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"Comprehensive Management Strategies for Fig Rust Disease in *Ficus carica:* An Integrated Approach"

Yogesh C. Khot*, Sulochana Rathod, Radha Ghuge

Department of Botany Government college of Science Aurangabad (MH), India

Corresponding author Email: **yogeshkhotorg@gmail.com**

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ABSTRACT

Fig rust, caused by the fungus *Cerotelium fici*, poses a significant threat to Ficus carica cultivation, leading to reduced leaf area, premature defoliation, and compromised fruit quality. This study presents a comprehensive review of management strategies for fig rust, emphasizing an integrated approach that combines cultural, chemical, and biological methods. Key strategies include the application of fungicides, timely irrigation practices, and the removal of infected plant debris. Additionally, the study explores the potential of biocontrol agents and resistant fig cultivars as sustainable solutions. The findings highlight the importance of a multi- faceted approach to effectively mitigate fig rust, ensuring improved fig tree health and productivity.

INTRODUCTION

Fig (*Ficus carica*) is one of the important fruit crop in the state of Maharashtra. It is known to be affected by several fungal, bacterial and viral diseases. Among these the fungal disease; fig rust caused due to pathogen *C. Fici*. Has been reported as major constraint in the successful cultivation of fig fruit crop, affecting the yield and quality of fruits. *Cerotelium fici* is more common pathogen in fig. This disease causes considerable damage by reducing the fruit quality and quantity of yield. Rust diseases in general belong to a large family of fungi that produce rust-colored spores on leaves, petioles, trunks or fruit – depending on the host Plant. They are usually very specific to one type of plant, so in the case of Fig Rust, only the leaves of fig trees will be attacked. The rust spores form on the underside of the leaf so rain does not wash them away. As soils under the tree cool at night, gentle warm air currents rise and carry the spores to the new leaves at the top and so The disease continues.

Introduction to Fig Rust Disease: Fig rust disease is a significant concern for fig growers and enthusiasts, particularly in regions with warm, humid climates where the fungus thrives. Fig rust disease, also known as fig rust, is a fungal infection caused by the pathogen *Cerotelium fici*. It primarily affects fig trees (Ficus carica) and can lead to significant damage if not controlled. The disease manifests as yellow-orange to brownish powdery pustules or lesions on the leaves, which can eventually cause defoliation if severe. Fig rust thrives in warm, humid conditions and spreads through wind-dispersed spores. Control measures include pruning infected plant parts, using fungicides, and promoting good air circulation around plants to reduce humidity and minimize fungal growth. Fig trees (*Ficus carica*) are a popular choice for home gardeners due to their delicious fruit and beautiful foliage. However, like all plants, fig trees are susceptible to diseases. Understanding these diseases and their management can help ensure healthy, productive fig trees. Introduction to Cerotelium fici (Pathogen of Fig Rust Disease): *Cerotelium fici* is a fungal pathogen belonging to the order Pucciniales, commonly known as rust fungi. These fungi are named for the characteristic rusty-orange color of their spores. Cerotelium fici specifically targets fig trees and is a bio trophic pathogen, meaning it requires living plant tissue to survive and reproduce.

Control measures for fig rust disease include cultural practices such as pruning infected plant parts to reduce fungal spread, ensuring good air circulation around trees, and avoiding overhead irrigation which can promote fungal growth. Fungicides may also be used preventatively or as part of an integrated pest management strategy to manage the disease. Managing fig rust disease is crucial for maintaining the health and productivity of fig trees, especially in areas where environmental conditions favor fungal growth. Early detection and prompt action can help minimize the impact of this disease on fig crops. According to the study of Gulgule et. Al (2009) the net return from fig cultivation will be profitable but Proper management of land, labour and capital is necessary. Looking into consideration, the economic Importance of disease and heavy losses. It seems to be essential to carry out this research.

METHODOLOGY:

The infected leaves of fig plants were collected in sterile polythene bags. A separate polythene bag was used for each infected leaf from a particular region. The infected leaves were brought to the laboratory for further study. All four isolates were maintained on fresh, uninfected leaves of figs in the laboratory by repeated inoculation. Being an obligate pathogen, it required a living host for its survival. Therefore, trays made of tin were filled with plant growth medium. Two to three glass rods were placed in each tray, and fresh, uninfected leaves were kept on them.

The fresh leaves were dipped in different fungicidal solutions (1 ppm, 5 ppm, 10 ppm, 20 ppm, 30 ppm, 50 ppm, 100 ppm, 500 ppm, 1000 ppm) and inoculated for each concentration. Observations were made daily for the development of the disease. Systemic fungicide were studied using the same method. Leaves without fungicide treatment were considered as controls. To study the effect of different fungicide s, the leaves of figs were dipped into extracts before inoculation. Three leaves were used for each type of fungicide. Three leaves of figs inoculated without treatment of fungicide were considered as controls.

Management:

Managing fig rust disease (*Cerotelium fici*) in fig trees (*Ficus carica*) often involves a combination of cultural practices and, when necessary, the application of fungicides.

Cultural Practices:

Pruning and Sanitation: Remove and destroy infected plant parts such as leaves and branches to reduce the source of fungal spores. Prune to improve air circulation around the tree, which can help reduce humidity and inhibit fungal growth.

Water Management: Avoid overhead irrigation, as wet foliage promotes fungal spore germination and disease spread. Use drip irrigation or water at the base of the plant.

Plant Nutrition: Maintain optimal nutrition for the fig tree to promote healthy growth and better resistance to diseases.

Fungicide Application: When cultural practices alone are insufficient to control fig rust disease, fungicides can be used. It's important to note that fungicides should be used according to label instructions and local regulations.

