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A REVIEW ON MEDICINAL PLANTS POSSESSING ANTIDERMATOPHYTIC ACTIVITY

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ABSTRACT

Dermatophytosis remains one of the most prevalent superficial fungal infections affecting skin, hair, and nails, caused mainly by Trichophyton, Microsporum, and Epidermophyton species. Traditional medicinal plants have long been used as natural remedies for fungal disorders, and recent scientific investigations have validated their antidermatophytic potential through various extract-based studies. This review presents a consolidated scientific account of fifteen medicinal plants reported for their antidermatophytic activity. For each plant, essential details including family, biological source, specific plant parts utilized, type of extracts prepared, bioassay employed, dermatophyte strains tested, and observed zones of inhibition are systematically documented. Published results show that extracts such as ethanolic, methanolic, aqueous, hydroalcoholic, and essential oils produce varying degrees of inhibitory activity against major dermatophytes like T. rubrum, T. mentagrophytes, M. gypseum, T. verrucosum, and E. floccosum. By compiling these experimentally reported findings, this review provides an organized comparative reference on plantderived antifungal effectiveness, supporting their continued relevance as promising natural agents for dermatophytosis management.

KEYWORDS: Dermatophytosis, Anti dermatophyte, Medicinal plants.

INTRODUCTION

Dermatophytosis is a highly prevalent superficial fungal infection of keratinized tissues, including the skin, hair, and nails, caused by dermatophytes of the genera Trichophyton, Microsporum, and Epidermophyton.[1] These fungi possess the unique ability to invade keratinized substrates, leading to clinical conditions such as tinea corporis, tinea pedis, tinea capitis, and onychomycosis.[2] Although generally non-life-threatening, dermatophytosis significantly affects quality of life due to itching, inflammation, cosmetic disfigurement, and frequent relapse.

Globally, dermatophytosis has shown a persistent rise over the last decade. According to the World Health Organization (WHO), superficial fungal infections affect over 1 billion people annually, of which dermatophytosis accounts for a major proportion in tropical and subtropical regions.[3] WHO surveillance data further indicate that 20–25% of the world's population experiences dermatophytic infections at some point, marking it as one of the most common fungal diseases worldwide.[4] Contributing factors include humidity, poor hygiene, overcrowding, immunosuppression, and increased resistance to conventional antifungal drugs.

The growing limitations of synthetic antifungal agents—such as resistance, hepatotoxicity, high cost, and recurrence—have intensified global interest in herbal alternatives.[5] Medicinal plants possess a diverse range of bioactive constituents including phenolics, flavonoids, alkaloids, terpenoids, saponins, and essential oils, many of which have demonstrated significant inhibitory effects against dermatophytes in experimental studies.[6] As a result, plantbased antifungal remedies have gained scientific recognition as safer, effective, and more accessible therapeutic options.

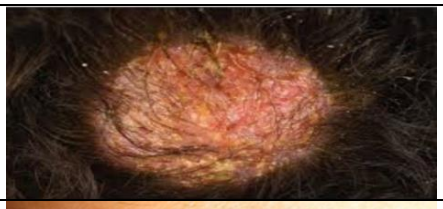
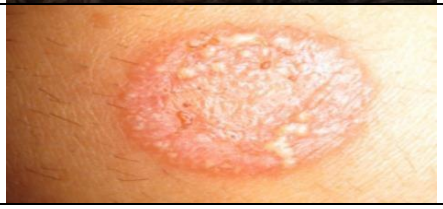
This review compiles and evaluates published evidence on fifteen medicinal plants possessing antidermatophytic activity. For each plant, details such as plant part used, biological source, family, extract type, bioassay method, dermatophyte strains tested, and reported zones of inhibition are systematically presented. By consolidating these experimentally validated findings, this review provides a comprehensive reference for researchers exploring herbal antifungal agents.

