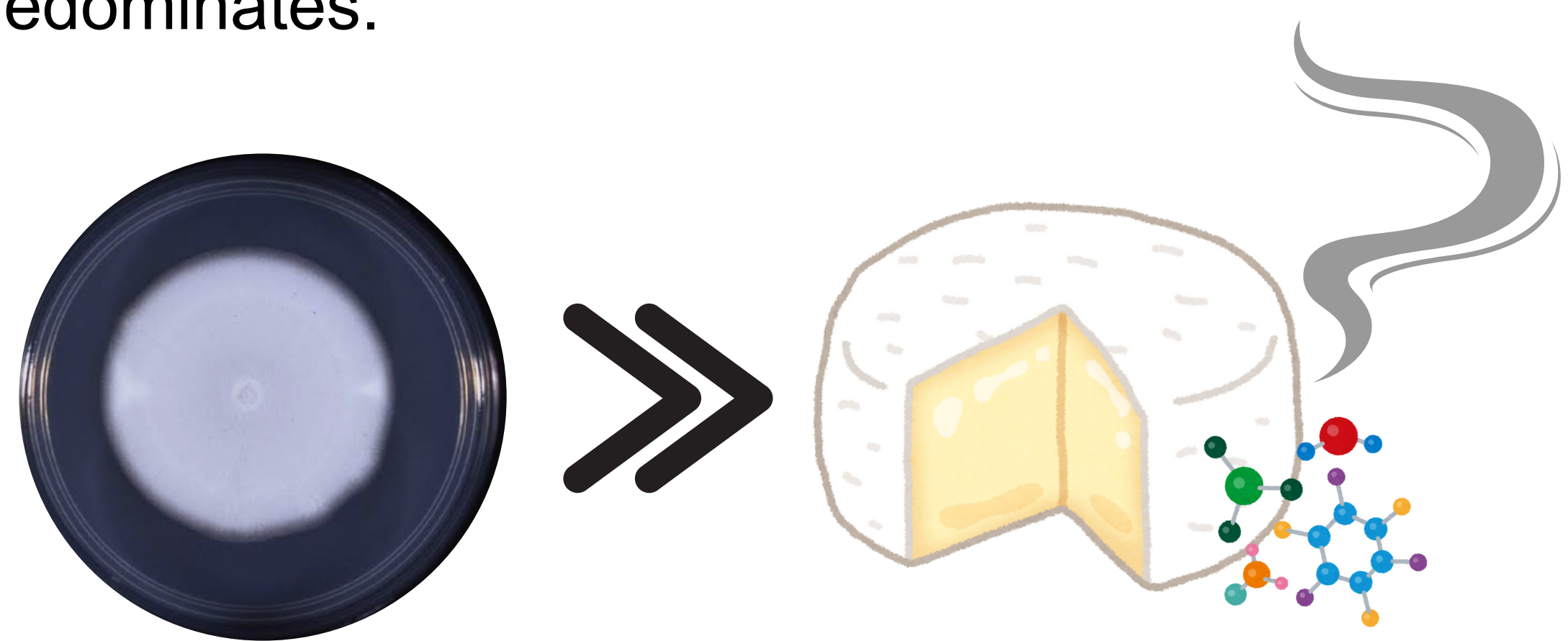


INTRODUCTION

Geotrichum candidum is a fungus commonly associated with dairy products and plays an essential role in the ripening of Natural Bloomy Rind Artisanal Minas Cheese (NBRAMC), where it naturally predominates.

