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Analysis of TFA, DFA and MFA in food

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Trifluoroacetic acid (TFA), difluoroacetic acid (DFA) and monofluoroacetic acid (MFA) are fluorinated organic compounds which occur ubiquitously in the environment.

TFA is a well-known metabolite of numerous pesticides, e.g. of saflufenacil (herbicide) and trifloxystrobin (fungicide), that can be found both in primary and succeeding crops. DFA is the major metabolite of flupyradifuron (a butenolide insecticide). Both compounds are persistent in soil. EFSA recently indicated the need to collect data on the occurrence of the substances in order to potentially establish separate MRLs for TFA and DFA. The third fluorinated acetic acid, MFA, is an endogenous poison in several plants, for example *dichapetalum cymosum* ("Gifblaar"), growing in Brazil, South Africa and Australia. Furthermore, monofluoroacetate is the main agent in "1080", a rodenticide which is well-established and primarily used in New Zealand. At the end of 2014 the reassessment of this substance gained special attention after an environmental activist had threatened to spike baby food with it.

A quick and easy-to-use method has been developed for simultaneously measuring all three fluorinated acetic acids from QuPPE or QuEChERS extracts in plant materials, using LC-MS/MS and electrospray ionization (ESI) in negative mode. The SelexION™ module was used to improve the selectivity and to reduce interferences by matrix compounds. The module uses a form of ion mobility spectrometry (DMS).

The following extraction methods were compared in recovery experiments: QuPPE, QuEChERS and two QuEChERS variations under acidic conditions, one using sulfuric acid and a second one using formic acid. Lowering the pH increased the recoveries of these compounds.

QuPPE in combination with the SelexION™-module of Sciex was overall best for DFA and TFA. MFA gained overall best results by using the QuEChERS variation with formic acid. Since MFA is not approved as pesticide in the EU and is also not a reported metabolite of pesticides, we chose to apply the extraction method which was best for TFA and DFA for the final validation. First results of measurements of real samples will be shown in this poster.

TFA and DFA were validated on four plant materials from different food commodities (cucumber, grape, rice and avocado) according to SANTE/11945/2015. DFA and TFA were spiked at different levels, using isotopically labelled internal standards (ILIS-13C2).