



ESTIMATING HIDDEN INFESTATIONS IN RICE BY MEASURING CARBON DIOXIDE LEVELS

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INTRODUCTION

Infestations by *Sitophilus* species cause significant losses in the rice value chain. Most of the life cycle of these insects occurs inside the grains, making infected grains indistinguishable by the naked eye [1]. The amount of CO₂ in rice storage is correlated to infestation, due to the insects' respiration rate [2]. Therefore, it is possible to estimate hidden infestations in rice by measuring CO₂ levels. This method can be effective in detecting hidden infestations and preventing waste [3].

METHODOLOGY AND RESULTS

O₂ and CO₂ (%) portable sensor to estimate infestation levels



6 replicates: 10g of untreated rice, previously infested with 10 insects each.

10 days → Removal of insects and start daily respiration rate measurements until adult insects are detected.

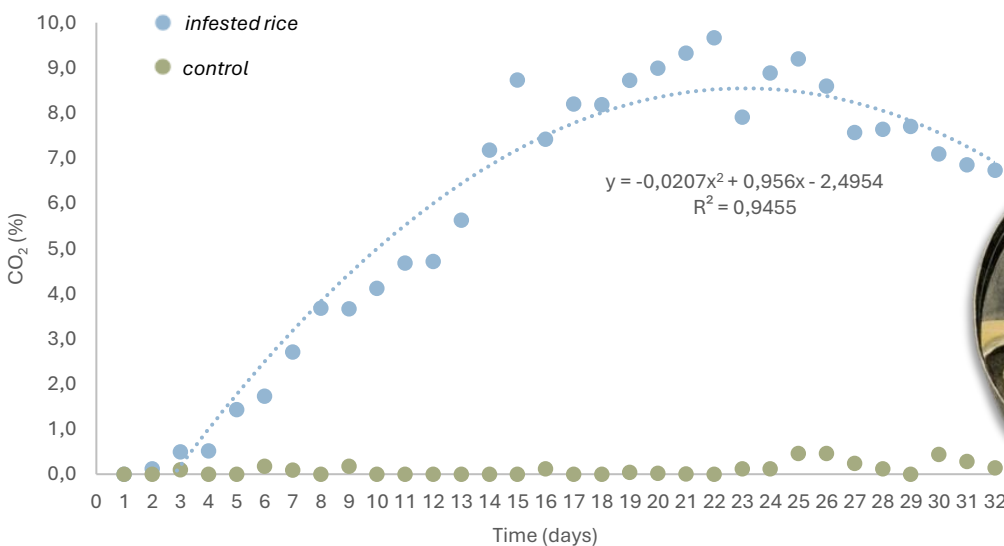


Figure 1. Mean CO₂ values (%) throughout the life cycle of the insects, determined on previously infested rice samples. Notes: the rice variety in the study is Ariete. Control corresponds to untreated rice, without infestation.

CONCLUSIONS

CO₂ levels gradually increase throughout the *Sitophilus* life cycle and start to decrease at the adult stage. Modern sensors can accurately predict and detect incipient or ongoing hidden infestations.

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This study is related to the Sustainable Development Goals (SDGs), **12. Responsible Consumption and Production**, since we hope to reduce food waste by reducing rice grain losses with new methods, capable of detecting hidden infestation, and **9. Industry, Innovation and Infrastructure**, because this methodology could be useful to apply in the industry, in rice storage, to control infestations.

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