

OP-278 [Pollination and Bee Flora]

Melissopalynology applied to the study of the botanical characterisation and geographical traceability of *Apis mellifera*, Linnaeus 1758 and Meliponini honeys produced in certain areas of Bolivia

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Melissopalynological analysis is a useful tool not only for identifying the botanical composition of honey, but also used to trace its geographical origin, thus highlighting the relationship between the bee and the territory. Honey is a product that is closely linked to the area of production, since its characteristics depend largely on the plants foraged by the bees. By analysing the pollen elements in honey, it is possible to identify relatively constant differences that distinguish products of different origins. This type of analysis is widely used in Europe to characterise *Apis mellifera*'s honeys and to identify the area of production of a given honey, but it is also applicable to other types of honeys, such as those produced by some stingless bee species belonging to the tribe Meliponini, which are widely reared for their products in some regions of South America. However, in many Latin American countries, especially in Bolivia, studies based on this technique are not widespread and research is few. The aim of this work is to valorise, through botanical characterisation, the typical bee products of some areas of Bolivia and to increase the knowledge of the botanical context in those regions where beekeeping practices are more widespread; areas for which there is a lack of detailed information on the diversity and availability of melliferous plants. More than 60 honey samples of *A. mellifera* and the other half of different Meliponini species from different areas of the country, were subjected by melissopalynological analysis. The analysis of the pollen spectrum of the samples made it possible to highlight the close relationship between the bees and the territory, the apicultural suitability of the areas of origin of the samples and the possibility of producing monofloral honeys in some places. In Bolivia there is no tradition of monofloral honeys, but this study could provide the basis for consolidating production practices aimed at defining and preserving monofloral honeys.



MELISSOPALINOLOGY APPLIED TO THE STUDY OF THE BOTANICAL CHARACTERISATION AND GEOGRAPHICAL TRACEABILITY OF *APIS MELLIFERA* LINNAEUS, 1758 AND MELIPONINI HONEYS PRODUCED IN CERTAIN AREAS OF BOLIVIA



APIMONDIA
SCANDINAVIA
2025
23-27 SEPTEMBER
SWEDEN | DENMARK | NORWAY

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SANAPI project:
2022 – 2025



Apis mellifera



Meliponini



THE SANAPI PROJECT

We are currently involved in this project coordinated by an “NGO”: **ASPEm**



SANAPI project → based in **Bolivia**

Field of interest →

- **Beekeeping**
- **Honey production**



- **Land protection + Economic development** through the consolidation of **sustainable** production practices
- **Enhance** the local **honey** → **Promoting** the **market**

SANAPI project:
2022 – 2025



Apis mellifera



Meliponini

AIMS

Characterization of the:

