefit ratio obtained by making dhup stick by using glycerine dried leaves of *Filicium decipiens*

Treatments	Dhup Stick Base Cost (₹)	Essence (₹)	Glycerine Cost/Card (₹)	Total Cost (₹)	Selling Price (₹)	Net income (₹)	Cost Benefit Ratio (BCR)
C ₁ M ₁	10	3	0	13	20	7	1:1.58
C ₁ M ₂	10	3	0	13	20	7	1:1.58
C ₂ M ₁	10	3	0.5	14	24	10	1:1.70
C ₂ M ₂	10	3	0.76	13.76	24	10.24	1:1.72
C ₃ M ₁	10	3	1	14.5	24	9.5	1:1.76
C ₃ M ₂	10	3	1.33	14.33	24	9.67	1:1.77
C ₄ M ₁	10	3	1.5	15	23	8	1:1.57
C ₄ M ₂	10	3	1.6	14.6	23	8.4	1:1.65
C ₅ M ₁	10	3	1.7	15.5	22	6.5	1:1.44
C ₅ M ₂	10	3	1.86	14.86	22	7.14	1:1.53
C ₆ M ₁	10	3	2	16	21	5	1:1.31
C ₆ M ₂	10	3	2.1	15.1	21	5.9	1:1.49

C₁ 0% glycerine solution (control)C₂ 20% glycerine solutionC₃ 40% glycerine solutionC₄ 60% glycerine solutionC₅ 80% glycerine solutionC₆ 100% glycerine solutionM₁ Full dip methodM₂ Uptake method**Fig 1:** Greeting card**Fig 2:** Frame**Fig 3:** Candle**Fig 4:** Dhup stick

Conclusion

This study confirmed the economic viability of botanical craft products made from glycerine-dried *Filicium decipiens* foliage. Among the two dehydration methods, the Uptake method combined with moderate glycerine concentrations (20%-40%) yielded superior leaf quality and cost efficiency. Products treated with 20% glycerine via uptake method recorded the highest BCRs 1:2.40 for greeting cards, 1:1.75 for frames, 1:1.72 for candles, and 1:1.74 for dhup sticks. Treatments with higher glycerine levels increased costs without proportional returns. Overall, the findings support glycerine-treated foliage as a sustainable and profitable option for small-scale botanical craft enterprises.

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