

A Review on Tectona Grandis Seeds and their Potential Role in Hair Growth

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Abstract: *Tectona grandis* Lf., commonly called teak or sag, is a tree best known for its timber. Its seeds have also attracted attention because they have traditionally been described as a hair tonic in India. This review summarises the plant's basic features, the available research on teak seed extract and hair growth, possible explanations for the observed effects, and the steps needed for further study. One experimental study reported that petroleum-ether extracts of teak seeds promoted earlier hair growth and changed the hair-cycle pattern in albino mice. This is an interesting early finding, but animal results cannot confirm that the same effect will occur in people. Research on teak leaves is more recent and includes a human trial, but leaf findings should not be treated as proof for seed extracts. More work is needed on seed chemistry, standardisation, safety and human effectiveness.

Keywords: *Tectona grandis*, teak seeds, seed extract, hair growth, alopecia, herbal cosmetics, preclinical research.

I. INTRODUCTION

Hair fall is a common concern and may affect confidence and quality of life. It can be caused by genetics, hormonal changes, illness, stress, nutritional problems, medicines or scalp conditions. Because hair loss has different causes, a product that may help one type of hair loss might not help another. People interested in herbal products should also remember that 'natural' does not automatically mean safe or effective.

Many medicinal plants are studied for compounds that may affect skin, inflammation or hair follicles. *Tectona grandis* is one plant with a traditional connection to hair care. A published study specifically tested a teak seed extract in mice, making seeds a reasonable subject for a focused review [1]. The evidence remains limited, so this article uses cautious language and does not describe teak seeds as a proven treatment.

II. BOTANICAL PROFILE OF TECTONA GRANDIS

Tectona grandis L.f. belongs to the family Lamiaceae and is commonly known as teak or sag. It is a large deciduous tree found in South and Southeast Asia, including India. It has broad leaves, small pale flowers in clusters, and rounded fruits. The fruit has a hard outer covering and contains the seed material. In scientific writing, it is important to distinguish the fruit, seed, kernel and seed extract, because these terms may refer to different materials and extraction methods.

Teak is grown mainly for its durable timber. Researchers have investigated different plant parts—including leaves, bark, flowers, fruits and seeds—for their chemical and biological properties [2,3]. Results from one plant part cannot automatically be applied to another. For a seed-based hair product, the seed material and extraction method should be stated clearly.





Figure 1. Botanical collage showing teak tree, leaves, flowers, fruits and seed material. This is an illustrative image; plant material used in research should be authenticated independently.

III. TRADITIONAL USE AND RESEARCH ON TEAK SEEDS

Teak seeds have been described in the literature as a traditional hair tonic. Jaybhaye and colleagues investigated the effect of petroleum-ether extract of *Tectona grandis* seeds on hair growth in albino mice [1]. The researchers prepared 5% and 10% seedextract ointments and applied them to shaved skin. A 2% minoxidil solution was used as a positive control.

The study reported that the seed-extract groups showed earlier initiation of hair growth than the untreated control. The researchers also reported a greater proportion of follicles in the anagen phase—the active growing phase of the hair cycle—in treated animals. The reported proportions were 64% and 51% for the two seed-extract groups, compared with 49% for the minoxidil group in the experiment [1]. These figures describe that particular animal study; they should not be interpreted as expected results in humans or as proof that teak seed extract is better than minoxidil.

Why this study matters

The study is directly relevant because it tested teak seeds rather than relying only on general information about the plant. It provides an early signal that seed extract deserves further investigation. At the same time, it appears to be a small preclinical study in animals. The result needs confirmation using well-controlled experiments, standardised extract, safety assessment and eventually properly designed human studies.

IV. HOW MIGHT TEAK SEED EXTRACT AFFECT HAIR GROWTH?

Hair follicles move through stages, including anagen (active growth), catagen (transition) and telogen (resting). A substance that changes the timing of these stages may affect when hair appears or how many follicles are in a growing



phase. The mouse study measured hair-growth initiation and follicle-cycle features, but it did not establish the exact mechanism by which the seed extract acted [1].

- Possible effect on the hair cycle: The animal findings suggest the extract may have influenced the transition into active growth, but the mechanism is not confirmed.
- Extractable compounds: Teak contains several classes of phytochemicals across its different parts. A seed-specific chemical profile is needed before assigning an effect to any individual compound [2,3].
- Topical delivery: The ointment base may influence how extract components spread on the skin. A new formulation would need its own testing rather than assuming the original animal preparation will behave the same way.
- Human relevance: The key question is whether a safe, standardised seed extract can produce a measurable benefit in people. This has not been established by the mouse study.

