

How can the Beecheck be used in risk assessment to quantify a pesticides impact on bees?

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Standardised field trials are vital for risk assessment of pesticides to bees but are time-consuming and costly. Current practices of monitoring field trials are very labour-intensive and only generate few “snapshots” of parameters of interest, failing to display dynamics over time. An electronic bee-counting device continuously records the in- and outgoing bees, providing additional information but also generating large data sets. This study aims at identifying appropriate target variables and methods of data analysis.

To generate sample data, the Beecheck was placed underneath nine different bee colonies in a common field trial setting in flowering *Brassica napus* and *Phazelia tanacetifolia* with bees being exposed to pesticides. In accordance to the literature, bee activity was associated to meteorological variables and time.

Using the autoregressive integrated moving average (ARIMA) method it may be possible to disentangle the impact of meteorological factors and the disturbances

caused by pesticide application, thereby quantifying the pesticide-induced losses of a colony. This would facilitate the comparison of results from field trials in different years and regions with varying weather, being of special interest for risk assessment.

The European Food Safety Authority developed a conceptual model to be used in risk assessment for bee colonies exposed to pesticides. The model simulates the dynamics of a bee colony under different stressors including adverse effects from pesticide exposure. Records obtained with the Beecheck can provide an empirical basis for model parametrisation. Running the model including pesticide-induced losses over several years allows extrapolation from one year to several years of exposure and thus evaluation of long-term risk. Further research is needed to verify the accuracy of the Beecheck.