Detection of pistachio (Pistacia vera) as allergen in food: performance evaluation of ELISA and PCR-based tests

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Introduction: Pistachio (Pistacia vera) is a nut included in the Annex II of Regulation EU 1169/2011 reporting the allergenic foods/ingredients that have mandatorily to be reported in food labeling. Two ELISA and two PCR-based kits were investigated on their inclusivity performances by analysing three different P. vera cultivars; other tests were made to quantify the loss in efficiency in quantification following the treatment of the seeds at high temperature.

Materials and Methods: Three cultivars (cv) of P. vera from Italy, Iran and Turkey were chosen to test the inclusivity performances of the 4 kits. On Napoletana (Italy), four combinations of heat treatments at 110 °C and 130 °C for 30 and 90' were performed in oven. Elisa tests are “Immunolab Pistacio Elisa” and “Euroclone Pistacio Elisa”. PCR-based tests are represented by Generon “SPECIAL finder PISTACHIO NUT” e R-biopharm “SureFood ALLERGEN QUANT Pistachio”. Samples were prepared according to producer instructions.

Results and Discussion: The three different pistachios belonging three different cultivars were identified, without any significant differences. As expected, both ELISA tests showed a loss in their efficiency in quantifying the pistachio proteins extracted from samples treated with high temperature. Quantification of proteins isolated from samples treated at temperature higher than 130 °C showed a reduction of 36 and 44%, respectively, when time of treatment was prolonged from 30 to 90 minutes, for both kits. Furthermore, when the treatment was performed for 30 minutes, the proteins quantification showed a reduction of 12 and 36%, respectively, when temperatures of treatment is increased from 110 °C to 130 °C. Finally, PCR based tests resulted positive in all samples and Ct values did not change significantly in relationship with different heat/time treatments.

Conclusion: All kits are potentially suitable for official control for detection of pistachio as hidden allergen in food. Roasting of seeds is responsible for a partial denaturation of proteins, leading to a loss in efficiency in quantification. Since heat treatments shall not mean a loss of reactivity in allergenic reaction in consumers, it needs to be considered during the test for their evaluation, particularly when quantification is required. Further investigations, as well as other tests on lab-prepared spiked foods, will be considered in order to clarify performances of these kits.