- **Botanical**
- **Geographical**

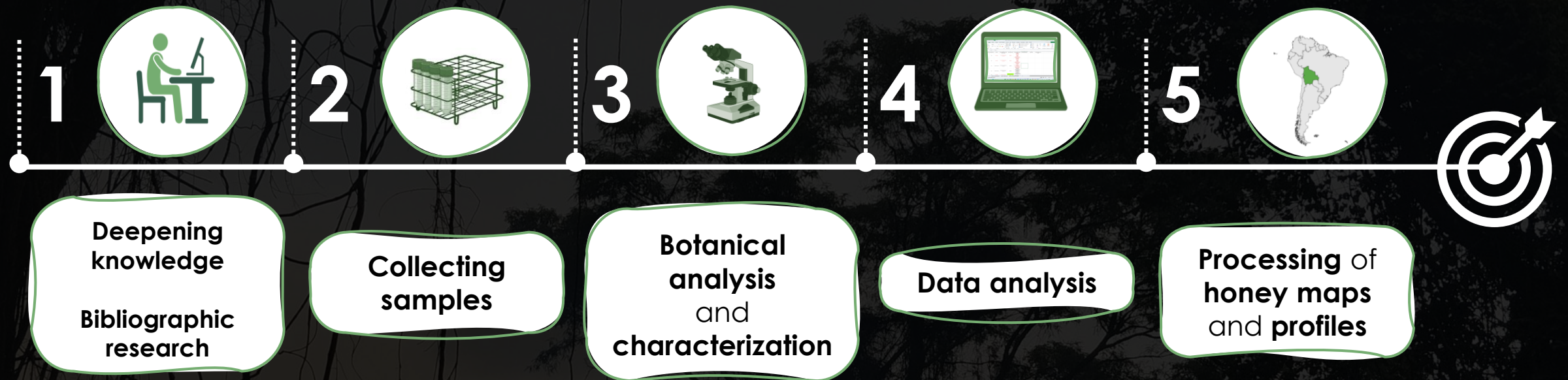
Origin of honey

→ In order to:

- Contribute to the creation of a
“Honey Library” of Bolivia
- Exploring possibilities for
monoflora



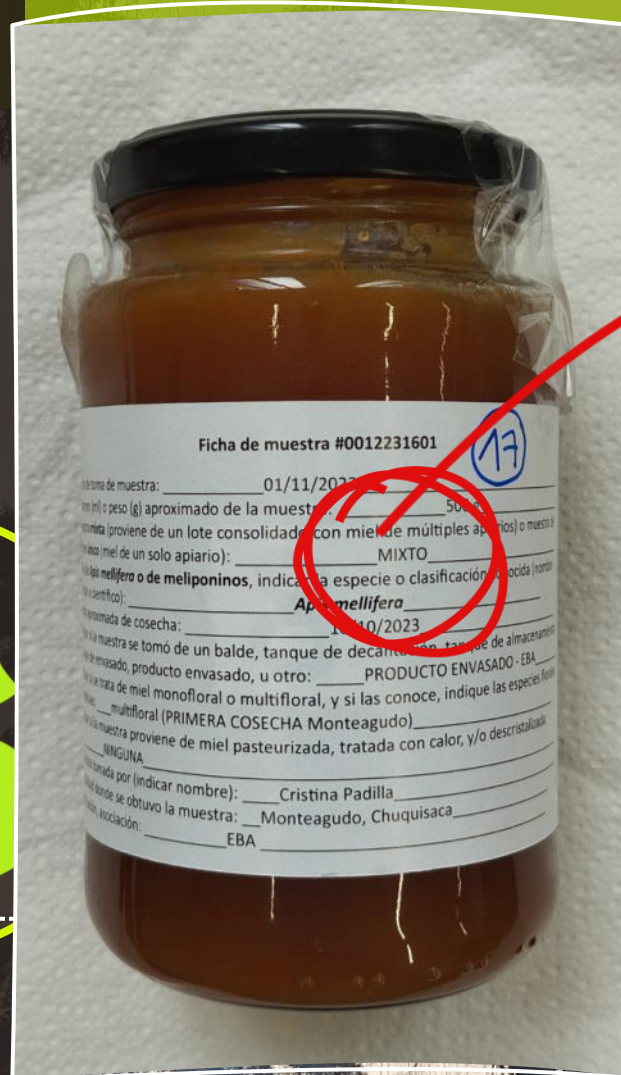
PATH TO ACHIEVING GOALS





DEEPENING KNOWLEDGE

- **Review** of scientific literature on the **vegetation**
- Insights into **meliponiculture practices**
- Distribution of a **questionnaire** to **local beekeepers**



Combination of honeys
produced in **different apiaries**



Interference with the
subsequent analyses of
botanical and geographical
characterization



COLLECTING SAMPLES

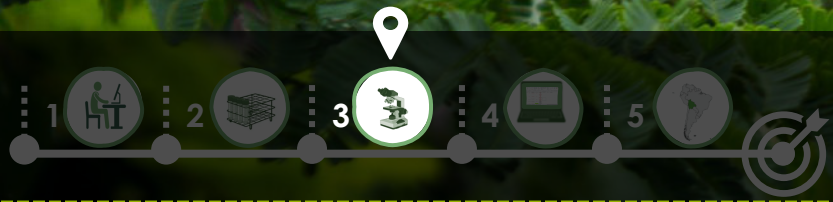
- **85 honey samples** were sent to us in **3 years**

- From **different regions** of Bolivia

The number of samples depended on:

