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Honey as microplastics bioindicator

A recent study carried out in Türkiye has assessed the presence of microplastics in different types of honey and has evaluated the potential of honey as a matrix for this kind of pollution.

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Microplastics are an emergent pollution problem, not more well known and analyzed. For microplastics we mean synthetic solid particles or polymeric, with regular or irregular shape, insoluble in water and ranging in size from 1 μm to 5 mm.



Microplastics, photo by Audiovisual Service – European Commission (Lukasz Kobus)

The presence of microplastics is spread in the air, water and soil and often also in vegetable and animal tissues, with risks that concern human and environmental health.

Microplastics have been found also in honey. Here microplastics can arrive from the environment, during the foraging activities of the honey bees, or from contamination during the honey production or packaging. So honey could be an interesting matrix to study microplastics' pollution. In fact honey bees forage across large areas and interact with air, soil, and water while collecting nectar and pollen, thereby acting as biological samplers of many environmental pollutants, and also for microplastics.

Many studies show that honey contamination from microplastics is not limited to specific regions nor to specific types of microplastics. Polymers such as polyethylene (PE), polyethylene terephthalate (PET), and ethylene vinyl acetate (EVA) are often consistently detected.

A new study conducted in Türkiye, and published in Science of Food, has analysed the presence of microplastics in two different types of honey – industrial and artisan – and its and its potential use as bioindicator.

Fifteen honey samples, eight industrial and seven artisan honeys, were analyzed using stereomicroscopy and Fourier Transform Infrared (FTIR) spectroscopy to determine microplastics's abundance, morphology, and polymer composition.

According to the results, microplastics were detected in 93% of samples, with significantly higher concentrations in artisan honey (11.4 microplastics/sample) than in industrial honey (4.9 microplastics/sample). Regarding the types of microplastics and polymers, fragments dominated (67%) over fibers (33%), with particle sizes ranged from 85 to 1200 μm . The most common polymers were ethylene-vinyl acetate, polyethylene terephthalate, polyethylene, halogen-free flame-retardant polymers, and polyamide.

Researchers hypothesized that artisan honey, due to less standardized processing and packaging, will contain higher microplastics loads than industrial honey.

Industrial honey is usually processed and packaged under standardized conditions, whereas special honey often undergoes more variable handling and may come into contact with diverse plastic materials.



Honey bees could be a good bioindicator for microplastics for their foraging activities on plants, water and soil.

Photo by [Jeffrey W. Lotz, Florida Department of Agriculture and Consumer Services, Bugwood.org](#)

The predominance of fragments over fibers suggests that the contamination likely originates from packaging materials, processing equipment, or environmental deposition rather than beekeeping activities alone. Also the dominance of EVA and PET polymers – commonly used in food packaging – supports this hypothesis.

The presence of microplastics found in this work is aligned to other studies carried out in Europe, America and Asia, and it confirms that honey could be a global bioindicator of microplastics contamination. In this way, integrating honey monitoring into broader food safety and environmental surveillance frameworks could provide a low-cost, globally applicable tool for assessing microplastics pollution.



References

Bilecen and Altunışık (2026) - [Honey as a bioindicator of microplastic pollution: insights from industrial and special honey types.](#)