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Hygienic behaviour in honeybee: a comparison of two in-field assays for phenotypic characterization.

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Abstract

The Western honeybee, *Apis mellifera*, represents a relevant productive livestock due to both hive products and to its indispensable role as commercial pollinator of many agricultural crops. In addition, honeybees contribute to the pollination of wild flowers, thereby helping the maintenance of natural ecosystems and biodiversity. Recently, the number of managed honeybee colonies has declined in both North America and Europe. Beside environmental causes, e.g. the loss of forage as a consequence of agricultural intensification, another cause is the increasing relevance of pests and diseases affecting honeybee colonies. In the honeybee, hygienic behaviour (HB) is a heritable phenotype that confers to the colony resistance to foulbrood diseases, chalkbrood, and the parasitic mite *Varroa destructor*. Nurse bees manifesting HB are able to detect, uncap, and remove infested and/or parasitized pupae from the colony. The genetic and biochemical factors that drive the manifestation of this behaviour are under investigation. Therefore, the selection of such trait still relies on field assays. Heretofore, there are two main tests to measure HB: the Pin Killed Brood (PKB) test and the Freeze Killed Brood (FKB) test. Concerning the FKB test, a comparison between the standard FKB test and a variant of this method (E. Bonfanti) has been performed in order to optimize the methodology in terms of time, costs, feasibility and safety for the operator and to choose the best option for a subsequent large scale phenotypic characterization for genetic selection.

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