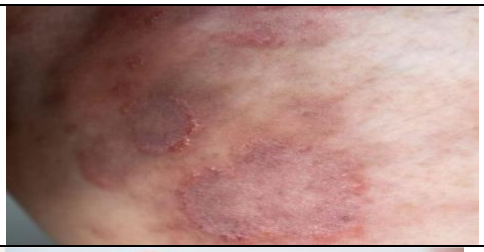
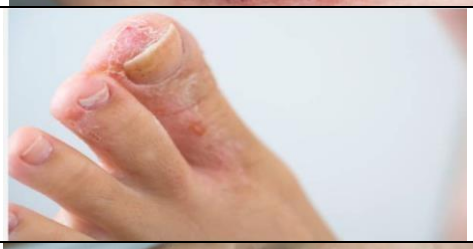
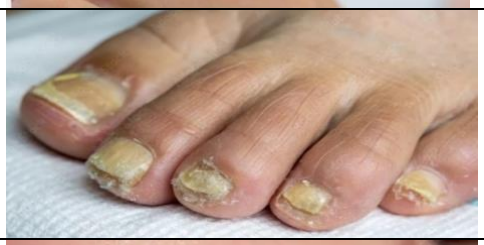
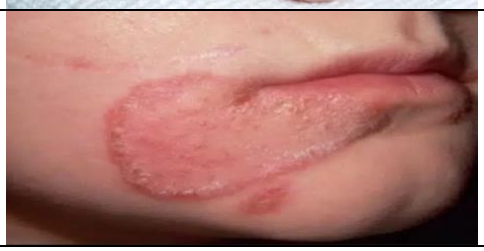
OVERVIEW OF THE DISEASE – DERMATOPHYTOSIS

Dermatophytosis is a superficial fungal infection of the skin, hair, and nails, caused by keratinophilic fungi of the genera Trichophyton, Microsporum, and Epidermophyton.[7] These organisms invade keratinized tissues and produce well-defined, itchy, circular lesions.

CLASSIFICATION

Dermatophytosis is classified according to the anatomic site of infection:[8]

Tinea capitis [scalp]	
Tinea corporis [body]	

Tinea cruris [groin]	
Tinea pedis [feet]	
Tinea unguium/ Onchomycosis [nails]	
Tinea faciei [face]	

Etiology

The disease is primarily caused by dermatophytes such as Trichophyton rubrum, T. mentagrophytes, Microsporum canis, and Epidermophyton floccosum. Transmission occurs via direct human-to-human, animal-to-human, and environmental exposure, especially in warm and humid climates.[7]

Clinical Manifestations

Common symptoms include pruritus, erythematous annular lesions, scaling, burning, and well-demarcated active borders.

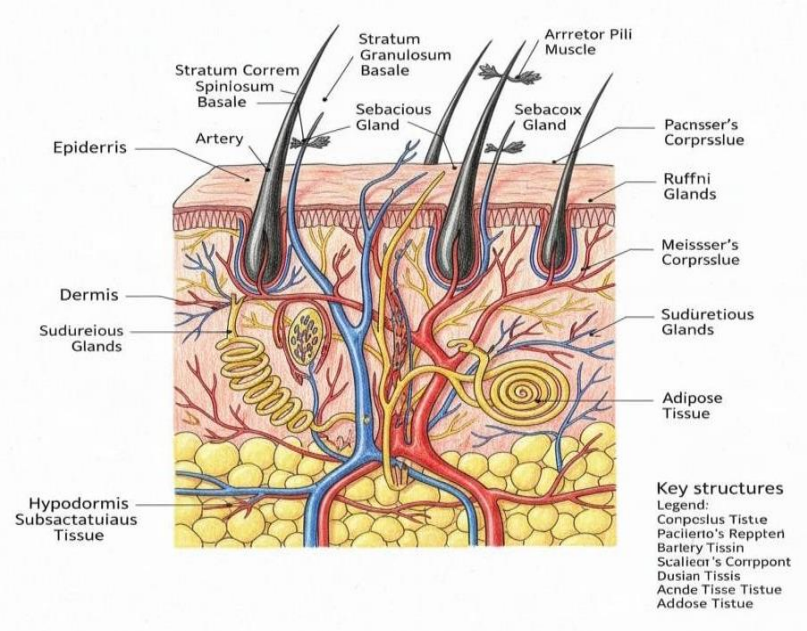
Tinea capitis may present with hair loss, while onychomycosis results in thickened, brittle, and discolored nails.[8]

Pathogenesis

Dermatophytes adhere to the stratum corneum and produce keratinases, lipases, and proteases, enabling penetration into keratinized tissues.[7] Fungal growth triggers an inflammatory response mediated by delayed-type hypersensitivity, which contributes to the characteristic itching and erythema. Chronic or recurrent infections occur when host immunity is compromised or when topical corticosteroids modify local immune responses.[9]

ANATOMY OF SKIN[10]

The skin is a complex multilayered integumentary organ that provides mechanical protection, regulates homeostasis, and serves as the first line of immunological defence. It is composed of three principal layers- the epidermis, dermis, and hypodermis- along with keratinized appendages such as hair and nails.



