

Year II, A Comprehensive Eco-Friendly Strategy for Citrus Greening Disease Management: Targeted Delivery of Novel Multi-Compound Formulation Derived From *Murraya koenigii* in Combination With Steam Therapy Approach and Its Validation Through Precision Agriculture Tools

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Huanglongbing (HLB) or the Citrus Greening Disease (*Candidatus Liberibacter asiaticus*) is the most destructive citrus disease worldwide. Currently, no pesticide is registered to cure this disease besides Oxytetracycline under Emergency Label Section 18. The curry leaf tree, *Murraya koenigii*, is highly attractive to the Asian citrus psyllid, *Diaphorina citri*, which vectors the bacterial causative agent of citrus greening disease, but it is not a carrier of disease. Thermotherapy can be a potential method to suppress the disease and increase the plant transpiration rate, thus enabling for the translocation of the bactericide. The objective of this investigation was to develop a novel biological bactericide using the bioactive compounds from curry leaves and engineer a Localized Thermal Therapy Framework to enhance the uptake of the treatment. The biological bactericide was used to treat the greening-infected trees through trunk injection at 7.5% rate. Steam-therapy wrap (ST) supplemented the biological treatment (NB). The combination of ST and NB resulted in more than 45% improvement in the management of Disease Severity, 50% Increase in Plant Vigor, 53% improvement in Chlorophyll content compared to untreated control. qPCR analysis verified a 26% increase in Ct-value in NB and ST treated trees. In conclusion, ST and NB was able to outperform the industry-standard by 14% and enhance treatment uptake. The Steam therapy wrap emerges as a low-cost, portable, and easy-of-use device to treat thousands of acres. This integrative approach comprising curry-leaves-biological bactericide and steam therapy presents a dual-strategy to eradicate citrus greening disease, emerging as an effective and sustainable solution to bolster the global citrus industry.

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