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 ORIGINAL PAPERS

# DISTRIBUTION AND QUALITATIVE AND QUANTITATIVE DETERMINATION OF PESTICIDE RESIDUES FROM A SAMPLE OF RED GRAPEFRUIT, AFTER TREATMENT WITH FUNGICIDE SOLUTIONS

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**Abstract.** *The Most citrus fruits are compromised each year due to post-harvest fungal infections. To reduce fungal infections, packing centers use fungicide solution mixtures to prevent infections that occur during harvest and then during storage. The most common fungal pathogens of citrus are commonly treated with the fungicides imazalil, Pyrimethanil due to their effectiveness in controlling these pathogens at low cost and ease of handling. However, little is known about how it alters tissues in citrus physiology. In this study we will investigate the behavior and retention of imazalil and pyrimethanil in the tissues of the red grapefruit fruit (peel and core before washing and after washing with hot water and simple dish detergent).*

*This work demonstrates a viable approach for assessing the quality of citrus fruits, and we can even proceed to thoroughly wash each fruit before consumption, as we remove a quantity of residue.*

*This work demonstrates that the treatment affects the citrus tissues and the substances migrate throughout the pulp, although the treatment was applied to the peel.*

*Washing, which is the first step in food processing on a domestic and industrial scale, helps to reduce pesticide residues on the fruit surface. In this study, the effectiveness of washing the peel was also investigated.*

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*Although many chemicals are applied to citrus to prevent certain diseases or control pests, there is little literature available on how these treatments alter the physiology of the fruit. Usually, the packaging only analyzes the level of treatments on the products.*

**Keywords:** pesticides, citrus fruits, fungicide treatment.

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## Introduction

The citrus industry is a major contributor to the agricultural economy. It has been reported that nearly 90 million tons of citrus fruits are produced annually worldwide, with grapefruit, lemons and oranges being at the highest consumption rate.

Unfortunately, the citrus industry is exposed to many pest and disease threats that can drastically reduce citrus production each year.

These threats include preharvest diseases such as *Diplodia natalensis* and *Phomopsis citri*, postharvest diseases including *Penicillium digitatum* and *Penicillium italicum*, overripe fruit, insect damage, and a variety of physiological disorders.

The citrus season typically runs from early winter to late spring for most cultivars in both hemispheres; therefore, both have to rely on off-season product import and in-season product export to keep citrus products on the market.

Exporting fruit abroad takes a considerable amount of time, so the products must maintain their shelf life. Therefore, proper chemical application prior to shipment is crucial to the process.

There are many pre-harvest and post-harvest pathogens, most of which can be controlled with fungicides. *P. digitatum* and *P. italicum* are the most abundant post-harvest diseases. *P. digitatum* is the more virulent of the two and is expected to contribute nearly 50% of total post-harvest losses. *P. digitatum*, also called green mold, is the most widespread post-harvest pathogen of citrus, which is capable of infecting any citrus species in wounds caused during harvest. Wounds also occur as the fruit enters the packing warehouse as it is processed for market distribution. Not only do the fruits provide nutrients that allow *P. digitatum* to thrive, but the skin of the fruit also contains aromatic substances that induce germination. *P. italicum* , also known as blue mold, is similar to *P. digitatum* in many ways.

To reduce product losses due to *P. digitatum* and *P. italicum infections* , packinghouses use aqueous fungicide applications to prevent and reduce infections that occur during harvest. Imazalil, also known as enilconazole (1-[2-(2,4-dichlorophenyl)-2(2-propenyloxy)ethyl]-1H - imidazole, IMZ), is the