Sensor technology for the identification of mycotoxins and fungi in the processing of grain - first results

Christine Idler[1], Claudia Rasch[2], Michaela Ditz[1], Michael Kumke[2]

[1]Leibniz-Institute for Agricultural Engineering, Max-Eyth-Allee 100, 14469 Potsdam-Bornim, Germany
Email: cidler@atb-potsdam.de
[2]University of Potsdam, Department of Chemistry (Physical Chemistry), Karl-Liebknecht-Str. 24-25, 14476 Potsdam-Golm, Germany

Introduction: The German Ministry of Education and Research (BMBF) provides funding of more than 1.9 million Euros for a large joint project on the development of innovative sensor-based techniques and processes in the field of food quality and safety. In this research-project "*Exploration of sustainability potentials by use of sensor-based technologies and integrated assessment models in the production chain of plant related food*" 13 partners from universities, non-university institutions and industry cooperate within seven subprojects. The expected results shall contribute to maintain freshness and improve safety of produce. In one of the seven subprojects "*Indicators and sensor technology for the identification of mycotoxin producing fungi in the processing of grain"* spectroscopic methods and electronic noses for the detection of moulds and/or mycotoxins are tested.

Materials and Methods: Grain (wheat, rye) with various moisture content and naturally or simulated inoculated with various fungi and mycotoxins is used. Non-destructive methods, such as absorption, fluorescence, reflection spectroscopy, ion mobility (IM) spectrometry and electronic noses are explored for the in-situ detection of mycotoxins and fungi on grain.

Results: In addition to information on ingredients, moisture content the NIR reflection spectra yield first information on the presence or absence of fungi on the grain sample. With the same methods it is also possible to differentiate poor culture of the genera *Aspergillus*, *Penicillium* and *Fusarium.* Moreover, from the reflection measurements, qualitative and quantitative information on the mycotoxins present can be obtained. In contrast IM spectrometry supplies no direct information on mycotoxins, work is in progress to test indirect ionization protocols. With the e-nose PEN it is possible to differentiate rye sample inoculated with various species of *Fusarium*.

Discussion and Conclusion: With diffuse reflection spectroscopy, qualitative and quantitative information on the ingredients, the moisture content and the presence or absence of fungi in the sample can be obtained. However, the experimental NIR spectra depend on the shape, colour, density and texture and composition of the kernels. Therefore, chemometric tools are indispensable to properly account for these disturbing factors and reach out for the desired chemical information of the sample (Kessler, 2006). The IM spectrometry will be further tested to differentiate in-situ species of fungi on grain samples.

References

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