V. WHAT IS KNOWN—AND WHAT IS NOT KNOWN

The evidence can be grouped into three levels. First, traditional use gives a reason to investigate a plant, but tradition alone does not establish effectiveness. Second, animal experiments can help researchers explore early biological effects. Third, human clinical trials are needed to determine whether a product works safely in people. For teak seeds, the key direct hair-growth evidence located for this review is the albino-mouse study [1].

A separate 2024 randomised, double-blind, placebo-controlled study evaluated a hair tonic containing 1% Tectona grandis leaf extract in men with androgenetic alopecia [4]. It reported improvements in several hair-growth measures in the leaf-extract group over 24 weeks. This is relevant to the wider plant, The study focused on leaves, not seeds. Therefore, the findings cannot be used to claim that teak seed extract has the same clinical impact.

Evidence Summary: Teak seed extract has shown some early encouraging results in animal studies.

However, the effectiveness and long-term safety of seed-based hair products in people are still uncertain. More direct research is needed.

VI. PHYTOCHEMISTRY AND EXTRACT PREPARATION

Reviews of Tectona grandis mention various compounds, including phenolic compounds, quinones, triterpenoids, steroids, and other components.

However, the chemical composition can differ based on the plant part, maturity, location, storage, and the solvent used for extraction [2,3]. Researchers should not assume that the compounds found in leaves or wood are present in the same amounts in seeds.

The original seed study used a petroleum-ether extract [1]. Petroleum ether is a non-polar laboratory solvent and is not suitable for home preparation or direct use on the scalp without proper solvent removal and quality checks. A student project should follow an approved laboratory protocol and receive guidance from a supervisor. The final extract should be tested for residual solvent and contaminants before any formulation or biological testing is done.

Information to record during extraction

- Botanical confirmation and source of the seeds.
- Whether the sample is whole seed, kernel, or another defined seed fraction.
- Drying conditions, particle size, solvent, extraction time, and extract yield.
- Any chemical markers or fingerprint compounds used to compare batches.
- Residual solvent, microbial quality, and other relevant contamination checks.

VII. PROPOSED FORMULATION AND EVALUATION FOR FUTURE STUDY

A hair-care product made from teak seed extract could be explored as a research project only after reviewing the evidence and confirming a safe and consistent extract.



The goal should be to test a clear scientific question, not just to add an ingredient to an oil and assume it promotes hair growth.

- Pre-formulation: Evaluate the solubility, colour, odour, and compatibility of the extract with a suitable topical base.
- Physical tests: Depending on the formulation, assess appearance, homogeneity, pH, viscosity, and spreadability.
- Stability: Monitor changes during storage and, where possible, measure a chemical marker over time.
- Safety and quality: Check for potential irritation, microbial quality, and residual solvent. Ensure qualified supervision.
- Laboratory screening: Use validated methods and appropriate controls. Results should be described as preliminary and not as proof of human hair growth.
- Clinical testing: Human studies require ethics approval, informed consent, a justified sample size, suitable comparison groups, and defined outcome measures.

VIII. SAFETY AND LIMITATIONS

A plant extract may cause irritation or allergy, and its safety depends on the composition, concentration, and method of use. Do not apply raw seed material or a laboratory solvent extract directly to the scalp. Do not ingest a seed extract for hair growth. A new product should not be used on broken or inflamed skin without professional advice. The main limitation is the lack of strong direct human evidence for teak seed extract. Results from animal studies on the hair cycle do not reliably predict the effect in people. Standardisation, reproducibility, suitable safety studies, and human clinical trials are needed. People experiencing sudden, patchy, painful, or persistent hair loss should consult a qualified healthcare professional rather than delaying assessment for an unproven herbal remedy.

IX. FUTURE RESEARCH OPPORTUNITIES

- Repeat the seed study with a clear protocol, sufficient sample size, and blinded outcome assessment.
- Identify and quantify seed-specific compounds rather than assuming the leaf profile applies.
- Compare extraction methods and document which preparation gives consistent results. Assess topical safety, irritation potential, and product stability before making efficacy claims.
- follicle-related mechanisms using validated models and appropriate controls.
- Only after sufficient preliminary evidence should an ethical human study using standardised seed extract be planned.

X. CONCLUSION

Tectona grandis seeds have a traditional link with hair care, and one published animal study reported hair-growth-related effects from a petroleum-ether seed extract in albino mice. This provides a starting point for further research, not proof of a treatment for human hair loss. Evidence from teak leaf products should be kept separate from that about seeds. Before a seed-based product can be recommended, researchers need to determine its chemical composition, safe preparation, quality, and effectiveness in well-designed human study.

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