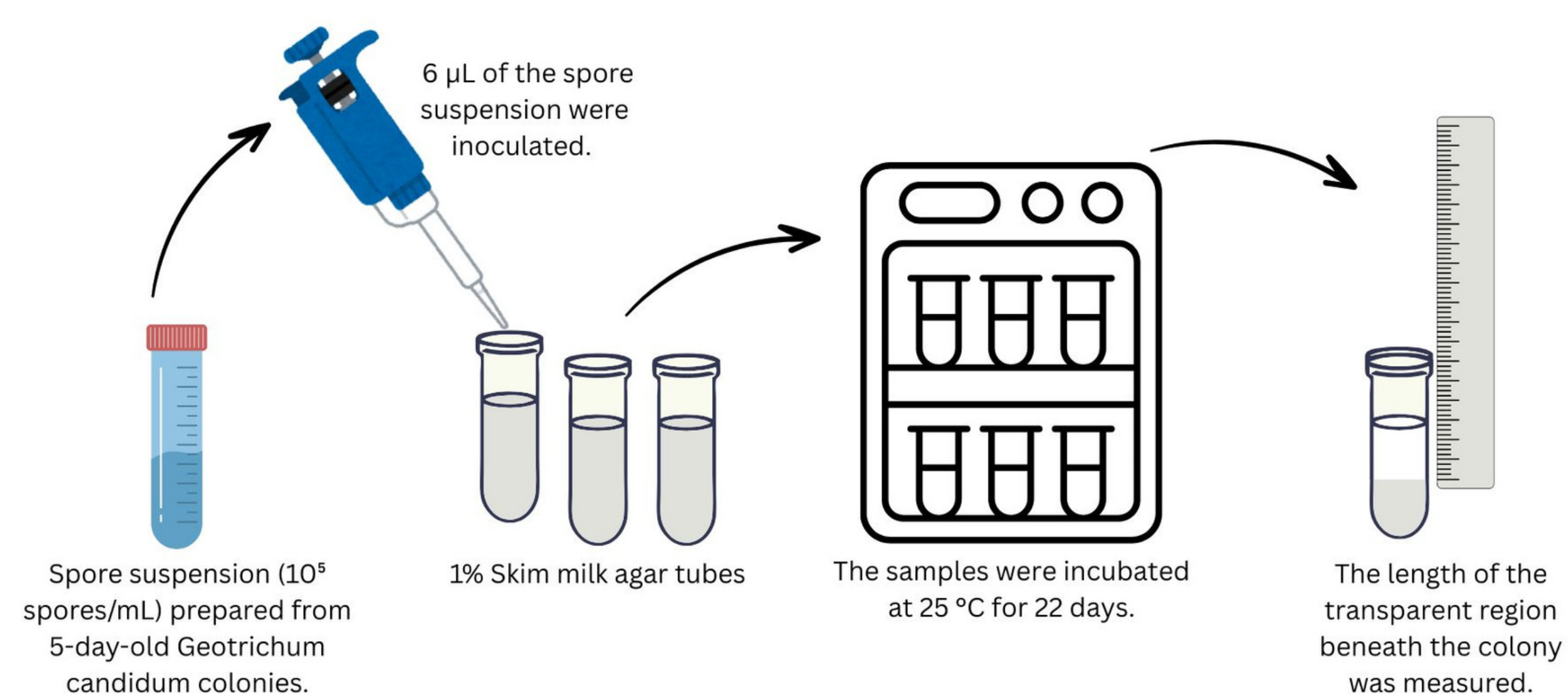


- This species contributes to proteolysis and the formation of numerous volatile compounds → flavor, aroma, and texture (Aragão, 2025).
- The proteolytic capacity varies among strains → phenotypic traits. Domesticated cheese-associated populations of *G. candidum* generally exhibit lower proteolytic activity compared to wild populations (Bennetot *et al.*, 2023)
- Strains exhibiting distinct morphotypes display different levels of proteolytic activity (Alper, 2011).
- Understanding these differences is essential for improving the quality and consistency of artisanal cheese production.

Therefore, this study aimed to evaluate the proteolytic capacity of *G. candidum* strains exhibiting distinct phenotypic characteristics and isolated from NBRAMC and the environment.

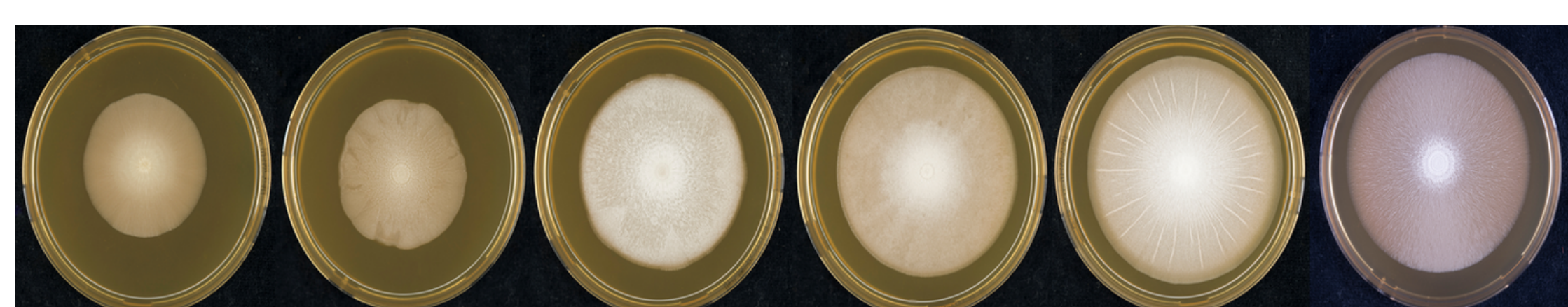
MATERIAL AND METHODS

The proteolytic activity was analyzed from six *Geotrichum candidum* strains (Fig. 1): five obtained from Bloomy Rind Artisanal Minas Cheese (*G. candidum* 1-5), which exhibited distinct phenotypic characteristics, and one environmental isolate (*G. candidum* 6).



Penicillium roqueforti and a non-identified bacterium isolated from milk were used as positive controls. Analysis of variance (ANOVA) and Tukey's test ($p < 0.05$) were performed using Sisvar software.

Fig. 1. Different *Geotrichum candidum* isolates tested in this study.