Epidermis

The epidermis is a stratified squamous epithelial layer dominated by keratinocytes, which undergo continuous differentiation to form the stratum corneum, the outermost keratin-rich barrier. This layer contains tightly packed corneocytes embedded in a lipid matrix that restricts microbial invasion. The presence of antimicrobial peptides, acidic pH, and regulated desquamation enhances innate defence.

Dermis

The dermis is a dense connective tissue layer containing collagen, elastin, fibroblasts, vasculature, lymphatics, nerves, and immune cells. It supports epidermal function and houses hair follicles, sebaceous glands, and sweat glands, which contribute to lubrication, thermoregulation, and antimicrobial protection.

Hypodermis

The hypodermis is composed of adipose tissue that provides insulation, shock absorption, and metabolic storage. It anchors the skin to underlying structures and aids in temperature regulation.

Skin Appendages

Hair and nails consist of highly compacted keratin, forming specialized structures that can influence microbial colonization and barrier function.[10]

RELEVANCE TO DERMATOPHYTOSIS

Dermatophytosis remains confined to keratin-rich tissues because dermatophytes depend on keratin as their primary carbon source. Their secretion of keratinases, lipases, and proteases enables invasion of the stratum corneum, hair follicles, and nails, making these regions biologically favourable for colonization. Conditions such as excess sweating, friction, skin maceration, poor barrier integrity, and weakened local immunity significantly enhance fungal penetration and persistence. Hair follicles may act as reservoirs, explaining recurrent or chronic infections despite topical therapy. Thus, the structural organization of skin—particularly the barrier function of the epidermis and keratin distribution—plays a central role in determining susceptibility, severity, and treatment outcomes of dermatophytosis.[11]

MEDICINAL PLANTS EXHIBITING ANTI-DERMATOPHYTIC ACTIVITY

1. NEEM (Azadirachta indica)[12]

i. **Part Used:** Leaf / Bark

ii. **Extracted With:** Ethanol, Methanol, Aqueous, Chloroform, Hexane

iii. **Antidermatophytic Activity Test:** Antifungal/Antidermatophytic

iv. **Test Organism:** T. rubrum, T. mentagrophytes, M. gypseum, E. floccosum

v. **Method Of Assay:** CLSI Disc Diffusion/Agar Well Diffusion

vi. **Result Report:**[12] Ethanolic and methanolic extracts show highest antidermatophytic activity.

Extract	T. rubrum	T. mentagrophytes	M. gypseum	E. floccosum
Ethanol	18.42 mm	17.10 mm	19.56 mm	16.88 mm
Methanol	17.80 mm	16.22 mm	18.40 mm	16.88 mm
Chloroform	14.60 mm	13.20 mm	15.10 mm	12.44 mm
Water	12.10 mm	10.80 mm	11.60 mm	10.22 mm

2. TURMERIC (Curcuma longa)[13]

i. **Part Used:** Rhizome

ii. **Extracted With:** Ethanol, Methanol, Acetone, Aqueous

iii. **Antidermatophytic Activity Test:** Antifungal /Antidermatophytic

iv. **Test Organism:** T. rubrum, T. mentagrophytes, M. canis, E. floccosum

v. **Method Of Assay:** CLSI Disc Diffusion / Agar Well Diffusion

vi. **Result Reported:**[13] Ethanolic extract exhibits maximum activity against M. canis.

Extract	T. rubrum	T.mentagrophytes	M. canis	E. floccosum
Ethanol	17.20 mm	15.86 mm	18.90 mm	14.40 mm
Methanol	15.70 mm	14.30 mm	17.40 mm	13.22 mm
Acetone	13.20 mm	12.50 mm	14.80 mm	11.60 mm
Water	10.10 mm	9.40 mm	10.90 mm	8.80 mm

3. TULSI (Ocimum sanctum)[14]

i. **Part Used:** Leaf

ii. **Extracted With:** Methanol, Ethanol, Petroleum Ether, Aqueous

iii. **Antidermatophytic Test:** Antifungal / Antidermatophytic

iv. **Test Organism:** T. rubrum, T. mentagrophytes, M. gypseum, E. floccosum

v. **Method Of Assay:** Agar Well Diffusion / CLSI Disc Diffusion

vi. **Result Reported:[14]** Methanolic extract shows highest inhibition.

