Foods 2024 Conference

The 5th International Electronic Conference on Foods

28–30 October 2024 | Online

MDPI

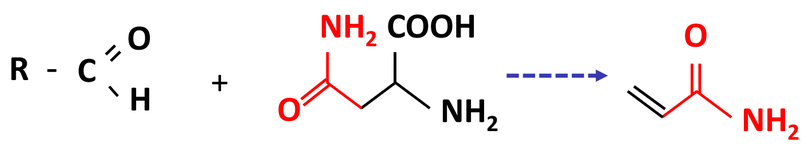
Use of the electronic nose technology to predict acrylamide formation in roasted almonds

Marta Mesías[1], Juan Diego Barea-Ramos[2], Jesús Lozano[3], Francisco J. Morales[1], Daniel Martín-Vertedor[2]

[1]Institute of Food Science, Technology and Nutrition (ICTAN-CSIC) Madrid, Spain; [2]Technological Institute of Food and Agriculture (CICYTEX-INTAEX) Badajoz, Spain

INTRODUCTION & AIM

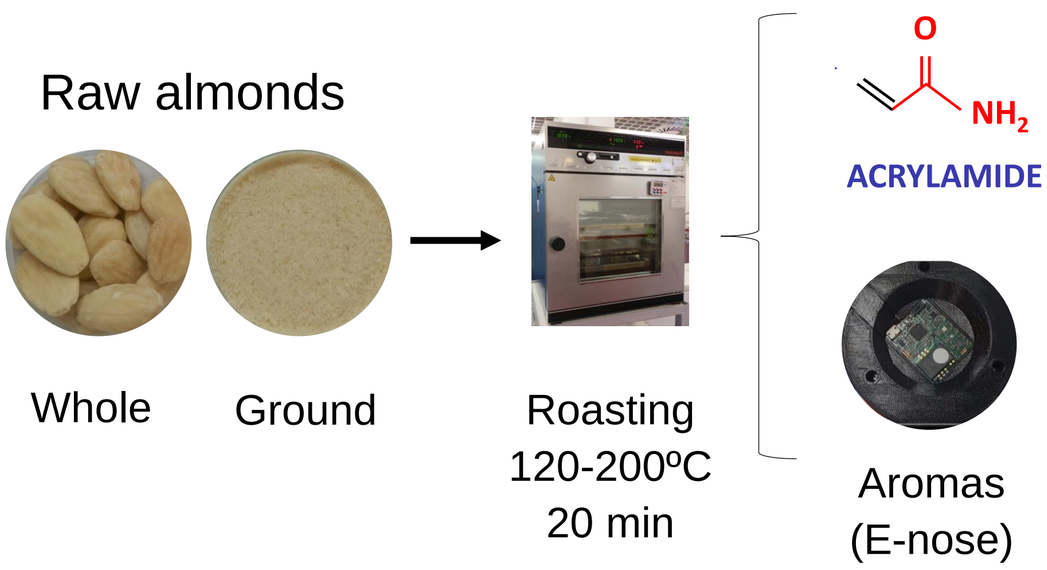
Acrylamide is a contaminant naturally formed when foods are heat treated. Amino acids and reducing sugars in almonds facilitate the Maillard reaction during roasting, leading to aromatic substances and acrylamide production. Although previous studies have explored acrylamide formation in almonds[1-4], its potential relationship with aroma remains unexplored. This study aimed to assess the viability of using the electronic nose (E-nose) to predict acrylamide generation during almond roasting.



Reducing sugars Asparagine ACRYLAMIDE

METHOD

Raw almonds in two forms (whole and ground) were subjected to roasting in a convective and an air-forced oven, utilizing temperatures ranging between 120-200ºC for a duration of 20 minutes. Analysis of acrylamide concentrations in the roasted almond samples was carried out using HPLC-MS/MS, while the detection of aromas was conducted through the utilization of the electronic device.



Funding: Authors thank Community of Madrid and European funding from FSE and FEDER programs (project S2018/BAA-4393, AVANSECAL-II-CM) and by GR21121 and GR21045 Projects, co-funded by FEDER and Junta de Extremadura.

RESULTS & DISCUSSION

Acrylamide levels significantly varied among the roasted almonds:

Roasted whole almonds

25-466 µg/kg

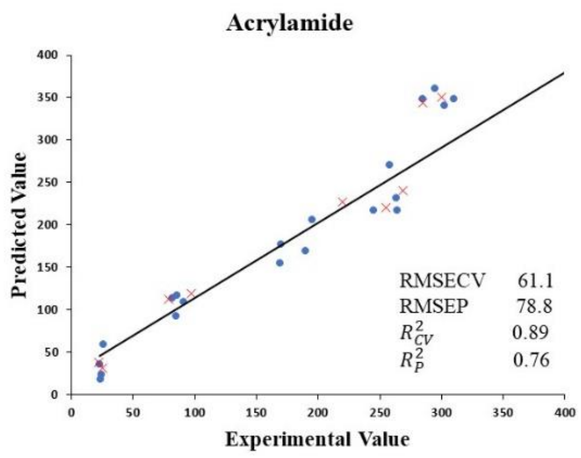
Roasted ground almonds

19-397 µg/kg

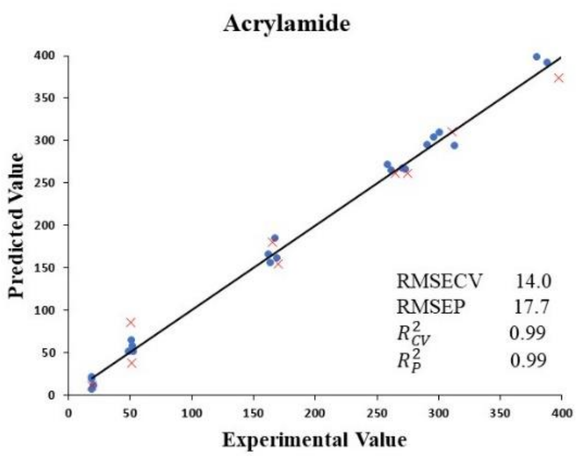
The electronic signals captured by the E-nose exhibited a strong correlation with the acrylamide content in both whole and ground roasted samples. These findings imply that the E-nose has the potential to serve as a valuable instrument for assessing the quality of roasted food products based on their sensory attributes and safety with regards to harmful compounds.

Figure: Experimental values for acrylamide against PLS cross-validation predictions (●) and validation set predictions (x)

Roasted whole almonds



Roasted ground almonds



CONCLUSION

The electronic nose could be a beneficial predictive chemometric tool for monitoring the generation of acrylamide in almond processing.

FUTURE WORK / REFERENCES

[1] Amrein et al. J. Agric.Food Chem. **2005**, 53, 7819–7825.
[2] Zhang et al. J. Agric. Food Chem. **2011**, 59, 8225–8232.
[3] Lukac et al. J. Food Sci. **2007**, 72, C33–C38.