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Research in Graubünden

Dangerous molds

Quicker tests for improved food safety

Fascinatingly beautiful - this is how *Aspergillus flavus* and his fellow species look under the microscope. However, the mold produces dangerous toxins, so-called aflatoxins. Aflatoxins are carcinogenic. They are found in improperly stored foods such as cereals, wheat, corn and nuts. They are also found in milk, eggs and meat from animals fed on contaminated feed. Aflatoxins not only pose a serious health risk but also have significant negative economic consequences for food manufacturers and consumers.



*Molds: beautiful under the microscope, but deadly and dangerous for humans.
Pictures: Shutterstock*

Because of their known carcinogenic effects, many countries, including the EU, set strict limits on the maximum levels of aflatoxins in food and feed. The current food safety process consists of taking samples on site at farms, slaughterhouses and border inspection posts. Samples are then sent to a laboratory to be tested. Safiye Jafari, a chemist at the CSEM in Landquart, is developing a new analytical device to quickly (30 minutes) and efficiently detect the hazardous contaminants in food directly on site.

Jafari's PhD project is part of the EU research project FoodSmartphone (Grant Agreement N. 720325. foodsmartphone.eu). She is working on the development of a small biosensor for the detection of aflatoxins in food samples. A biosensor is an analytical device that uses a biomolecule such as DNA, antibodies or a cell to detect and measure a specific substance in a sample. The small biosensor will send the result of the analysis directly to a smartphone app via Bluetooth or WiFi. In addition, the app will translate the data into user-friendly "traffic light" results (e.g. green: good, yellow: suspicious, red: alarm).

Jafari first examines which biomolecules are best suited for the detection of aflatoxins. Her experiments have already yielded promising preliminary results. Jafari explains her further approach: "I will concentrate in particular on aflatoxin B1 in cereals and aflatoxin M1 in milk. Why these two of all fourteen types of aflatoxins? Well, aflatoxin B1 is the most carcinogenic. Aflatoxin M1 is an intermediate of B1 contained in the milk of cows fed on contaminated food."

To complete the final prototype of the food analyzer, the biosensor must be miniaturized and its interaction with the smartphone must be developed. The device should enable user-friendly, accurate and cost-

effective detection of food contamination by aflatoxins. In the future, the smart analyzer will be used by food inspectors at border inspection posts, by the food industry in their production line and by food suppliers as a precautionary test.

Find out more about research in Graubünden: www.academiaractica.ch, www.graduateschool.ch.



The Expert

Safiye Jafari's family fled from the war in Afghanistan to Iran many years ago. There, the young Afghan woman studied applied chemistry at the University of Tehran. Since September 2017, she has been a doctoral student at the CSEM Centre Landquart and at the Laboratory for Toxicology at ETH Zurich. She writes about her life in Switzerland in an entertaining blog: <https://foodsmartphone.blog/author/safiye22/>. If you have any questions on this topic, please contact the expert at info@graduateschool.ch. by March 6.

The researcher Safiye Jafari. Picture. D. Heinen

Authors: Daniela Heinen and Safiye Jafari