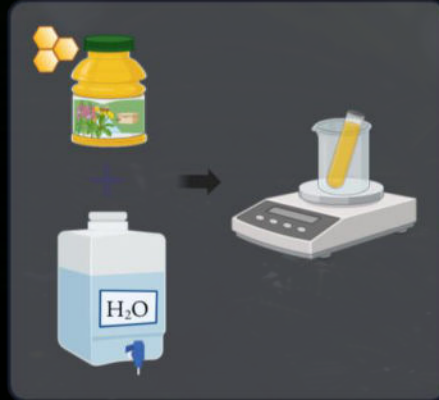
- **Availability** of beekeepers
- **Environmental factors** affected honey production

PROJECT YEAR	TOTAL NUMBER OF SAMPLES 	A. MELLIFERA HONEY SAMPLES 	MELIPONINI HONEY SAMPLES 
1st year (2023)	9	7	2
2d year (2024)	50	19	31
3d year (2025)	26	22	4



POLLEN EXTRACTION PROTOCOL

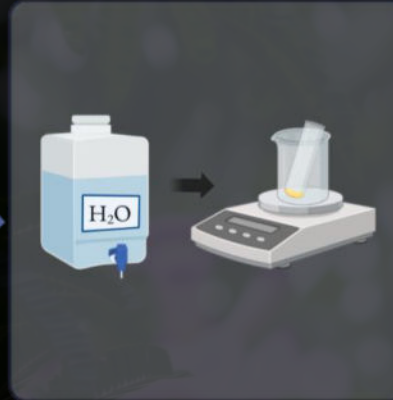
- Take **10–20 g** of honey
- Add **distilled water**
- **Homogenize** the mixture



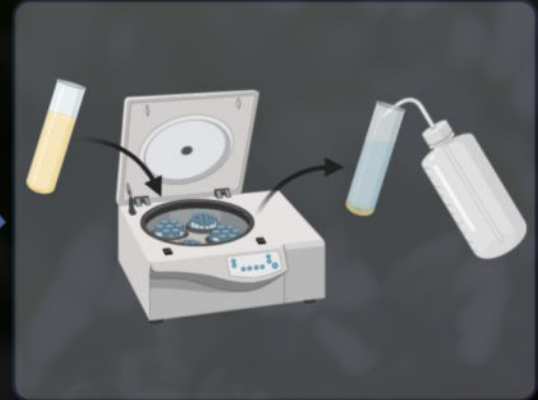
- **1st centrifugation** cycle (3000 rpm x 20 min)
- Removal of **supernatant**



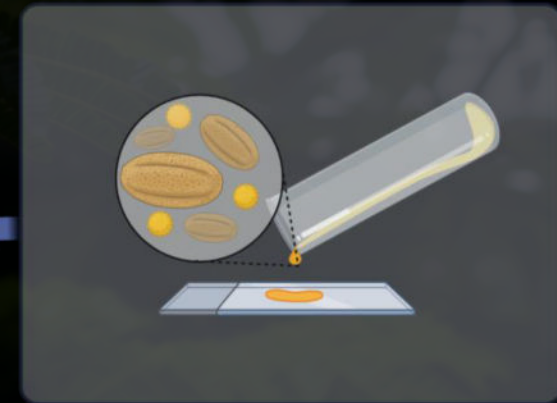
- Add **distilled water**
- **Homogenize** the mixture



