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Sustainable Beekeeping, *from the south of the world*

ABSTRACT BOOK

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OP-193
Artificial Inteligence to count and discriminate honey bee activity at the hive entrance

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The study of bee foraging activity under different levels of environmental stress is one of the most ambitious challenges. Within the MEDIBEES project, one of the objectives is to compare foraging activity in several Mediterranean countries, so it is necessary to carry out field trials to determine their activity and to make these comparisons reliable. The most commonly used method so far has been to manually count the bees entering and leaving the hive during a given time. Ideally, several measurements should be taken at different times of the day throughout the beekeeping period. However, this method is time-consuming and the number of measurements is usually small, which can lead to inaccurate data on bee activity. On the other hand, colonies in very warm environments maintain their optimal temperature conditions because the bees remain static at the entrance, beating their wings to increase the airflow inside the hive. At CIAPA in Marchamalo (Spain), a computer tool developed by the Spanish company K.R.C. Española S.A., (https://www.krc.es) has been tested which, by means of artificial intelligence, has managed to count with more than 96% reliability both the bees that enter and leave the colony and those that remain static at the entrance of the hive. This tool works on high quality videos of about 2 minutes previously recorded from the hive entrance and can be programmed to collect several videos, with the added advantage that data can be collected from several hives at the same time, allowing for a more accurate comparison. This new device represents a breakthrough in the study of bee colony activity in real time.
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OP-194
Application of Fluorescence Spectroscopy for the Detection of Adulterated Honey in the UK

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Honey is a high-value product, but in recent decades, there has been a significant increase in honey adulteration and fraud. UK beekeepers are particularly concerned about the quality of honey supplied, as in the recent EU study "From the Hives" all samples from honey consignments exported from the UK were flagged as suspected of being adulterated [1]. Existing testing methods, such as chromatographic methods, sensory analysis, pollen study are either becoming obsolete or are expensive, time-consuming, and required highly trained personnel with sophisticated lab equipment.
Fluorescence (FL) spectroscopy has the potential to make honey testing more agile, quicker, and more widely available [2]. The method uses a spectral "fingerprint" of bio-chemical components in honey and can detect tampering, contaminants, and even the geographical origin of honey based on the presence of native plant chemicals. This method has already been proven effective and can complement existing methods.
In this report, we present fluorescence excitation-emission spectroscopy data of various honey samples produced in Britain. We aim to create a standard FL spectroscopic database to determine principal chemical components, such as polyphenols, furosines, and other Maillard products present in various honey samples. The changes in FL spectral features, such as peak position, intensity, and peak shapes will be used to authenticate the honey standard. By using FL spectroscopy linked with machine learning data analytic methods, we hope to provide a faster and more accessible method for honey testing that can help maintain the integrity of the UK honey industry.
Collaboration
This project is a collaboration between Honey Authenticity UK and Aston Institute of Photonic Technologies at Aston University and is supported by BBKA. We intend to work with key industry stakeholders and regulators to develop honey samples database and authentication protocol.
Reference
[1] EU Coordinated Action "From the Hives. Sampling, investigations and results. European Commission, 2023.
[2] L. Lenhardt et al. / Food Chemistry 175 (2015) 284–291.

Globally, this action will allow more information to the stakeholders via monitoring and set the basis for regulation of products to reach the minimum standards for quality, effectiveness, and economy of honey bee feed, and finally guaranteeing the quality of the bee products.