The role of microalgae-based systems in the dynamics of odorous compounds in the meat processing industry. Part II – olfactometry and sensory relevance

Karem Rodrigues Vieira a, Mariana Manzoni Maroneze a, Bruna Klein a, Roger Wagner a, Maria Isabel Queiroz b, Eduardo Jacob-Lopes a, Leila Queiroz Zepka a, *

a Bioprocess Intensification Group, Federal University of Santa Maria, UFSM, Roratina Avenue 1000, Santa Maria, RS 97105-900, Brazil, emails: lqz@pq.cnpq.br (L.Q. Zepka), merakvieira@gmail.com (K.R. Vieira), mariana_maroneze@hotmail.com (M.M. Maroneze), brunaklein06@yahoo.com.br (B. Klein), rogerwag@gmail.com (R. Wagner), ejacoblopes@gmail.com (E. Jacob-Lopes)
b School of Chemistry and Food, Federal University of Rio Grande (FURG), Rio Grande, RS, Brazil, email: queirozmariaisabel@gmail.com

Received 1 February 2021; Accepted 23 May 2021

ABSTRACT

This research evaluated the role of microalgae-based systems in deodorizing the meat processing industry by analyzing gas chromatography-olfactometry (GC-O). The olfactometric odorant profile of raw wastewater, the deodorization process along the residence time, and the high-value volatile organic compounds generated by heterotrophic cultures of Phormidium autumnale were assessed. The results presented thirty-seven compounds identified by GC-O in the raw wastewater. Indole and skatole were considered the main odor markers with the modified frequency of 91% and 75%, respectively. These compounds did not present sensory perception after 72 h of residence time, suggesting that were completely removed. At the same time, a total of 11 compounds were formed in the microalgae-based process. These compounds were classified as fruity, citrus, green, and resinous by the judges and can be used as a flavoring agent. Finally, the microalgal heterotrophic bioreactor was able to mitigate the most unpleasant odors of the meat processing wastewater, and, in addition, compounds of commercial interest were generated, suggesting the possibility of exploring them for application in the fine chemical or food industry.

Keywords: Microalgae/cyanobacteria; Agro-industrial wastes; Olfactometric analysis; Deodorization; Bioproducts

* Corresponding author.