- **2d centrifugation** cycle (3000 rpm x 20 min)
- Removal of **supernatant**



Observation and
identification of
pollen grains using an
optical microscope

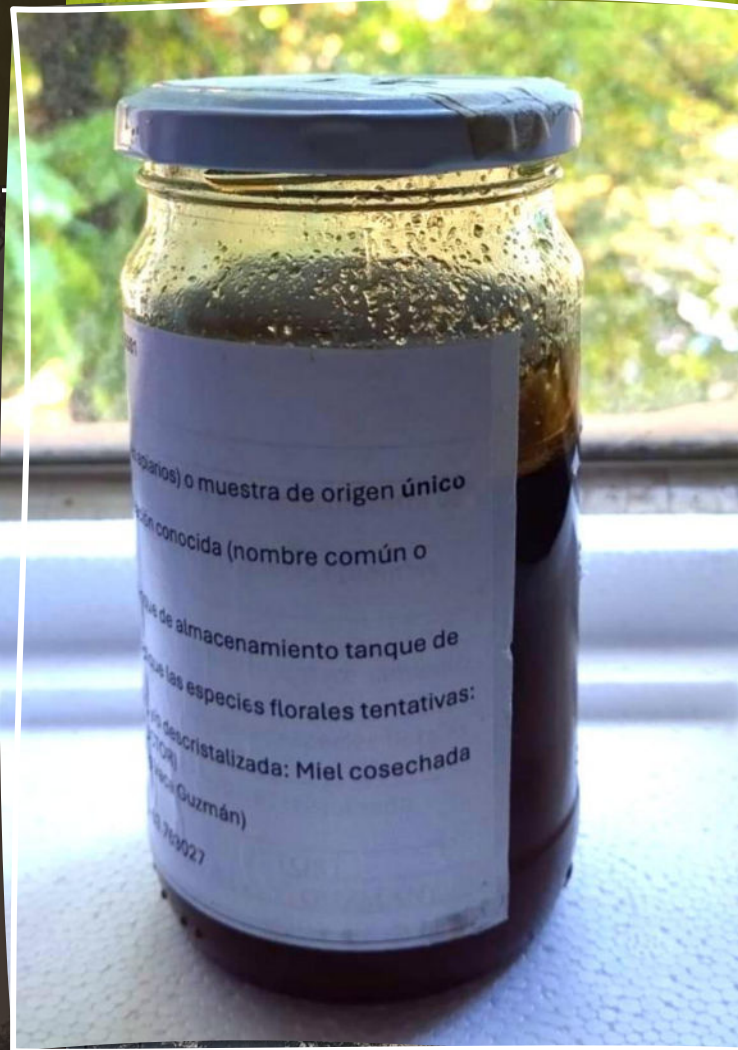


- **Assembling the slide**



POLLEN EXTRACTION PROTOCOL

- *Myracrodruon urundeuva*
- Fabaceae (Acacie – *Calliandra* type)
- Anacardiaceae
- Myrtaceae (*Eucalyptus* type)
- Amaranthaceae
- Asteraceae (type «H», *Artemisia* type)
- Malvaceae (Bombacacie)
- Euphorbiaceae

