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**PRESSE-
INFORMATION**

Agriculture and food

Analytical chemists: Guardians of health and the environment

Glyphosate is not an isolated case. Due to their effects on our health, many substances that we ingest with our food on a daily basis are just as controversial. And there are more of them every day. That is because analytical chemists constantly discover new substances in foods whose compositions are usually very complex, and that either have a direct biological effect on the human body or react with other substances and change when ingested. Several examples and the latest research results will be presented at the analytica conference in Munich from May 10 to 12. The conference takes place at the same time as analytica, the International Trade Fair for Laboratory Technology, Analysis and Biotechnology, at the Messe München trade fair center.

The toxins produced by mold, i.e. mycotoxins, did not begin to get scientists' attention until the 1960s. A number of those substances have since been identified and their toxic effects examined. The spectrum ranges from hepatotoxic and carcinogenic to mutagenic, zytotoxic, neurotoxic and antibiotic effects. However, these substances also undergo chemical changes that are triggered by living organisms such as plants and animals or even by food processing, be it in the kitchen or in industry. Right now, we know very little about the formation mechanisms and toxic relevance of these modified mycotoxins. But reliable data from analytical testing of food samples prove their existence.

At the analytica conference, significant advances in unraveling the complex interactions between the original mycotoxin and a plant, animal or human "host

GDCh-Öffentlichkeitsarbeit
Postfach 90 04 40
D-60444 Frankfurt am Main
Tel.: 069/7917-493
Fax: 069/7917-1493
E-Mail: pr@gdch.de

Diesen Text können Sie im
Internet abrufen unter
<http://www.gdch.de>

organism" will be introduced that may help to track the metabolic pathways on which modified mycotoxins are formed. Unexpected results will be revealed in the process: Plants, for example, are able to create special metabolites known as "masked mycotoxins," but then they lose their "mask" in the gastrointestinal tract and exit again in their original form.

Fusarium avenaceum is a fungus that infests grains and is common throughout Europe and in Scandinavia in particular. A working group from Oslo will present its ongoing research at the analytica conference, which focuses on the effects of the toxin produced by the fungus, i.e. the polyketide AOD. It is cytotoxic, which means it is toxic to tissue cells. Everything points to the fact that this toxin targets the cell membrane and that its chemical structure is similar to that of the fumonisins, which are produced by other fusarium molds. That is why these studies—which also include scientists from Denmark and the United States and in which interaction with enzymes have been observed—are significant for research about mycotoxins in general and about fumonisins and aflatoxins in particular.

Aflatoxins and fumonisins are the focus of scientific research in which phomopsins—and phomopsin A in particular—are receiving more and more attention. It is produced by *Diaporthe toxica*, a fungus that attacks lupine seeds and plants, which are an increasingly interesting source of high-quality protein. So far, serious cases of poisoning have been reported in sheep in Australia and New Zealand. Phomopsins are hepatotoxic agents. Research here is still in its infancy, but it is also considered extremely important because phomopsins can also attack other legumes such as peas and beans.

Research also continues to focus on toxic, nitrogen-rich phytonutrients. Pyrrolizidine alkaloids and their nitrogen oxides (PA/PANO) are a group of more than 500 compounds that are probably produced by more than 6,000 plants, including above all composite plants, the borage family and legumes. PA/PANOs have hepatotoxic and carcinogenic characteristics. Among other things, they are found in honey and various types of teas. In Munich, the latest analysis results as well as their potential effects on human and animal health will be discussed.

When it comes to anthropogenic contaminants, i.e. those caused by humans, presentations in Munich will focus on per- and poly-fluorinated alkyl substances (PFASs) and the metabolic products of pesticides. Per- and poly-fluorinated substances, for example, are needed for water-repellant, breathable clothing, paper that repels dirt, oil and water, packaging materials in the food sector, to waterproof furniture, carpeting and shoes, and as coatings for pots and pans and fire-extinguishing foams. So it comes as little surprise that PFASs can be found everywhere in nature: in water, soil, foods, animals and in people—i.e. both in the blood and in breast milk. PFASs are not biodegradable, and they are harmful when used in high doses in animal experiments. PFASs find their way into the human body through food including tap and bottled water. But how high may the concentration of PFASs in the human body be? How

much can we ingest on a daily basis? These questions have not yet been answered. The basic data that we need to do so, i.e. by conducting toxicological evaluations, comes from analytical chemists.

When it comes to taking an analytical inventory of the metabolites of plant protection products, i.e. fungicides, insecticides and pesticides, the situation gets even trickier. After all, it is entirely possible that some metabolites are even more toxic than the pesticide used on cultivated plants. A number of metabolites have been found in the past, but in the interest of protecting people and the environment, analytical chemists are still searching.

The analytica conference takes place at the ICM – Internationales Congress Center München. Admission is free of charge for visitors attending analytica, the International Trade Fair for Laboratory Technology, Analysis and Biotechnology. analytica takes place at the Messe München trade-fair center from May 10 to 13. The schedule for the analytica conference, which takes place from May 10 to 12, is being organized by Forum Analytik, an alliance of three of Germany's leading scientific associations, i.e. the German Chemical Society (GDCh), the Society for Biochemistry and Molecular Biology (GBM) and the German Society for Clinical Chemistry and Laboratory Medicine (DGKL).

An up-to-date schedule for the analytica conference is available online at www.gdch.de/analyticaconf2016 and in the event database at www.analytica.de/conference.

Contact for the press:

analytica conference
Dr. Renate Hoer
German Chemical Society
Public Relations
Tel.: +49 69 7917-493
E-mail: r.hoer@gdch.de

analytica
Kathrin Hagel
PR Manager analytica
Tel.: +49 89 949-21474
E-mail: kathrin.hagel@messe-muenchen.de