

Polar research for better morning rolls

GERMAN SCIENTISTS ARE CURRENTLY WORKING ON A PROJECT IN WHICH ICE STRUCTURING PROTEINS ARE APPLIED IN BREAD DOUGH. IN THIS WAY STRUCTURAL DAMAGE BY ICE CRYSTALS DURING FROZEN STORAGE SHALL BE PREVENTED



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Numerous analytical methods, such as 3D laser profile measurement, are being used at EIBT for investigating the influence of ice structuring proteins on the quality of morning rolls

+ Freezing processes represent, from a logistic point of view, a great opportunity for the production of bread and rolls. However, their impact on the quality of the dough is usually negative. Ice crystals that form at sub-zero temperatures damage the gluten network and the yeast cells. In the end product, this leads to lower volume and poor structure of the crumb. Because the ice crystals grow over time, the baking quality declines as the frozen storage period increases. So far, these problems are being addressed by the use of specific process techniques, e.g. shock freezing, as well as the use of emulsifiers, yet this implies high energy and material costs.

ISPs

Ice structuring proteins are considered as biotechnological products with high potential. Over the last few years, ISPs have been isolated from a variety of cold-resistant organisms. In many areas a potential application is being anticipated, such as for cryopreservation of stem cells, i.e. the freezing of cells in liquid nitrogen, for regenerative medicine, for the protection of technical surfaces against the growth of ice, and for quality improvement of frozen foods. +++

Scientists of the European Institute of Baking Technology (EIBT) and of the Alfred-Wegener Institute for Marine and Polar Research, both from Bremerhaven, Germany, are currently evaluating a novel approach: A special protein isolated from the polar diatom *Fragilariopsis cylindrus* is being used as a bakery ingredient. The protein belongs to the group of the Ice Structuring Proteins (ISPs, formerly called Antifreeze Proteins). ISPs have the peculiarity of interacting with the surface of the ice crystals, thus inhibiting their growth. Already very low concentrations of ISP in the range of 10 to 100 ppm are giving rise to this effect.

The vision of the German researchers is: If the growth of ice crystals in the dough matrix can be prevented by the use of ISPs, then the damage caused by the freezing process will be dramatically reduced. This approach may complement or even replace the current solutions.

In order to realize this vision, the scientists are now working on three main tasks: the optimization of the manufacturing process of the ISPs; the assessment of the interactions between the ISPs, the ice crystals and the other components of the dough; and the evaluation of application performance. In parallel, regulatory approval is being prepared. The project results are expected to be published during the course of this year. +++



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