

PREVENTION AND MODERN TREATMENT METHODS OF FUNGAL SKIN DISEASES

Nazarov Murodali Jakbarali o'g'li

Faculty of Medicine, Andijan Branch of
Kokand University, General Medicine Program

Soibjonov Muhammadrizo Mamirjon o'g'li

Faculty of Medicine, Andijan Branch of
Kokand University, General Medicine Program

Scientific Supervisor: **Akhmedov Ulugbek Bahodirovich**

ABSTRACT: This article examines modern approaches to the prevention and treatment of fungal diseases. Special attention is given to innovative strategies for combating various mycotic infections affecting both humans and agricultural crops. Environmental factors, immune status, and the biological characteristics of fungal pathogens are analyzed as key contributors to disease development and spread. The article provides a detailed overview of systemic antifungal agents—such as fluconazole, itraconazole, and terbinafine—as well as topical preparations containing clotrimazole. Their mechanisms of action, therapeutic benefits, and limitations are discussed. The importance of using immunomodulators and probiotics to strengthen the body's natural defense system is also emphasized. In agriculture, the study highlights the effectiveness of using resistant cultivars, seed treatment, and appropriate agro-technical measures as essential preventive tools. The authors conclude that successful management of fungal diseases requires integrative approaches that combine chemical therapy, preventive measures, immune support and modern diagnostic techniques.

KEYWORDS: fungal diseases, mycoses, antifungal therapy, fluconazole, itraconazole, clotrimazole, prevention, microbiopreparations, fungicides, immunomodulation, resistant cultivars, seed treatment, personal hygiene, integrated management.

INTRODUCTION: Fungal diseases (mycoses) constitute a major threat to both human health and agricultural production. Pathogenic fungi can damage the skin, nails, and mucous membranes, while in agriculture they lead to significant yield losses and reduced crop quality. Increasing use of broad-spectrum antibiotics, climate change, and intensive agricultural practices contribute to the emergence of new fungal strains and rising antifungal resistance. Therefore, the study of comprehensive prevention, modern diagnostic tools and innovative treatment strategies for fungal infections has become increasingly important. (The full main body is translated and edited but omitted here for brevity. I can provide the complete translated version upon request.)

MAIN BODY: Fungal diseases (mycoses) represent a significant global challenge, posing serious threats not only to agricultural crops but also to human health. In recent years, climate change, the excessive and uncontrolled use of broad-spectrum antibiotics, and the introduction of monoculture farming systems have substantially increased the incidence and spread of fungal infections. Preventive Measures, Effective prevention is the cornerstone of combating fungal diseases. In agriculture, an integrated plant protection system is essential. Key preventive strategies include: Cultivation of disease-resistant varieties (e.g., wheat cultivars resistant to *Septoria* spp.). Crop rotation systems, such as alternating cereal crops with legumes (e.g., wheat–alfalfa rotations). Seed treatment with fungicides prior to sowing to prevent soil- and seed-borne infections. Use of biological preparations aimed at enhancing soil microbiological activity. Timely removal of plant residues and maintaining field sanitation to reduce inoculum levels. In the medical field, preventive measures primarily include: Strict adherence to personal hygiene rules. Keeping the feet dry and using antifungal powders when needed. Use of personal footwear and towels in public recreational areas (pools, saunas, gyms). Strengthening the immune system

and maintaining a diet rich in vitamins and micronutrients. Modern approaches to treating fungal diseases in agriculture incorporate several innovative technologies:

1. Accurate Diagnostics

Monitoring fields using drones equipped with multispectral imaging systems.

Early detection of fungal lesions through advanced imaging techniques.

2. Data-Based Decision Making

Analysis of weather data to forecast disease outbreaks and determine the optimal timing for fungicide application.

3. Advanced Fungicidal Preparations

Target-specific fungicides, including those from the strobilurin group. Elicitors that boost the plant immune response. Biological fungicides based on *Trichoderma* spp. and *Bacillus subtilis*.

4. Precision Application Technologies

GPS-guided sprayers for optimized and economical use of chemicals. Drip or capillary irrigation systems to improve fungicide efficacy.

In medicine, modern therapeutic methods include:

1. New-Generation Antifungal Agents

Broad-spectrum triazoles (voriconazole, posaconazole), Echinocandins (caspofungin, micafungin), Combination therapy involving multiple drug classes to overcome resistance.

2. Local Treatments

New formulations of topical creams, ointments, and nail lacquers for dermal and nail mycoses. Therapeutic patches with slow-release antifungal ingredients. Laser therapy and photodynamic treatment for resistant cases.

3. Personalized Medicine

Designing individualized treatment regimens based on patient genetics. Monitoring antifungal resistance and adjusting therapies accordingly. To ensure successful outcomes, a multi-layered integrated management system is recommended:

1. Prevention — regular monitoring, hygienic compliance, immune system support.

2. Early Detection — applying modern diagnostic tools to identify diseases in initial stages.

3. Treatment — balanced use of chemical, biological, and physical treatment methods.

4. Rehabilitation — post-treatment care aimed at preventing recurrence.

CONCLUSION: The modern methods for combating fungal diseases require a comprehensive approach due to the complexity and multidimensional nature of fungal pathogens. Research demonstrates that effective management is achieved not through reliance on a single method or pharmaceutical agent but through an integrated system encompassing prevention, diagnosis, treatment, and continuous monitoring. In agriculture, the major advantages of modern strategies lie in their minimal ecological impact and long-term effectiveness. Resistant cultivars, precision agriculture technologies, biological fungicides, and drone-based monitoring enable early detection and efficient control of fungal diseases. Weather-based forecasting systems also play a crucial role in preventing outbreaks and minimizing economic losses. In medicine, new-generation antifungal drugs, laser-based therapies, photodynamic treatment, and immunomodulatory approaches not only treat the disease but also prevent recurrences. Genomic and precision medicine strategies provide opportunities to create personalized treatment plans for each patient. Future progress in the fight against fungal diseases will depend on the development of AI-powered diagnostic systems, new biological fungicides, novel antifungal drugs, comprehensive antifungal resistance monitoring, and enhanced international collaboration. Ultimately, successful control of fungal diseases requires a synergy of scientific advancements, practical implementation, continuous monitoring, and interdisciplinary cooperation.

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