

Honey, as the “time capsule” of long term environmental change – acacia bee products

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Honeys are excellent indicators of the environment, several studies show that the elemental content of honey entirely depends on the botanical and geographical origin, but the information is incomplete regarding time-dependent composition changes. Twenty-six acacia and four honey samples with unknown botanical origin were collected between 1958-2018 and analysed for elemental composition by microwave plasma optical emission spectrometry (MP-AES). The elemental analysis was coupled with independent dating method by accelerator mass spectrometry (AMS) to determine the real age of the honey samples and test the possibility of radiocarbon based dating of bee products, which has not been applied before.

According to the analytical measurements and statistical analysis, we can conclude that the elemental composition shows change with time in the acacia honey during the last five decades. We have proven that honey preserves information of previous times and thus can be applied as an environmental indicator in reconstruction studies by analysing the non-degradable mineral content. Our results further show that acacia honey is a suitable material for radiocarbon dating, proved by the results compared to the atmospheric radiocarbon bomb-peak. The presented new approach for investigations of honey by radiocarbon-based age determination coupled with elemental analysis can be used in biological, dietary, archaeological or other multidisciplinary studies as well. Some samples show slightly depleted radiocarbon content, based on these results, honey could be used for atmospheric monitoring.

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