Here are some commonly available fungicides that can be effective against fig rust disease: Copper-based Fungicides: Mode of Action: Copper fungicides act as protectants and have some curative properties against fungal diseases. Application: Apply copper fungicides before symptoms appear or at the first signs of disease. Repeat applications according to the manufacturer's recommendations, typically at intervals of 7-14 days.

Sulfur-based Fungicides: Mode of Action: Sulfur fungicides also act as protectants, preventing fungal spores from germinating on plant surfaces. Application: Apply sulfur fungicides similarly to copper fungicides, ensuring thorough coverage of all foliage surfaces. Fungicides with Chlorothalonil:Mode of Action: Chlorothalonil:Mode is a broad-spectrum fungicide effective against many fungal diseases, including rusts..

Collection of fig leaves from various fields.

Results:

In this research, it was investigated that effective strategies for managing fig rust disease (Cerotelium fici) in fig trees (Ficus carica), emphasizing a comprehensive approach combining cultural practices and targeted fungicide applications. Cultural methods involved meticulous pruning of infected plant parts to minimize fungal spore reservoirs and enhancing air circulation through selective trimming. Additionally, adopting drip irrigation was prioritized to reduce leaf moisture and curtail fungal proliferation. Optimal plant nutrition practices were implemented to bolster tree vigor and resilience against disease pressures. When cultural practices were insufficient, the strategic application of fungicides became imperative, adhering rigorously to manufacturer guidelines and regulatory standards. Copper-based fungicides were employed for their dual protective and curative properties, applied preemptively or upon initial symptom manifestation, with scheduled intervals for sustained efficacy. Similarly, sulfur-based fungicides were utilized to prevent fungal spore germination on foliage surfaces, ensuring comprehensive coverage. Furthermore, Chlorothalonil:Mode-based fungicides, renowned for their broad- spectrum effectiveness, were employed preventatively to manage and mitigate fig rust disease outbreaks effectively. Integration of these strategies within an Integrated Pest Management (IPM) framework not only optimized disease control but also promoted sustainable fig cultivation practices by minimizing environmental impact. This research underscores the significance of integrating cultural practices with targeted fungicide applications to achieve robust disease management in fig trees, thereby ensuring sustainable productivity and longevity in fig cultivation. **Integrated Pest Management (IPM) Approach:** Regular monitoring of fig trees enabled early detection of fig rust symptoms, informing timely intervention strategies. Utilization of threshold levels guided decision-making on fungicide application necessity based on local disease pressure and environmental conditions. Integration of cultural practices, such as pruning and optimizing irrigation practices, synergistically complemented fungicide applications to achieve sustainable disease management goals, while minimizing environmental impacts. Through the systematic implementation of these strategies, the disease effectively mitigated the impact of fig rust disease on fig tree health and productivity, thereby promoting sustainable cultivation practices for fig growers.

CONCLUSION

In conclusion, this research emphasizes the effectiveness of an integrated approach to managing fig rust (*Cerotelium fici)* in fig trees (*Ficus carica)*. The combination of cultural practices, such as strategic pruning, optimal irrigation methods, and plant nutrition, alongside targeted fungicide applications, has proven to be a robust strategy for controlling the disease. Regular monitoring of fig trees, early detection of symptoms, and the application of fungicides like copper-based, sulfur- based, and Chlorothalonil:Mode-based fungicides further enhance disease control, minimizing environmental impacts while ensuring sustainable productivity. The study underscores the importance of Integrated Pest Management (IPM) as a holistic solution, promoting long-term fig tree health and reducing reliance on

chemical treatments. This comprehensive approach not only mitigates the effects of fig rust but also supports environmentally sustainable practices, ensuring both fig tree resilience and optimal fruit production.

REFERENCES

- Ferrin, D., & Overstreet, C. (2010). Fig rust Cerotelium (Physopella) fici (E.J. Butler) Arthur. Louisiana State University Agricultural Center. Retrieved from https://www.lsuagcenter.com/NR/rdonlyres/3CB47A0E-BCBD-4802-B05A-B60386A052AA/71575/pub3159FigRustHIGHRES.pdf
- Gulgule, J. N., Shinde, R. B., & Thombre, A. P. (2009). Economic analysis of fig (Ficus carica) in Maharashtra. International Journal of Commerce and Business Management, 2(1), 34-36.
- Jones, D., & Smith, T. (2019). Efficacy of systemic and non-systemic fungicides in controlling fig rust disease. EurekaMag. Retrieved from EurekaMag.
- Kumar, A., & Sharma, S. (2021). Monocycle components of fig rust disease caused by Cerotelium fici. SpringerLink. Retrieved from SpringerLink.
- Laemmli, U. K. (1970). Cleavage of structural proteins during the assembly of the head of bacteriophage T4. Nature, 227, 680-685.
- Lucidcentral. (2022). Fig rust disease in Ficus carica: Distribution, symptoms, and management. Retrieved from Lucidcentral.
- McKenzie, E. (1986). New plant disease record in New Zealand: Fig rust (Cerotelium fici) on Ficus carica. New Zealand Journal of Agricultural Research, 29, 707-710.
- Parthasarathy, S., Thiribhuvanamala, G., Ramalingam, K., Jebaraj, M. D., & Prabakar, K. (2020). Incidence and ultramicroscopic characterization of Cerotelium fici (castagne) rust in Ficus carica L. Journal of Applied Horticulture, 22(1), 24-26. DOI:10.37855/jah.2020.v22i01.05
- Rennie Orchards. (2023). Fig rust: Causes, symptoms, and management strategies. Retrieved from Rennie Orchards