

# Nematicidal action of *Bacillus licheniformis* proteases

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Nematodes are parasites responsible for various diseases in humans, animals, and plants, resulting in significant impacts on health and global agricultural production, with estimated annual losses of approximately US\$70 billion. Using chemical nematicides as a form of control has proven effective. However, excessive use of these products favors the selection of more resistant organisms, compromising the effectiveness of these compounds. This fact highlights the need to explore new alternatives to combat the environmental spread of these parasites and their infectious forms. One way forward is the use of enzymes. In this context, the objective of this study was to analyze the nematicidal action on *Panagrellus* sp. using three pure industrial proteases (HPP, HPF, and APP1500) supplied by the company Prozyn®, all from *Bacillus licheniformis*. Each pure enzyme was evaluated at a concentration of 1% (w/v). The experiment was conducted by forming two groups for each enzyme: G1 – Control and G2 – Active. Approximately 60 juveniles of *Panagrellus* sp. were added to the G1 control group. and 100 µL of distilled water in 200 µL microtubes, while for the active group, around 60 juveniles of *Panagrellus* sp. and 100 µL of 1% (m/v) enzyme solution. The microtubes were incubated at 25 ± 1°C for 24 hours. After the incubation time, the viability of the nematodes was evaluated using optical microscopy. The t-test was applied to the results, representing a significant difference (p<0.001) between the control group and pure enzymes. Industrial proteases demonstrated encouraging results regarding nematicidal action compared to the control group. After 24 hours of incubation, the HPP enzyme showed a reduction of 67%, the HPF recorded an even more substantial decrease of 94%, and the APP1500 achieved a significant reduction of 84% compared to the number of juveniles in the control group. Therefore, the results of this study suggest that *B. licheniformis* proteases have remarkable potential as nematicidal agents and may represent a promising approach to controlling these nematodes.

**Keywords:** nematicidal action, industrial enzymes, proteases, sustainability

## Ação nematicida de enzimas industriais sobre *Panagrellus* sp.

Nematoides são parasitas, que causam grandes prejuízos à saúde humana, animal e à produção agrícola (cerca de US\$ 70 bilhões anualmente). O uso excessivo de anti-helmínticos torna os parasitas mais resistentes. Dessa forma, neste estudo investigou três enzimas puras industriais (HPP, HPF e APP1500) da Prozyn®, todas de *Bacillus licheniformis*, em *Panagrellus* sp. Após 24 horas de incubação a 25±1°C, as enzimas mostraram resultados promissores. A enzima HPF obteve uma redução significativa de 94% na mortalidade dos nematoides, enquanto HPP e APP1500 alcançaram reduções de 67% e 84%, respectivamente. Este estudo sugere que as enzimas da Prozyn® podem ser eficazes como nematicidas.

**Palavras-chave:** ação nematicida, enzimas industriais, proteases, sustentabilidade

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