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APPROACHES TO MINIMIZE ACRYLAMIDE IN OXIDIZED CALIFORNIA STYLE OLIVES

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Acrylamide (AA) is an undesirable process contaminant classified by IARC as a probable human carcinogen (Group 2A). According to an EFSA opinion, the dietary intake of AA should therefore be reduced [1]. Hence, AA benchmark levels (BML) in food and mitigation measures were established in Commission Regulation (EU) 2017/2158 [2]. In addition to foods such as potato chips and French fries, which are commonly associated with AA, olives have also been identified by EFSA as a potential source of AA [1]. As there are insufficient data and thus no BML for olives so far, olives have been included in the Commission Recommendation (EU) 2019/1888 [3]. AA is formed during food processing primarily via the Maillard reaction. During this process, the free amino acid asparagine reacts with reducing sugars, particularly at temperatures above 120°C. In olives, an alternative formation pathway via precursors from fat degradation is probably responsible for AA formation [4]. The results of a German nationwide monitoring project in 2021 showed that significant amounts of AA were found in blackened "California style" olives. In contrast, green and naturally ripened black olives contained rather low AA amounts [5]. The widespread in AA levels in different olive varieties is attributed to differences in production methods. Raw olives have a very bitter taste, which is removed by treatment with brine or lye baths. During the production of "California style" olives, the oxidation of phenolic compounds is stimulated by an additional supply of air, which gives the olives their characteristic black colour. It is assumed that the subsequent sterilization in combination with the oxidation process is responsible for the formation of the high AA amounts [4]. Numerous olive samples from the retail sector were analysed at CVUA Stuttgart in 2019 to 2023, and their AA contents confirmed the results of the monitoring project. In addition, indications were found that there might be a relationship between the AA content in oxidized olives and the packaging and preservation that was used. In some samples of oxidized olives sold in plastic containers and/or to which preservatives had been added, significantly lower AA levels were detected. It can be assumed that these samples, in contrast to olives in jars, were not subjected to sterilization at high temperatures. Lower temperatures during heat preservation, also in combination with the use of preservatives, could thus represent a possible measure to mitigate the AA content in oxidized olive products.

[1] EFSA Panel on Contaminants in the Food Chain (CONTAM), EFSA Journal. 2015, 13(6), 321.
[2] Commission Regulation (EU) 2017/2158 of 20 November 2017.
[3] Commission Recommendation (EU) 2019/1888.
[4] S. Charoenprasert, A. Mitchell, J. Agric. Food Chem. 2014, 62, 8716.
[5] Berichte zur Lebensmittelsicherheit, BVL Report, 2021, 149.

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