Extract	T. rubrum	T. mentagrophytes	M. gypseum	E. floccosum
Ethanol	15.20 mm	16.10 mm	14.40 mm	12.90 mm
Methanol	16.40 mm	17.22 mm	15.50 mm	14.10 mm
Petroleum Ether	12.80 mm	13.20 mm	11.90 mm	10.60 mm
Water	8.60 mm	9.20 mm	7.80 mm	7.40 mm

4. GINGER (Zingiber officinale)[15]

i. **Part Used**: Rhizome

ii. **Extracted With**: Ethanol, Methanol, Aqueous, Acetone

iii. **Antidermatophytic Activity Test**: Antifungal / Antidermatophytic

iv. **Test Organism**: T. rubrum, T. mentagrophytes, M. canis, E. floccosum

v. **Method Of Assay:** CLSI Disc Diffusion / Agar Well Diffusion

vi. **Result Report:[15]** Ethanolic extract shows highest antifungal activity, significantly inhibiting growth of all tested dermatophytes.

Extract	T. rubrum	T.mentagrophytes	M.canis	E.floccosum
Ethanol	16.80 mm	15.50 mm	17.90 mm	14.80 mm
Methanol	15.40 mm	14.20 mm	16.20 mm	13.60 mm
Acetone	13.10 mm	12.40 mm	14.30 mm	11.90 mm
Water	9.80 mm	8.90 mm	10.40 mm	8.20 mm

5. PEPPER (Piper nigrum)[16]

i. **Part Used:** Fruit / Seed

ii. **Extracted With:** Ethanol, Methanol, Chloroform, Aqueous

iii. **Antidermatophytic Activity Test:** Antifungal / Antidermatophytic

iv. **Test Organism:** T. rubrum, T. mentagrophytes, M. gypseum, E. floccosum

v. **Method Of Assay:** Agar Well Diffusion / CLSI Disc Diffusion

vi. **Result Reported:[16]** Ethanolic extract shows strongest inhibition among tested extracts.

Extract	T. rubrum	T.mentagrophytes	M. gypseum	E. floccosum
Ethanol	17.10 mm	16.00 mm	18.20 mm	15.40 mm
Methanol	15.90 mm	14.60 mm	16.50 mm	13.90 mm
Chloroform	14.20 mm	12.80 mm	15.10 mm	12.30 mm
Water	10.50 mm	9.80 mm	11.40 mm	9.10 mm

6. FENNEL (Foeniculum vulgare)[17]

i. **Part Used:** Seed

ii. **Extracted With:** Ethanol, Methanol, Aqueous, Hexane

iii. **Antidermatophytic Activity Test:** Antifungal / Antidermatophytic

iv. **Test Organism:** T. rubrum, T. mentagrophytes, M. canis, E. floccosum

v. **Method Of Assay**: Agar Well Diffusion / CLSI Disc Diffusion

vi. **Result Reported:[17]** Ethanolic extract demonstrates maximum inhibition against tested dermatophytes.

Extract	T. rubrum	T.mentagrophytes	M. canis	E. floccosum
Ethanol	15.80 mm	14.90 mm	16.60 mm	13.80 mm
Methanol	14.50 mm	13.60 mm	15.10 mm	12.90 mm
Hexane	12.60 mm	11.80 mm	13.20 mm	10.90 mm
Water	9.20 mm	8.50 mm	10.0 mm	7.80 mm

7. GARLIC (Allium sativum)[18]

i. **Part Used**: Bulb

ii. **Extracted With:** Ethanol, Methanol, Aqueous

iii. **Antidermatophytic Activity Test**: Antifungal / Antidermatophytic

iv. **Test Organism:** T. rubrum, T. mentagrophytes, M. gypseum, E. floccosum

v. **Method Of Assay:** Agar Well Diffusion / CLSI Disc Diffusion

vi. **Result Reported:[18]** Ethanolic extract shows highest inhibition due to allicin content, effectively controlling dermatophyte growth.

