How helping beekeepers limiting colony losses and related economic deficits?

Over the past 20 years, the substantial and global decline of bees has been alarming as they provide critical pollination services. In particular, the mortality of honey bee colonies (Apis mellifera) has attracted a lot of attention due to its important role for human well-being by producing honey, sustaining populations of wild plants and supporting production of major crops. Unfortunately, abnormal high mortality rates of honey bee colonies have been revealed in several regions of the world, including Europe where it can reach up to 25–50% every winter. These mortality rates have strong impacts on beekeeper economy and sustainability, and consequences for associated services.

The BeeConnected project aims to investigate, develop and test new digital solutions based on data collection to deliver early-warning indicators of honey bee colony mortality and decision-support tools to help beekeepers limiting colony losses and related economic deficits.

Monitoring of honey bee colonies is a common practice of beekeepers to check for potential disorders, changes in productivity or to follow their performance in breeding apiaries. Such techniques are also used in research as monitoring to predict and anticipate disorders' occurrence. Nevertheless, routine monitoring is only possible from spring to autumn since opening the hives when temperatures are cold put the colony survival at risk by failure in thermoregulation. Beehives are therefore considered as black boxes by beekeepers during winter, although the colony mortality mainly occurs during this critical period.

The goal of the project is to understand mechanism underlying winter bee colony mortality and to identify early-warning indicators. To do so, the project team of BeeConnected equips hundreds of colonies with multiple low-cost sensors along gradients in climate and landscape structure. This field experiments are replicated in three countries, France, Germany and Greece. The in-nest temperature, vibration and colony weight are recorded in real time and over the complete year. Data will be

associated with mechanistic models to assess the risk of colony mortality and to identify early-warning indicators.

BeeConnected will produce direct and strong outcomes for beekeeping through the automated monitoring of the colonies with detection of abnormal behaviours and diseases, and the production of early warning indicators of mortality. These related decision-support tools will help beekeepers minimizing colony losses in winter to enhance beekeeping economy and sustainability.

Author info & Relevant link

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