Digital image analysis tool to improve the assessment and evaluation of brood development in higher tier honey bee studies

Lukas Jeker[1], Thomas Meschberger[1], Marco Candolfi[1], Josef P. Magyar[2]

[1]Innovative Environmental Services (IES) Ltd, Benkenstrasse 260, 4108 Witterswil, Switzerland
[2]Nextreat, Weltistrasse 11, 5000 Aarau, Switzerland

Abstract

The potential impact of plant protection products on honeybee brood development is of increasing concern. Therefore, regulatory authorities request the studies to be monitored for potential adverse effects on honeybee brood development (Guidance document OECD 75). Current methods have a number of inherent technical limitations which we solved by computerizing the analysis. The computer-aided digital image analysis and evaluation method of brood development in honeybee combs which we developed allows to systematically evaluate brood development on the basis of high definition pictures of brood frames taken during semi-field or field honeybees trials. The computer-aided method enables the *post-hoc* analysis of virtually any number of cells in the comb, overcoming the issue of the low cell number, usually monitored with the acetate-sheet method as well as the traceability and verification of the data.

The recording method and software have been designed and compiled with the intention to provide a tool for a 100% traceable analysis of bee brood studies which is gap free and systematically documented. This is of utmost importance when working under Good Laboratory Conditions (GLP). The method minimizes adverse impact on bee brood by reducing the out-of-hive time and hence is likely to increase the success rate of studies. The availability of digital images allows the *post hoc* analysis of any number of cells. The automated tracing of the cells under investigation, together with the automated classification of the data excludes manual data transcription errors which are possible when the acetate-sheet technique is used. As a result, data reliability, quality and statistical power have been significantly improved. For more details please see Jeker *et al.* (2012).

References

1. Jeker L, Schmid L, Meschberger T, Candolfi M, Pudenz S, Magyar JP (2012): Computer-assisted digital image analysis and evaluation of brood development in honey bee combs. In press: Journal of Apicultural Research 51(1).