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PP-265 [Beekeeping Technology and Quality]

METHODOLOGY FOR ESTIMATING HONEY YIELD

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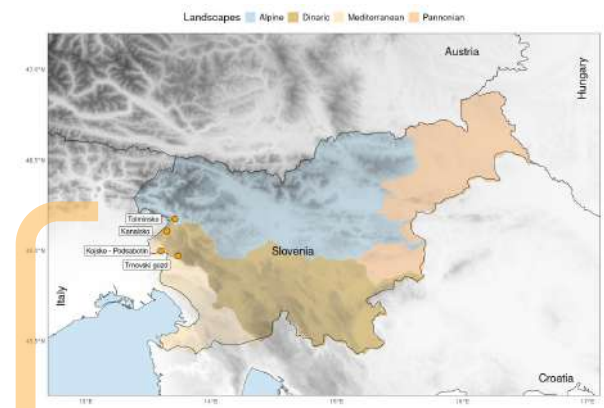
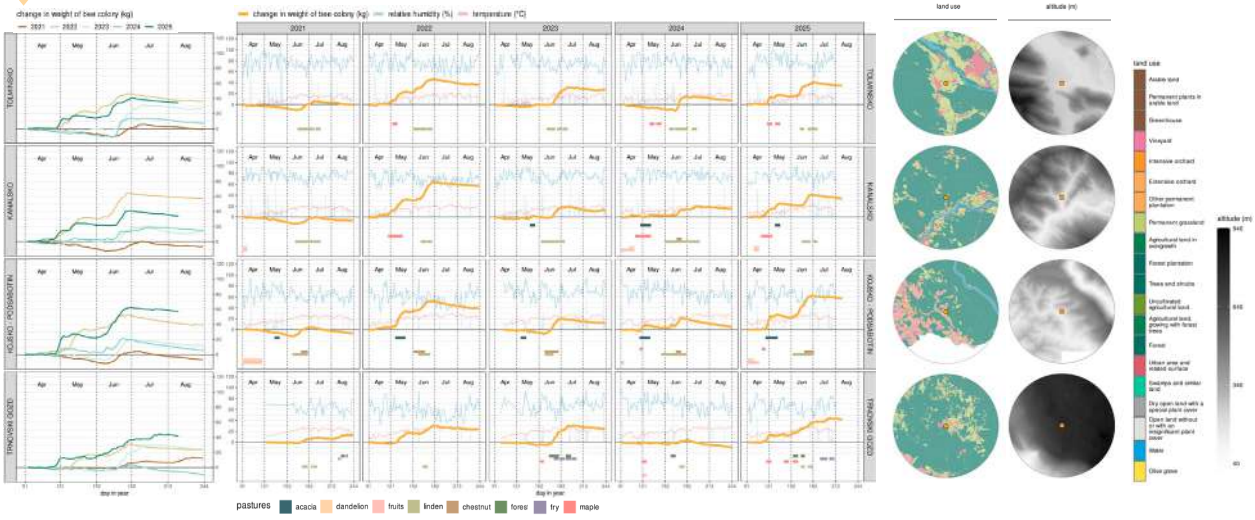
The current methodology for assessing national honey yield relies solely on the number of registered colonies and the average yields (including negative yields) from the hives in the observational network. We assume that these estimates are underestimated.



Numerous studies highlight the critical role of weather conditions in honey production, with weather factors explaining 50-80% of yield variability. Climate and weather conditions – especially temperature, relative humidity, rainfall, and solar radiation – are among the most important environmental factors affecting bees and beekeeping and consequently honey yields. Together with other environmental factors such as topography, nectar source availability and land use, they create microlocations with distinct microclimates that vary in resilience to the increasing impacts of climate change which drive the intensification of extreme environmental conditions.

Therefore, considering these environmental factors is essential when assessing honey yields, especially in countries with high phytogeographical diversity, such as Slovenia, which lies at the intersection of the Alps, Dinaric Alps, Pannonian Basin, and Adriatic Sea Basin.



To obtain a more accurate estimation of honey yield, we propose an approach based on:

i) data on hive migrations and stationary hives[2],
ii) data on pastures and honey yield from hives in the observation network[1,3], and
iii) data on landforms[4], biodiversity[5–7], and weather[2].

The data are spatio-temporal in nature; therefore, models such as ST-SARIMA (Spatio-Temporal Seasonal Autoregressive Integrated Moving Average) and STK (Spatio-Temporal Kriging) will be tested. These methods incorporate environmental data, including meteorological factors (e.g., temperature, air pressure, solar radiation, relative humidity, precipitation, wind), land use (agricultural, forest, urban areas, water), terrain (e.g., altitude, aspect, landforms), soil type, and the density of bee colonies through time and space.

[2]The Slovenian Environment Agency [3]Beekeeping Association of Slovenia [4]Ministry of Natural Resources and Spatial Planning [5]Ministry of Agriculture, Forestry and Food [6]Centre for Cartography of Fauna and Flora [7]Slovenian Forestry Services

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Methodology for estimating honey yield

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Numerous studies highlight the critical role of weather conditions in honey production, with weather factors explaining 50-80% of yield variability. Climate and weather conditions – especially temperature, relative humidity, rainfall, and solar radiation – are among the most important environmental factors affecting bees and beekeeping, and consequently honey yields. Together with other environmental factors such as topography, nectar source availability and land use, they create microlocations with distinct microclimates that vary in resilience to the increasing impacts of climate change which drive the intensification of extreme environmental conditions.

Therefore, considering these environmental factors is essential when assessing honey yields, especially in countries with high phytogeographical diversity, such as Slovenia, which lies at the intersection of the Alps, Dinaric Alps, Pannonian Basin, and Adriatic Sea Basin.

To determine a suitable method for assessing honey yield we, tested models like SARIMA (Seasonal Autoregressive Integrated Moving Average), which incorporated environmental data, including meteorological factors (e.g., temperature, air pressure, solar radiation, relative humidity, precipitation, wind), land use (agricultural, forest, urban areas, water), terrain (e.g., altitude, aspect, landforms), soil type and the density of bee colonies.

We identified a suitable method for estimating honey yield that incorporates key environmental factors from the available data. This method provides a more accurate and precise estimate of honey yield than the current one and contributes to a better understanding of the relationship between bees and the environment.