

Entwicklung und Anwendungstest eines autarken Bienenüberwachungssystems in Hinblick auf die akustische Prognose des Schwarmverhaltens der Honigbiene

Masterarbeit im Fachgebiet Agrartechnik

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Abstract

Honeybees are one of the most important domesticated animals of humans. But the future of the honeybee (*Apis mellifera*) is endangered. Multifactorial causes lead to a continuous decline of pollinator insects worldwide. One possibility to deal with the problems is the use of technical tools from precision farming. Thus, processes in the bee colony could be monitored and used to predict health hazards. The present work deals with the development of a prototype for a self-sufficient monitoring system for the recording of acoustic signals in a beehive. Basic knowledge could be gained for further development to predict swarming. For the recording attempt, the acoustic signals of four honeybee colonies were recorded over 25 days during the swarming period. The results were analyzed descriptively and by means of the statistical prediction model "Oblique Random Forest". Dominant frequencies could be identified that largely coincided with the results of other studies. Representative sound changes, such as the increase in sound intensity over time, which indicate the swarm behavior, could not be determined by descriptive methods. However, the predictive modeling gave a high prediction accuracy. A tendency to successfully use the applied method for the further development of the monitoring system can already be seen. Since the sample size and the comparability of the bee colonies do not fit sufficiently statistical requirements, the results have to be relativized and serve only as an orientation. In the long term, a bee monitoring system based on an internet database and decision-support system would be conceivable. It could provide further insights into the condition and behavior of honeybee colonies.