



Università degli Studi di Napoli Federico II

PhD in Biotechnology - 39th cycle

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Novel bio-pesticides for crop protection

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The escalating world population has intensified pressure on agriculture, necessitating increased use of synthetic pesticides to mitigate crop losses caused by various pests. However, the indiscriminate use of these pesticides has raised concerns due to their detrimental effects on the environment and human health. Consequently, there's a growing urgency to explore sustainable alternatives for crop protection. Biopesticides offer a promising solution, utilizing natural compounds derived from living organisms to manage pests in an eco-friendly manner. These biopesticides, categorized into biochemicals, plant-incorporated protectants, and microbial pesticides, exhibit target specificity, biodegradability, and reduced risk to non-target organisms¹. Among biopesticides, essential oils (EOs) have gained attention for their efficacy against pests while being environmentally safe, which possess antimicrobial and antioxidant properties, making them effective in pest management across diverse crop systems². However, their utilization faces challenges due to volatility and instability, which can be addressed through nanoencapsulation techniques using biopolymers like chitosan. This process enhances stability, efficacy, and controlled release of bioactive compounds, ensuring prolonged pest control with minimal environmental impact. Moreover, repurposing surplus polymers as hydrocolloids for encapsulation further contributes to sustainability³. This abstract proposes a novel approach to develop biopesticides by harnessing natural compounds from EOs, encapsulating them into nanoparticles, and evaluating their efficacy in sustainable crop protection. By achieving this, the project aims to offer "green pesticides" that not only improve plant disease management but also promote environmental sustainability and human health.

References

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