

Food Safety in Wine: Removal of Ochratoxin a in Contaminated White Wine Using Commercial Fining Agents

Authors : Ant3nio In3s, Davide Silva, Filipa Carvalho, Lu3s Filipe-Riberiro, Fernando M. Nunes, Lu3s Abrunhosa, Fernanda Cosme

Abstract : The presence of mycotoxins in foodstuff is a matter of concern for food safety. Mycotoxins are toxic secondary metabolites produced by certain molds, being ochratoxin A (OTA) one of the most relevant. Wines can also be contaminated with these toxicants. Several authors have demonstrated the presence of mycotoxins in wine, especially ochratoxin A. Its chemical structure is a dihydro-isocoumarin connected at the 7-carboxy group to a molecule of L- β -phenylalanine via an amide bond. As these toxicants can never be completely removed from the food chain, many countries have defined levels in food in order to attend health concerns. OTA contamination of wines might be a risk to consumer health, thus requiring treatments to achieve acceptable standards for human consumption. The maximum acceptable level of OTA in wines is 2.0 $\mu\text{g}/\text{kg}$ according to the Commission regulation No. 1881/2006. Therefore, the aim of this work was to reduce OTA to safer levels using different fining agents, as well as their impact on white wine physicochemical characteristics. To evaluate their efficiency, 11 commercial fining agents (mineral, synthetic, animal and vegetable proteins) were used to get new approaches on OTA removal from white wine. Trials (including a control without addition of a fining agent) were performed in white wine artificially supplemented with OTA (10 $\mu\text{g}/\text{L}$). OTA analyses were performed after wine fining. Wine was centrifuged at 4000 rpm for 10 min and 1 mL of the supernatant was collected and added of an equal volume of acetonitrile/methanol/acetic acid (78:20:2 v/v/v). Also, the solid fractions obtained after fining, were centrifuged (4000 rpm, 15 min), the resulting supernatant discarded, and the pellet extracted with 1 mL of the above solution and 1 mL of H₂O. OTA analysis was performed by HPLC with fluorescence detection. The most effective fining agent in removing OTA (80%) from white wine was a commercial formulation that contains gelatin, bentonite and activated carbon. Removals between 10-30% were obtained with potassium caseinate, yeast cell walls and pea protein. With bentonites, carboxymethylcellulose, polyvinylpolypyrrolidone and chitosan no considerable OTA removal was verified. Following, the effectiveness of seven commercial activated carbons was also evaluated and compared with the commercial formulation that contains gelatin, bentonite and activated carbon. The different activated carbons were applied at the concentration recommended by the manufacturer in order to evaluate their efficiency in reducing OTA levels. Trial and OTA analysis were performed as explained previously. The results showed that in white wine all activated carbons except one reduced 100% of OTA. The commercial formulation that contains gelatin, bentonite and activated carbon reduced only 73% of OTA concentration. These results may provide useful information for winemakers, namely for the selection of the most appropriate oenological product for OTA removal, reducing wine toxicity and simultaneously enhancing food safety and wine quality.

Keywords : wine, ota removal, food safety, fining

Conference Title : ICNFS 2015 : International Conference on Nutrition and Food Sciences

Conference Location : Zurich, Switzerland

Conference Dates : July 29-30, 2015