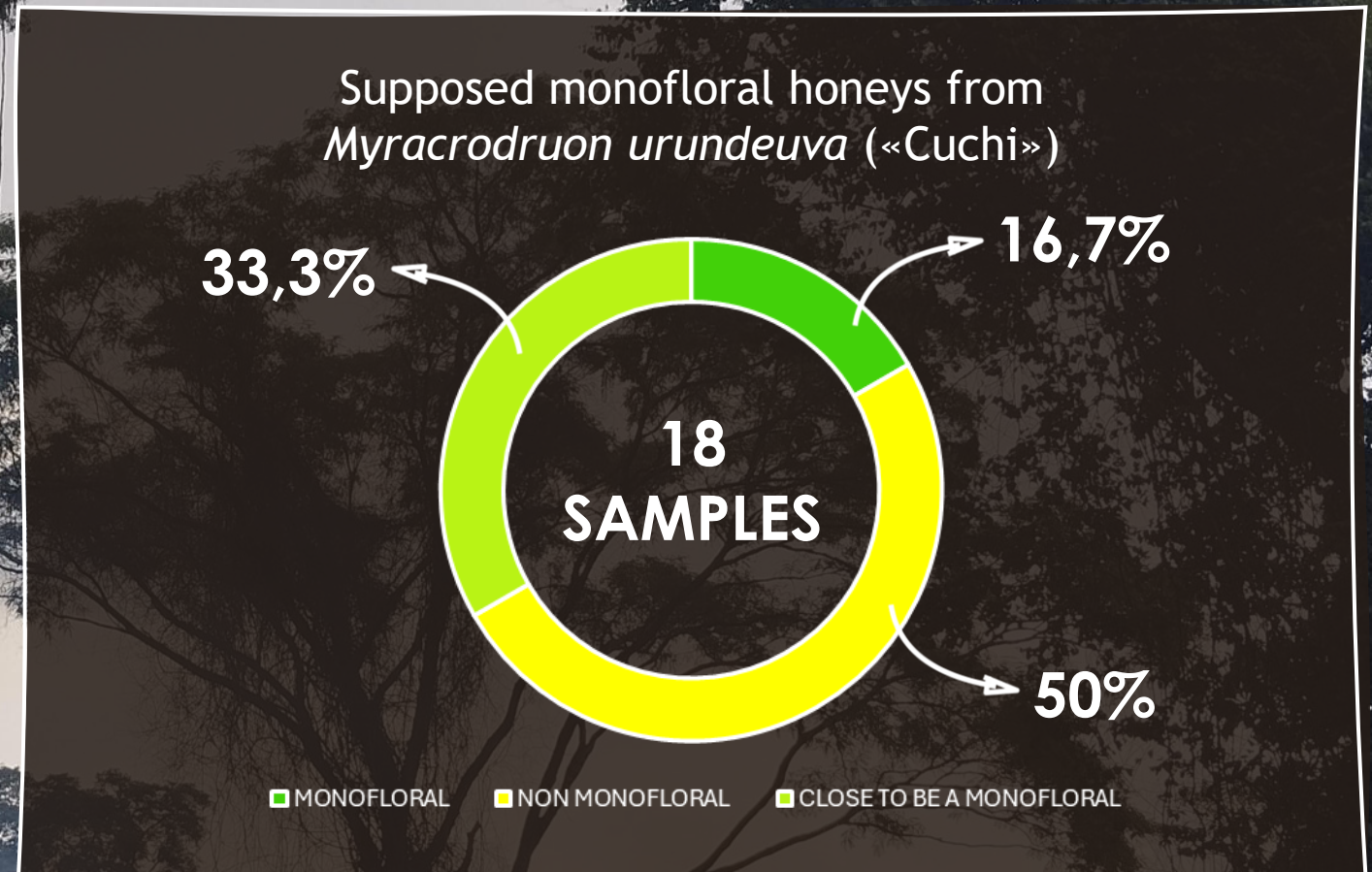




Characteristics of *Myracrodruon urundeuva* honey:

- Color: **dark amber**
- Does **not crystallize** at room temperature
- The plant grows mainly in **seasonally dry tropical forests**
- ***M. urundeuva* pollen is highly overrepresented**

EXPLORING THE POSSIBILITIES OF PRODUCING MONOFLORAL HONEY





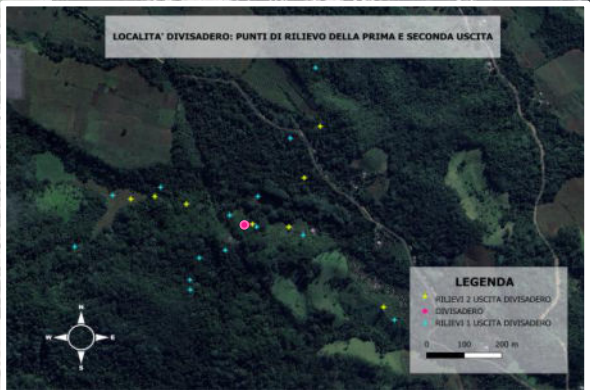
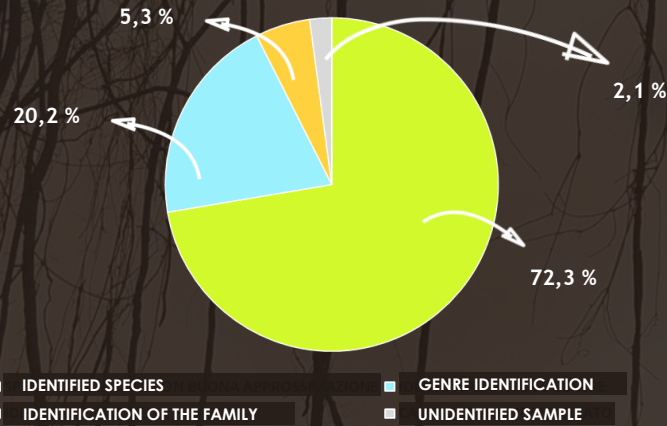
FLORISTIC-VEGETATION SURVEYS

