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In Vitro Assessment of Trichoderma Strain as an Antagonist against Phytopathogenic Fungi in Tomatoes: Improving Fruit Quality via Biocontrol

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ABSTRACT

Fusarium oxysporum, Phytophtora infestans and Alternaria alternata are a soil borne fungal pathogen that attacks plants through roots at all stages of plant growth, causes major economic losses by inducing necrosis and wilting symptoms. Trichoderma sp. tested against the selected fungi under in vitro conditions. The results revealed that Trichoderma sp. showed maximum inhibition against the three pathogenic fungi Alternaria alternata strain (A), Fusarium oxysporum strain (F) and Phytophtora infestans (P). It may be therefore a promising ecofriendly bio controlling sources and cost effective for the safe agricultural practices as well as to farmers.

Keywords: Trichoderma strain, Phytopathogenic fungus, Tomato, Fruit quality, Biocontrol.

1 Introduction

Tomatoes (Solanum lycopersicum) play a vital role in global agricultural production, but their vulnerability to phytopathogenic fungi presents a substantial risk to both yield and fruit quality. In this study, we carried out an in vitro antagonist test to assess the biocontrol capabilities of Trichoderma strains against a common phytopathogenic fungus affecting tomatoes. The main goal was to investigate the effectiveness of Trichoderma as a biological control agent in countering the fungal pathogen, thereby enhancing the overall quality of tomato fruits.

2 Experimental

A specific Trichoderma strain was isolated, cultured, and then pitted against the targeted phytopathogenic fungus under controlled laboratory conditions. Antagonistic interactions were evaluated using diverse parameters, including inhibition of mycelial growth, spore germination, and the production of antifungal metabolites. The results highlighted the capability of certain Trichoderma strains to significantly hinder the growth and development of the phytopathogenic fungus. Additionally, the study delved into the potential impact of Trichoderma biocontrol on the quality of tomato fruits. Parameters such as fruit weight, size, color, and biochemical composition were scrutinized to assess any noticeable enhancements resulting from the application of Trichoderma.

3 Results and discussion

Initial findings indicate that the biocontrol treatment has a positive impact on the quality of tomatoes by alleviating the adverse effects caused by the phytopathogenic fungus.

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4 Conclusions

In conclusion, our study emphasizes the promising biocontrol capabilities of particular Trichoderma strains against phytopathogenic fungi affecting tomatoes. The in vitro antagonistic test demonstrates noteworthy inhibitory effects on the targeted pathogen, and initial assessments suggest a potential improvement in the quality of tomato fruits. These results contribute to the advancement of sustainable and eco-friendly strategies for mitigating fungal diseases in tomatoes, providing a viable alternative to conventional chemical approaches. Further field trials and investigations are necessary to validate and refine the application of Trichoderma-based biocontrol methods for practical implementation in tomato cultivation.

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