RESULTS

Proteolytic activity was found to vary among the *G. candidum* strains (Fig. 2-3). Five out of six strains produced clear zones of different length, although smaller than those observed for the positive controls, *P. roqueforti* and the bacterium, 48.7 mm and 52.7 mm, respectively. Notably, the *G. candidum* strain isolated from the environment (green – Fig. 2) was among those with the highest proteolytic activity, with length sizes ranging from 17.7 mm to 23.3 mm.

Fig. 2. Proteolytic activity (mm) of the tested strains

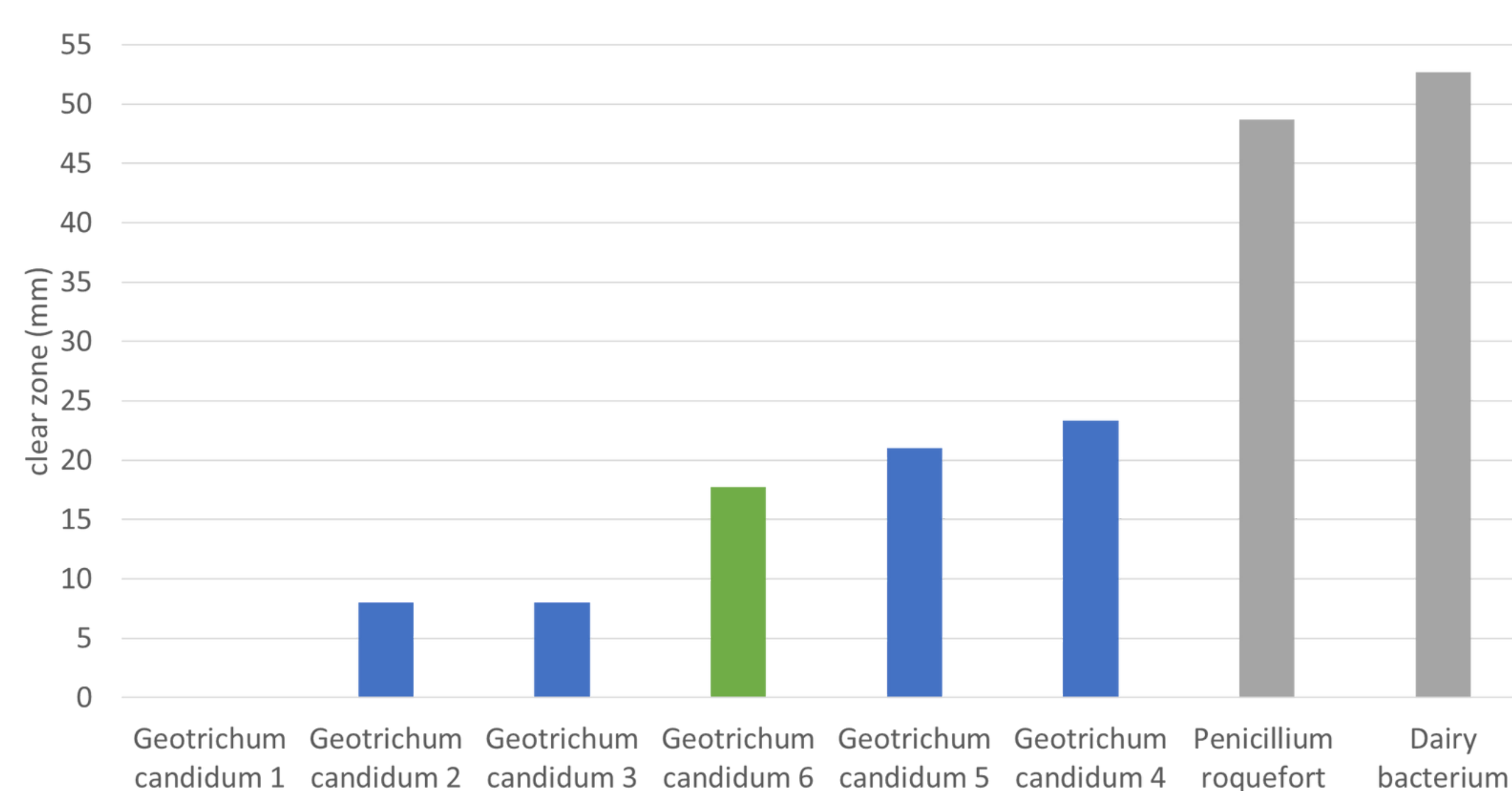


Fig. 3. Proteolytic activity of *G. candidum* strains on skim milk agar.



These findings highlight the intraspecific variability of *G. candidum*. This variability may explain the diversity of sensory profiles observed in NBRAMC, a cheese whose production relies on the natural, uninoculated development of *G. candidum*, which is not controlled during the process. Bennetot *et al.* (2023) reported that wild and mixed-origin populations of *G. candidum* showed significantly higher proteolytic activity than cheese-derived populations. The reduced proteolysis in domesticated strains is a selected trait that prevents excessive protein degradation during cheese ripening.

CONCLUSION

Different morphotypes of *G. candidum* found in NBRAMC exhibit variable proteolytic activity, which likely plays a key role in shaping the complex and diverse flavor and aroma profiles of this traditional cheese.

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