RELATIVE ABUNDANCE OF SAMPLED SPECIES



- | | | | |
|-----------------|----------------|----------------|---------------|
| Acanthaceae | Adoxaceae | Amaranthaceae | Apiaceae |
| Apocynaceae | ASTERACEAE | Bignoniaceae | Boraginaceae |
| Bromeliaceae | Cannabaceae | Caricaceae | Cleomaceae |
| Erythroxilaceae | EUPHORBIACEAE | FABACEAE | Lamiaceae |
| Lauraceae | Lythraceae | Malpighiaceae | Moraceae |
| Muntingiaceae | Myrtaceae | Nyctaginaceae | Papaveraceae |
| Petiveriaceae | Phyllanthaceae | Phytolaccaceae | Portulacaceae |
| Rhamnaceae | Rosaceae | Rubiaceae | Rutaceae |
| Sapindaceae | Sapotaceae | SOLANACEAE | Urticaceae |
| VERBENACEAE | Violaceae | | |

PERCENTAGES OF THE DEGREE OF RECOGNITION OF THE SAMPLES COLLECTED



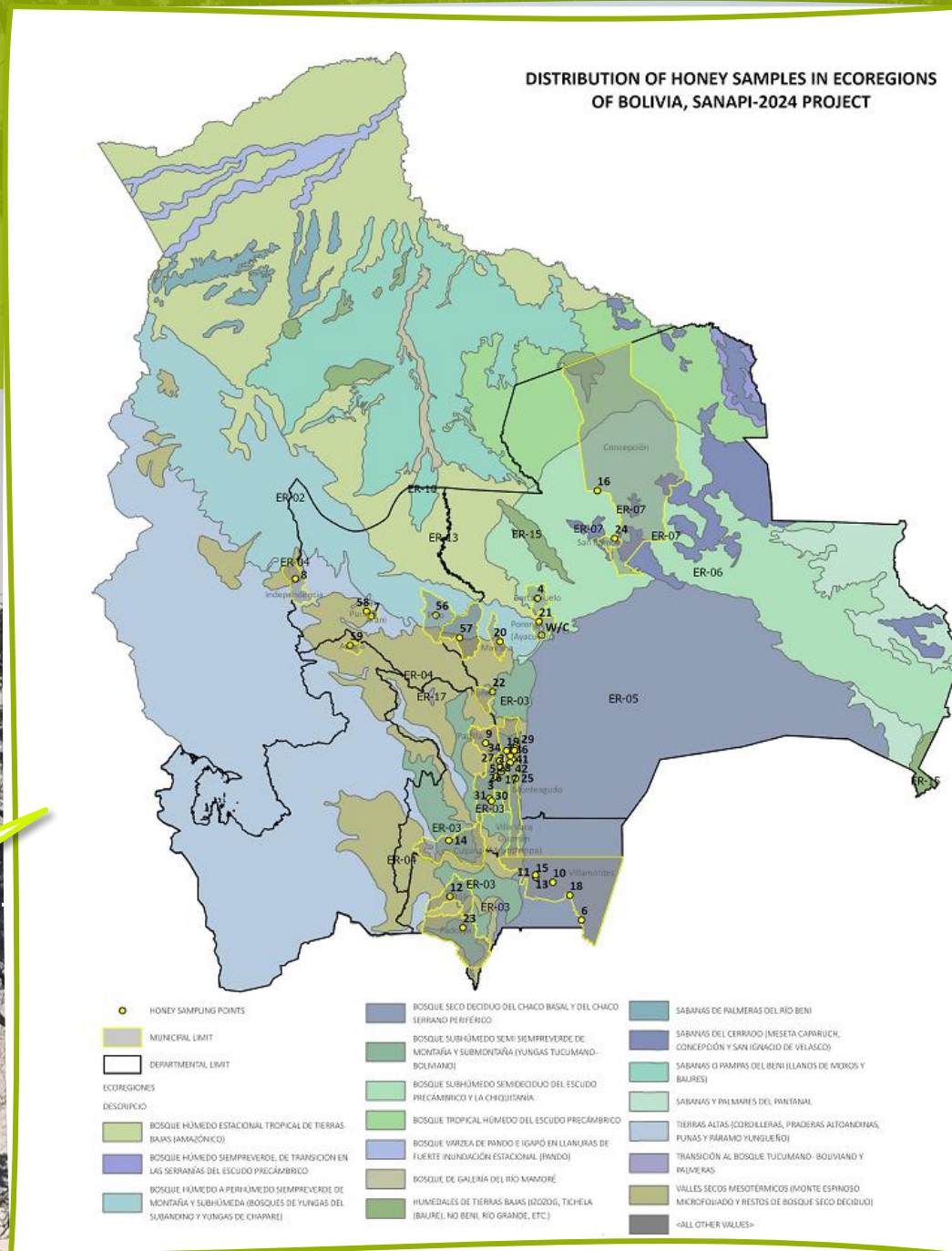


DESIGN MAPS

Overlap of:

- Map of **ecoregions** characterizing **Bolivia**
- +**
- Location** of certain **apiaries** and **meliponaries**

