

Standardized methods for the GMO monitoring of butterflies and moths: The whys and hows

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This is a picture of a butterfly examined during the survey. Credit: Andreas Lang

Butterflies and moths were the first biological indicators considered for the purpose of GMO monitoring within the VDI guidelines series. The European community stipulates a monitoring plan in order to trace and identify any harmful effects on human health or the environment of GMO after they have been placed on the market. Butterflies and moths

are widely accepted as relevant protection goals and have often been suggested and applied as suitable indicators for the monitoring of environmental quality and changes as one of the major indicators to monitor and assess biodiversity change in Europe.

Adverse effects of genetically modified (GM) plants on *Lepidoptera* have already been reported, which strongly supports their quality and significance for an appropriate GMO monitoring. The VDI guidelines provide the state-of-the-art of a GMO monitoring of *Lepidoptera* as required by the European Community. They describe the best possible treatment of the demands of a Lepidopteran GMO monitoring.

The paper recently published in the open access journal [BioRisk](#), reports known and potential effects of GM plants on *Lepidoptera*. The study aims at an increase in the detection success of such effects, thus meeting the required criteria for a GMO monitoring formulated by the EC. Information is provided on the sampling and monitoring of day-active *Lepidoptera*, of night-active [moths](#) and of the recording of Lepidopteran larvae, as well as to sample design and strategy. Though specifically designed for GM crops, the VDI guidelines may also serve as a template to monitor the effects of a wider range of adverse factors on *Lepidoptera* in agriculture



This image is showing Dr. Lang searching for butterfly larvae. Credit: Andreas Lang



This is an image of a maize field in an agricultural landscape Credit: Andreas Lang

The guidelines describe and ensure a suitable approach for a powerful and cost-efficient monitoring, which is not equivalent to being cheap, but means generating data of high (or sufficient) quality with an acceptable and justified effort. An iterative quality control of the monitoring results is paramount, regularly checking the relation between invested efforts and value of generated data, and continuously adapting the monitoring programme to scientific progress and new knowledge.

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