Extract	T. rubrum	T.mentagrophytes	M.gypseum	E. floccosum
Ethanol	18.40 mm	17.10 mm	19.00 mm	16.80 mm
Methanol	17.20 mm	16.00 mm	17.80 mm	15.90 mm
Water	12.60 mm	11.40 mm	13.20 mm	10.80 mm

8. HENNA (Lawsonia inermis)[19]

i. **Part Used:** Leaves

ii. **Extracted With:** Ethanol, Methanol, Aqueous, Chloroform

iii. **Antidermatophytic Activity Test:** Antifungal / Antidermatophytic

iv. **Test Organism:** T. rubrum, T. mentagrophytes, M. gypseum, E. floccosum

v. **Method Of Assay:** Agar Well Diffusion / CLSI Disc Diffusion

vi. **Result Reported:[19]** Methanolic extract shows highest inhibition against all tested dermatophytes.

Extract	T. rubrum	T.mentagrophytes	M. gypseum	E. floccosum
Methanol	16.80 mm	17.00 mm	15.90 mm	14.60 mm
Ethanol	15.40 mm	16.10 mm	14.20 mm	13.40 mm
Chloroform	13.20 mm	12.80 mm	11.90 mm	10.70 mm
Water	9.80 mm	9.10 mm	8.70 mm	7.90 mm

9. LIQUORICE (Glycyrrhiza glabra)[20]

i. **Part Used:** Root

ii. **Extracted With:** Ethanol, Methanol, Aqueous

iii. **Antidermatophytic Activity Test:** Antifungal / Antidermatophytic

iv. **Test Organism:** T. rubrum, T. mentagrophytes, M. gypseum, E. floccosum

v. **Method Of Assay:** Agar Well Diffusion / CLSI Disc Diffusion

vi. **Result Reported:[20]** Ethanolic extract exhibits maximum inhibition against dermatophytes.

Extract	T. rubrum	T. mentagrophytes	M. gypseum	E. floccosum
Ethanol	17.50 mm	16.40 mm	18.20 mm	15.90 mm
Methanol	15.80 mm	14.90 mm	16.10 mm	13.80 mm
Water	11.20 mm	10.80 mm	12.0 mm	9.90 mm

10. MORINGA (Moringa oleifera)[21]

i. **Part Used:** Leaves

ii. **Extracted With:** Ethanol, Methanol, Aqueous

iii. **Antidermatophytic Activity Test**: Antifungal /Antidermatophytic

iv. **Test Organism:** T. rubrum, T. mentagrophytes, M. canis, E. floccosum

v. **Method Of Assay:** Agar Well Diffusion / CLSI Disc Diffusion

vi. **Result Reported:[21]** Ethanolic extract shows highest antifungal activity against all tested fungi.

Extract	T. rubrum	T. mentagrophytes	M. canis	E. floccosum
Ethanol	17.20 mm	16.50 mm	18.00 mm	15.60 mm
Methanol	15.60 mm	14.80 mm	16.20 mm	13.90 mm
Water	11.40 mm	10.90 mm	12.30 mm	10.00 mm

11. INDIAN NETTLE (Girardinia diversifolia)[22]

i. **Part Used:** Leaves

ii. **Extracted With:** Ethanol, Methanol, Aqueous

iii. **Antidermatophytic Activity Test:** Antifungal / Antidermatophytic

iv. **Test Organism:** T. rubrum, T. mentagrophytes, M. canis, E. floccosum

v. **Method Of Assay:** Agar Well Diffusion / CLSI Disc Diffusion

vi. **Result Reported:**[22] Methanolic extract demonstrates highest inhibition against dermatophytes.

Extract	T. rubrum	T. mentagrophytes	M. canis	E. floccosum
Methanol	16.90 mm	16.20 mm	17.50 mm	14.90 mm
Ethanol	15.40 mm	14.70 mm	15.90 mm	13.40 mm
Water	10.80 mm	10.30 mm	11.20 mm	9.50 mm

12. ASTHMA PLANT (Euphorbia hirta)[23]

i. **Part Used:** Whole Plant

ii. **Extracted With:** Ethanol, Methanol, Aqueous

iii. **Antidermatophytic Activity Test:** Antifungal / Antidermatophytic

iv. **Test Organism:** T. rubrum, T. mentagrophytes, M. canis, E. floccosum

v. **Method Of Assay:** Agar Well Diffusion / CLSI Disc Diffusion

vi. **Result Reported:**[23] Ethanolic extract shows maximum inhibition against dermatophytes.

