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ASSOCIATION OF APPLIED BIOLOGISTS  
PLANT PHYSIOLOGY AND  
CROP IMPROVEMENT

**Acrylamide and process  
formed contaminants:  
A supply chain approach**

**4<sup>th</sup>-5<sup>th</sup> September 2024**

**The Museum of Natural Sciences  
Brussels, Belgium**



**CONFERENCE PROGRAMME  
and ABSTRACT BOOK**

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## ***Acheta domesticus* - Novel food ingredient: influence on cereal products quality and acrylamide content**

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### **ABSTRACT**

In some countries, the use of insects as food is traditional. However, in Europe, this alternative source of nutrients is still new, and consumers react differently to this offer. With the regulation of some raw materials prepared from insects in Europe, a need has arisen for their adaptation in the food industry. Today it is important to understand that consumers in Europe are not ready to choose insects as a main food source. However, the inclusion of raw materials prepared from insects into traditional food product formulas could be promising. Despite the fact that raw materials prepared from insects are considered to be of high biological value, when incorporating them into traditional food formulas, it is important to control not only the nutritional value and sensory properties of the final product, but also to anticipate what undesirable changes may occur during technological processes. One of such undesirable phenomena could be the assumption that enriching cereal products with raw materials high in protein might influence changes in the concentration of Maillard reaction products. We decided to start our research with an assessment of the acceptability of newly proposed raw materials – insects - by consumers. In the following stages, *Acheta domesticus* flour (unfermented and fermented with *Lactiplantibacillus plantarum* No. 122 and *Lacticaseibacillus casei* No. 210 strains) was used to enrich bread and biscuits, and their impact on product quality parameters and acrylamide concentration was assessed. Additionally, various parameters of unfermented and fermented *Acheta domesticus* flour were evaluated (pH, lactic acid bacteria count, color coordinates, fatty acid, volatile compound, and biogenic amine concentration). The tested product groups were prepared by adding to the main recipe different quantities of unfermented and fermented *Acheta domesticus* flour (into the main wheat bread formula - 10, 20, 30%; into the main biscuits formula (280 g of wheat flour, 100 g of margarine, 50 g of

saccharose, 3 g of vanilla sugar, 50 g of eggs, 1.5 g of salt and 2.0 g of baking powder - 40, 80, and 100 g). An assessment of the acceptability of insects by consumers showed that 70.7% of the respondents had never eaten insects. A fermentation experiment demonstrated that in most cases, fermentation reduced the biogenic amine concentration in *Acheta domesticus* flour and influenced the volatile compound profile in both *Acheta domesticus* flour and cereal products (wheat bread and biscuits). Most of the wheat bread sample groups prepared with untreated and fermented *Acheta domesticus* flour showed higher acrylamide content compared to the control bread group, except for the group with 10% fermented *Acheta domesticus* flour. However, the opposite tendency was found for biscuit samples. The lowest acrylamide concentration ( $84.1 \mu\text{g kg}^{-1}$ ) was observed in biscuit samples containing 40 g of No. 210 fermented *Acheta domesticus* flour. Due to the decrease in acrylamide concentration in biscuits, fermented *Acheta domesticus* flour can be recommended for the manufacture of such products. For wheat bread preparation, 10% fermented *Acheta domesticus* flour is recommended, as most wheat bread sample groups prepared with untreated and fermented *Acheta domesticus* flour showed higher acrylamide content compared to the control bread sample groups.

### Acknowledgements

This work is based upon the work from COST Action CA21149 ACRYRED—Reducing acrylamide exposure of consumers by a cereals supply-chain approach targeting asparagine.