- Vegetation complexity**
- Wide biodiversity**





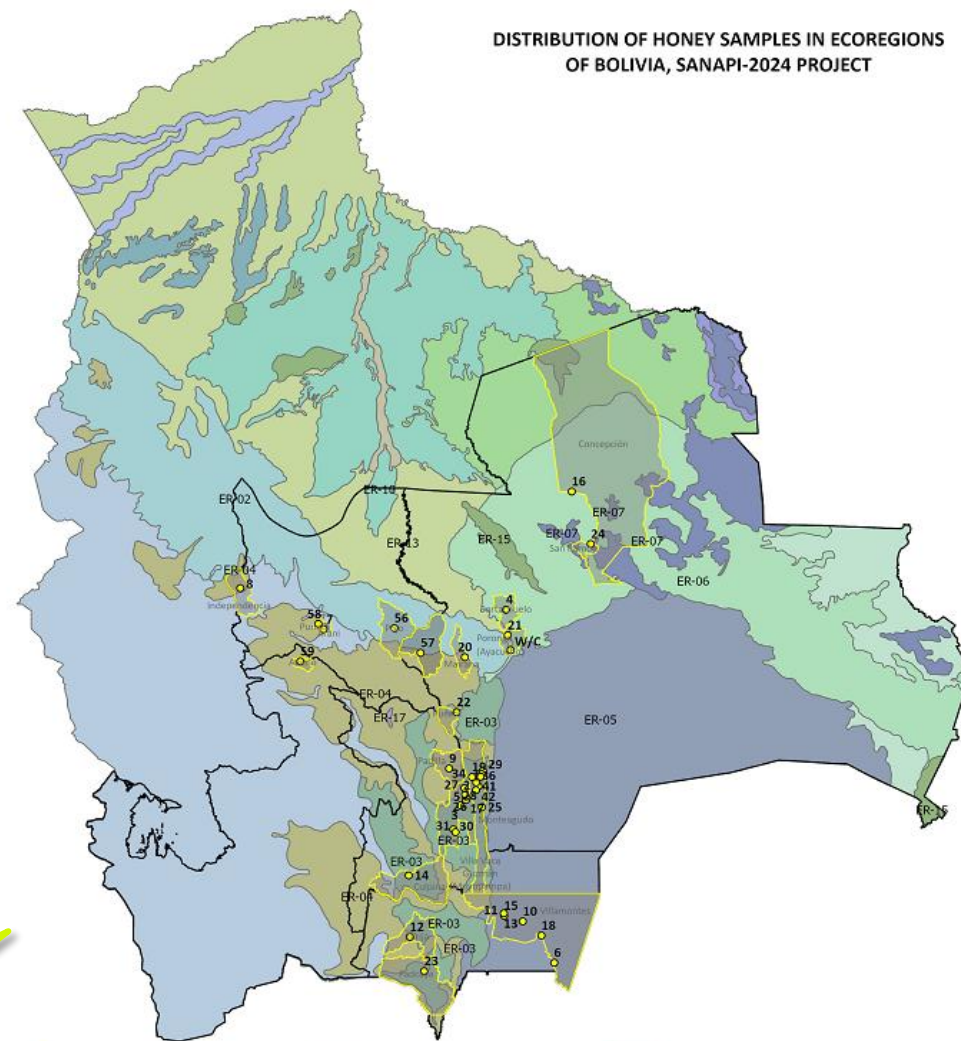
NEXT STEP

- Info of the **vegetation**
- **Georeferencing** of beehives
- Honeys **botanical characterization**
- **Monofloral** honey



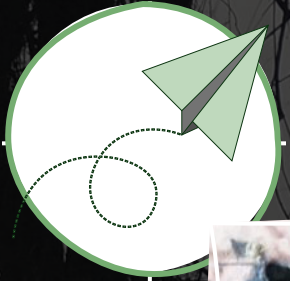
Update the distribution map of the **suitable** honey production areas

DISTRIBUTION OF HONEY SAMPLES IN ECOREGIONS OF BOLIVIA, SANAPI-2024 PROJECT



- | | | |
|-------------------------|---|---|
| ● HONEY SAMPLING POINTS | ■ BOSQUE SECO DECIDUO DEL CHACO BASAL Y DEL CHACO SERIANO PERIFÉRICO | ■ SABANAS DE PALMERAS DEL RIO BENI |
| ■ MUNICIPAL LIMIT | ■ BOSQUE SUBHÚMEDO SEMI SIEMPREVERDE DE MONTAÑA Y SUBMONTAÑA (YUNGAS TUCUMÁN-BOLEIVANO) | ■ SABANAS DEL CERRADO (MESETA CAMARUCHI, CONCEPCIÓN Y SAN IGNACIO DE VELASCO) |
| ■ DEPARTMENTAL LIMIT | ■ BOSQUE SUBHÚMEDO SEMI DECIDUO DEL ESCUDO PRECAMBRIANO Y LA CHICHITANIA | ■ SABANAS O PAMPAS DEL BENI (LLANOS DE MOKOS Y BAURES) |
| ■ ECOREGIONES | ■ BOSQUE TROPICAL HÚMEDO DEL ESCUDO PRECAMBRIANO | ■ SABANAS Y PRAIRIAS DEL PANTANAL |