Extract	T. rubrum	T. mentagrophytes	M. canis	E. floccosum
Ethanol	16.80 mm	16.10 mm	17.60 mm	14.90 mm
Methanol	15.50 mm	14.80 mm	15.90 mm	13.20 mm
Water	10.90 mm	10.40 mm	11.60 mm	9.80 mm

13. POMEGRANATE (Punica granatum)[24]

i. **Part Used:** Peel / Fruit

ii. **Extracted With:** Ethanol, Methanol, Aqueous

iii. **Antidermatophytic Activity Test:** Antifungal / Antidermatophytic

iv. **Test Organism:** T. rubrum, T. mentagrophytes, M. canis, E. floccosum

v. **Method Of Assay:** Agar Well Diffusion / CLSI Disc Diffusion

vi. **Result Reported:[24]** Ethanolic peel extract shows highest antifungal activity.

Extract	T. rubrum	T. mentagrophytes	M. canis	E. floccosum
Ethanol	17.30 mm	16.50 mm	18.10 mm	15.60 mm
Methanol	15.70 mm	14.80 mm	16.20 mm	13.90 mm
Water	11.50 mm	10.90 mm	12.10 mm	10.20 mm

14. LOTUS (Nelumbo nucifera)[25]

i. **Part Used:** Leaf / Flower

ii. **Extracted With:** Ethanol, Methanol, Aqueous

iii. **Antidermatophytic Activity Test:** Antifungal / Antidermatophytic

iv. **Test Organism:** T. rubrum, T. mentagrophytes, M. canis, E. floccosum

v. **Method Of Assay:** Agar Well Diffusion / CLSI Disc Diffusion

vi. **Result Reported:[25]** Methanolic leaf extract exhibits highest inhibition against dermatophytes.

Extract	T. rubrum	T. mentagrophytes	M. canis	E. floccosum
Methanol	16.90 mm	16.20 mm	17.70 mm	14.80 mm
Ethanol	15.50 mm	14.80 mm	15.90 mm	13.20 mm
Water	10.80 mm	10.40 mm	11.60 mm	9.80 mm

15. CLOVE (Syzygium aromaticum)[26]

i. **Part Used:** Flower Bud

ii. **Extracted With:** Ethanol, Methanol, Aqueous

iii. **Antidermatophytic Activity Test:** Antifungal / Antidermatophytic

iv. **Test Organism:** T. rubrum, T. mentagrophytes, M. gypseum, E. floccosum

v. **Method Of Assay:** Agar Well Diffusion / CLSI Disc Diffusion

vi. **Result Reported:[26]** Ethanolic extract shows strongest antifungal activity against all tested dermatophytes.

Extract	T. rubrum	T. mentagrophytes	M. gypseum	E. floccosum
Ethanol	18.20 mm	17.40 mm	19.00 mm	16.50 mm
Methanol	16.80 mm	15.90 mm	17.50 mm	14.90 mm
Water	12.40 mm	11.80 mm	13.20 mm	10.90 mm

CONCLUSION

This review highlights the remarkable antidermatophytic potential of fifteen medicinal plants, with Garlic (Allium sativum), Neem (Azadirachta indica), and Clove (Syzygium aromaticum) exhibiting the highest inhibitory activity against dermatophytes. Ethanolic and methanolic extracts were generally the most effective, emphasizing the importance of solvent polarity in extracting bioactive compounds. Other plants such as Ginger, Pepper, Fennel, Henna, Liquorice, Moringa, Indian Nettle, Asthma Plant, Pomegranate, and Lotus also demonstrated moderate to robust activity, suggesting a broad spectrum of natural antifungal agents.

Considering these findings, several formulation approaches can be applied: these extracts could be incorporated into topical creams, ointments, gels, or nano formulations, potentially enhancing stability, skin penetration, and therapeutic efficacy. Synergistic combinations of multiple plant extracts may further improve antifungal performance. Despite promising in vitro results, in vivo studies, extract standardization, stability testing, and safety profiling are needed to translate these plants into effective, clinically viable antifungal products. Overall, these medicinal plants provide a valuable, sustainable resource for combating dermatophytosis, and future research can focus on mechanistic studies and innovative formulations to maximize their therapeutic potential.

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