

# Biotechnological properties of *Galactomyces geotrichum* isolated from Canastra cheese

Dalila Luzia de Oliveira Soares<sup>1\*</sup>, Walmar Oliveira Leite<sup>1</sup>, Solimar Gonçalves Machado<sup>2</sup>, José Guilherme Prado Martin<sup>1</sup>

<sup>1</sup> Microbiology Department, Federal University of Viçosa, Chotaro Shimoya Building, Av. Peter Henry Rolfs, s/nº, University Campus, Federal University of Viçosa, Viçosa (MG), Brazil

<sup>2</sup> Food Technology Department, Federal University of Viçosa, Av. Peter Henry Rolfs, s/nº, University Campus, Federal University of Viçosa, Viçosa (MG), Brazil

\* Corresponding author. E-mail: dalila.soares@ufv.br

Cheeses are the most consumed dairy products in the world. In Brazil, a great diversity of cheeses is produced both in industrial and artisanal models. They include mould-ripened cheeses, such as the classical Camembert, Roquefort and Brie-types as well as mould-ripened artisanal cheeses, for example bloomy rind cheeses from Minas Gerais (QMACF) produced in Canastra region. Fungi play an important role on cheese sensorial characteristics, such as texture and flavour. In this work, the biotechnological potential of *Galactomyces geotrichum* strain FERM-GC-31 isolated from Canastra cheese was evaluated, aiming at its industrial application as a secondary culture to be used in dairy products. The strain was used in a mini-cheese model performed in 24-well plates and in 60 x 15 mm Petri dishes in order to evaluate its proteolytic and lipolytic activities during ripening at 12°C for 20 days. In addition, the antagonistic activity of FERM-GC-31 against *Lactococcus lactis* subsp. *lactis* ATCC 19435 and *Lactococcus lactis* subsp. *cremoris* ATCC 19257, lactic acid bacteria commonly used as starter cultures, was evaluated. For proteases, the standardized enzymatic assay at 45°C for 30 minutes of reaction resulted in maximum activity at pH values ranging from 5.5 to 9.0, indicating the production of neutral and alkaline proteases. For lipases, the highest activities were observed at 35°C and pH 9.0 after 20 minutes of reaction. In general, *G. geotrichum* exhibited maximum total proteolytic activity around 19,000 U/mL and lipolytic activity of 6,076.11 U/mL, both on the 15th day after the appearance of the fungal mycelium on the cheese rind. Regarding antagonism assay, *L. lactis* subsp. *cremoris* showed greater inhibition activity against *G. candidum* (28, 48%) compared to *L. lactis* subsp. *lactis* (7.34%). These results demonstrate that *G. geotrichum* FERM-GC-31 could be used as a secondary culture due to its significant lipolytic and proteolytic activities, as well as the low antagonism rate against conventional bacterial starter cultures. The insights obtained here reinforce the relevance of studies for bioprospecting fungi strain from fermented foods, contributing to the Brazilian dairy industry.

**Key words:** Ripening; Fungi; Proteolysis; Lipolysis; Antagonism.

## Propriedades biotecnológicas de *Galactomyces geotrichum* isolado de queijo Canastra

Diferentes tipos de queijos são produzidos mundialmente, incluindo os maturados por fungos. A produção de Queijo Minas Artesanal de Casca Florida tem sido estimulada, sendo *Galactomyces geotrichum* uma das espécies mais relevantes no processo de maturação. Este estudo avaliou a atividade lipolítica e proteolítica de *G. geotrichum* FERM-GC-31 isolado de queijo Canastra. Utilizou-se modelo de mini-queijo e acompanhou-se a atividade enzimática durante 20 dias. FERM-GC-31 apresentou atividade proteolítica total de 19.000 U/mL e lipolítica de 6.076,11 U/mL. Além disso, avaliou-se o antagonismo com duas espécies de bactérias lácticas. O isolado demonstrou significativa capacidade para aplicação na maturação de queijos.

**Palavras-chave:** Maturação; Fungos; Proteólise; Lipólise; Antagonismo.

Acknowledge: This work was funded by Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG, Processo APQ-04417-07) and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (Capes) Financial code: 001.