

# Linking the protease activity to the nematicidal action of *Pleurotus djamor*

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The use of enzymes in the biochemical control of nematodes is a promising alternative. Edible mushrooms are natural enemies of nematodes and produce metabolites such as toxins and enzymes. However, the mechanisms of action of these enzymes are not yet fully understood. This study investigated the nematicidal effect of a crude, cell-free, enzyme-rich extract of *Pleurotus djamor* against *Panagrellus* sp. at different fermentation times. For this, mushroom fermentation occurred in wheat seeds for two different periods (45 and 75 days). After these periods, the enzymes were extracted from the solid media with water in a 1:5 (solid: liquid) ratio. Then, the activity of the proteases was measured at different pH values (5, 7, and 9). The nematicidal activity of the crude extract was tested against *Panagrellus* sp juveniles. This assay consisted of three distinct groups: control, active, and denatured. Each group had six replicates. In response to these experiments, the proteolytic activity was  $8.3 \pm 2$  U mL<sup>-1</sup> at pH 5, regarding 45 days of fermentation. For the 75 days, the extract did not show enzymatic activity. At pH 7 and 9, it wasn't observed detectable proteolytic activity in both fermentation times. About the nematicidal assay, the active crude extract of the mushroom showed a significant difference of juveniles reduction compared to the control and the denatured crude extract ( $p < 0.01$ ) for the 45-day fermentation time. In addition, the control and denatured groups were not significantly different ( $p > 0.05$ ). In the 75 days, the results obtained for all the groups tested did not show a significant difference in comparison to them ( $p > 0.05$ ). In the shorter fermentation time, the percentage of nematode reduction relative to the control group was 73%. In summary, this study suggests, for the first time, that the nematicidal activity in *Panagrellus* sp. of the active, cell-free extract of *P. djamor* is also due to the presence of proteases produced by the fungus.

**Keywords:** Enzymes; Edible mushroom; Biochemical control.

## Ligando a atividade de proteases à ação nematicida de *Pleurotus djamor*

O emprego de enzimas no controle de nematoides é uma alternativa promissora. Neste trabalho, investigou-se o efeito nematicida do extrato bruto de *Pleurotus djamor*, rico em enzimas, no controle de *Panagrellus* sp. Os resultados mostraram que o extrato bruto ativo de *P. djamor* apresentou atividade nematicida contra *Panagrellus* sp., reduzindo a população de nematoides em 73%. A atividade proteolítica do extrato bruto foi de  $8,3 \pm 2$  U mL<sup>-1</sup> no pH 5. Esses resultados sugerem que a atividade nematicida do extrato bruto de *P. djamor* pode estar relacionada à presença de proteases produzidas pelo fungo.

**Palavras-chave:** Enzima; Cogumelo comestível; Controle bioquímico.

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