| ■ DESCRIPCION | ■ BOSQUE HUMEDO ESTACIONAL TROPICAL DE TIERRAS BAJAS (AMAZONICO) | ■ TIERRAS ALTAS (CORDILLERAS, PRADERAS ALTOANDINAS, PUNAS Y PARANO YUNGUEÑO) |
| | ■ BOSQUE HUMEDO SIEMPREVERDE, DE TRANSICION EN LAS SERANAS DEL ESCUDO PRECAMBRIANO | ■ TRANSICION AL BOSQUE TUCUMÁN-BOLEIVANO Y PALMERAS |
| | ■ BOSQUE HUMEDO A PERHÚMEDO SIEMPREVERDE DE MONTAÑA Y SUBHÚMEDA (BOSQUES DE YUNGAS DEL SUBANDINO Y YUNGAS DE CHAPARE) | ■ VALLES SECOS MESOTERMICOS (MONTE ESPINOSO MICROFOLIADO Y RESTOS DE BOSQUE SECO DECIDUO) |
| | ■ BOSQUE DE GALERIA DEL RIO MAROÑÉ | ■ <ALL OTHER VALUES> |
| | ■ HUMEDALES DE TIERRAS BAJAS (COZCOS, TICHELA (BAURE), NO BENI, RIO GRANDE, ETC.) | |

FUTURE



PERSPECTIVES

- ❑ **Deepen** the **knowledge** of the **vegetation** in **Bolivia**
- ❑ Build a first core for a **reference pollen atlas** with the plants that have been identified
- ❑ **Pave the way** for more in-depth research in the future

THANK YOU FOR YOUR ATTENTION

May this be a starting point
for further collaboration and
knowledge-sharing!

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