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Slovenian forests cover approximately 58% of the country and provide a vital source of nectar, pollen, and honeydew for bees. Honeydew, secreted by sap-sucking insects such as aphids and scale insects (Hemiptera), plays a crucial role in forest ecosystems by sustaining various insect populations. Climate change is altering floral and honeydew availability, potentially impacting honey production and bee colony sustenance.

This study, conducted in 2024 as part of an ongoing research initiative by the Agricultural Institute of Slovenia in collaboration with the Slovenian Beekeepers' Association, aimed to assess honeydew availability and its suitability for honey production at different altitudes. A key objective was to determine whether higher-altitude locations could serve as viable beekeeping sites under shifting climate conditions.

To achieve this, honey yield, temperature, humidity, wind, and precipitation were monitored at 35 observation sites, each hosting a single honeybee colony. The presence of honeydew-producing insects was visually assessed, and molecular DNA analyses were performed for species identification. Honeydew samples were collected from both honeydew droplets and the honey stomachs of bees captured at hive entrances. The sugar composition of honeydew was analyzed using high-performance liquid chromatography (HPLC).

Findings from the 2024 season indicate that 29 out of 35 monitored colonies had positive honey balances, with the highest yield recorded at Snežnik – Črni dol (26.6 kg). Molecular analyses identified 19 honeydew-producing insect species, with the genus *Cinara* being the most diverse. HPLC analyses detected various sugars, including glucose, fructose, sucrose, and melezitose, alongside unidentified sugars requiring further characterization.

The study highlights the importance of monitoring honeydew dynamics and honeydew-producing insect diversity. Results suggest that higher-altitude sites may provide stable alternative forage sources for beekeepers, supporting adaptation to climate variability. Future research will focus on refining sugar composition analyses, assessing honeydew producer diversity across locations, and improving data transmission efficiency in remote areas.