How much insecticide do Bt plants actually produce?

New publication shows inadequacies in risk assessment

Munich 21 November 2011. A new publication by an international research consortium has revealed several inadequacies in current approaches to risk assessment of genetically engineered plants. The publication deals with methods used for measurement in so-called Bt-plants. These plants produce an insecticidal protein (a so-called Bt toxin) that originates from soil bacteria (*Bacillus thuringiensis*). One example is maize MON810 which is cultivated in some countries in the EU, many others can be imported and used in food and feed. Now for the first time, joint research involving four laboratories has shown that the results produced by industry and other institutions so far are not reliably reproducible and comparable because they are not determined and validated by standardized methods.

The actual content of these Bt toxins is highly relevant for assessing risks for the environment, and also for preventing resistance in pest insects. Without reliable data, the safety of these genetically engineered plants cannot be properly assessed.

András Székács from the Plant Protection Institute of the Hungarian Academy of Sciences summarized relevant findings: “Our data emphasize the importance of standardized protocols among laboratories and provide compelling evidence that, currently, reproducibility and comparability of reported Bt toxin measurements is low. Hence, individual results of Bt toxin concentrations cannot be taken at face value as a definitive result without further validation. An outstanding example is the reporting of Bt concentrations in pollen of MON 810 maize, stemming from very few individual studies only.”

The content of Bt toxin in pollen is a pivotal question when it comes to environmental risk assessment and regulatory decision-making. The pollen can be taken up by various pollinating insects such as honey bees and wild bees, hoverflies and many more. It can also be ingested by butterfly caterpillars that feed on pollen-dusted plants. Toxic pollen is extremely rare in nature but has become wide-spread where genetically engineered Bt-plants are grown. Of similar importance is the Bt content in roots since it might affect important soil organisms and their food web. But also the Bt content in those parts of the plants that are used for food and feed is critical since open questions remain concerning their potential effects on health. Additionally, only very little research has investigated the impact of various environmental factors on the Bt toxin production in different Bt plant varieties and plant parts. Thus, reliable methods for measuring Bt concentrations in Bt plants that can be compared among studies are indispensable and urgently needed.

Currently already ten different Bt toxins are allowed in the usage of genetically engineered plants imported to the European Union. In many cases, these toxins are even combined in the plants. For example, a maize called SmartStax, developed jointly by Monsanto and Dow AgroSciences produces six different Bt toxins. As a recent report from Testbiotech shows, these plants were never tested properly for possible interactions of the various Bt toxin combinations, nor were reliable methods or data presented regarding the actual content of the insecticidal proteins.

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Reference to the article:
András Székács, Gabriele Weiss, David Quist, Eszter Takács, Béla Darvas, Matthias Meier, Trilochan Swain & Angelika Hilbeck (2011): Inter-laboratory comparison of Cry1Ab toxin quantification in MON 810 maize by enzyme-immunoassay, Food and Agricultural Immunology, DOI:10.1080/09540105.2011.604773, http://dx.doi.org/10.1080/09540105.2011.604773

Link to the report about SmartStax: http://www.testbiotech.de/en/node/515

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