

A European citizen science project for monitoring hornet abundance in apiaries

iHORNETS is a mobile application designed to monitor the abundance of hornet species in apiaries using a simple and standardized methodology.

By collecting observations from apiaries across Europe, the project aims to better understand:

- seasonal hornet dynamics,
- differences in abundance between regions,
- and the expansion of invasive hornet species.

The information collected through the app will help researchers generate European-scale monitoring maps and improve scientific knowledge about hornet pressure on apiaries.

Project PID2023-149487OA-I00, funded by MICIU/AEI/10.13039/501100011033 and by FEDER/UE.



@ihornetsapp
ihornetsapp@gmail.com



How does iHORNETS work?

1. Register your apiary

Add your apiary location using the mobile application.

2. Count hornets

Stand in front of a SINGLE hive and count the hornets flying in front of the hive for 30 seconds.

3. Repeat the process

Repeat the count on additional hives (covering at least 5 hives per apiary) and repeat the survey on different weeks (preferably every 2 weeks from mid-August to mid-November)

IMPORTANT

- Counts must be conducted on a SINGLE hive, never on the apiary as a whole.
- Observations with ZERO hornets are just as important as those with hornets and should always be submitted.



iHORNETS

Target species

iHORNETS focuses on hornets belonging to the genus *Vespa*, including both native and invasive species present in Europe.

The project mainly aims to monitor species commonly associated with apiaries, such as:

Vespa velutina



Didier Descouens CC BY-SA 4.0

Vespa orientalis



Sandy Rae CC BY-SA 4.0

Vespa bicolor



portioid CC BY-SA 4.0

Vespa crabro



AfroBrazilian CC BY-SA 4.0



@ihornetsapp
ihornetsapp@gmail.com

Using the iHORNETS app

In the following pages, you will find step-by-step information and images explaining how to use the iHORNETS mobile application.

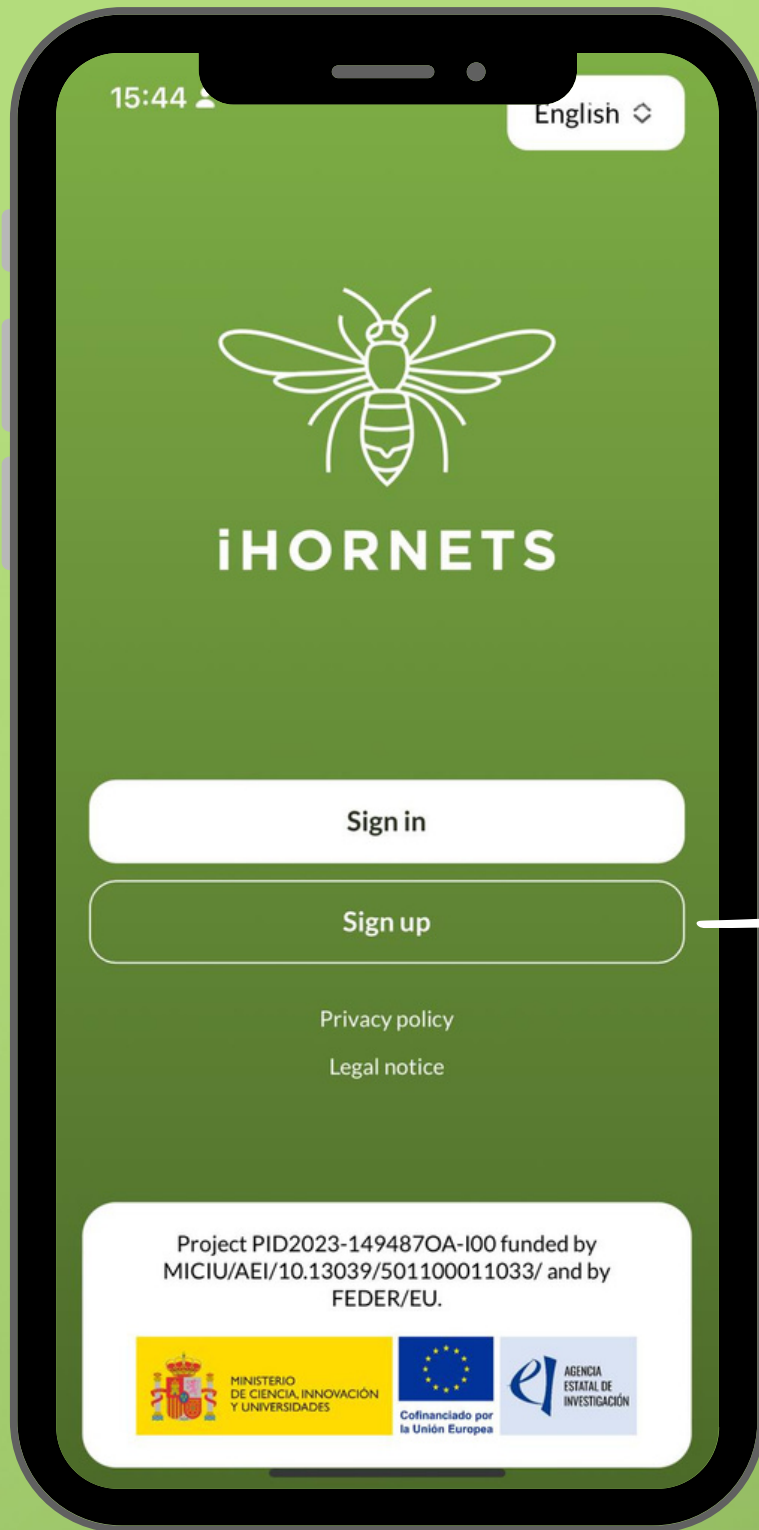
The tutorial will guide you through:

- Sign up (p5)
- Create a settlement (p7)
- Edit a settlement (p10)
- Delete a settlement (p11)
- Start counting (p13)
- Save a count (p20)
- Continue counting (p22)
- Delete a counting (p24)
- Home page (p26)

The application has been designed to be simple, fast, and accessible to all beekeepers.



1. Sign up

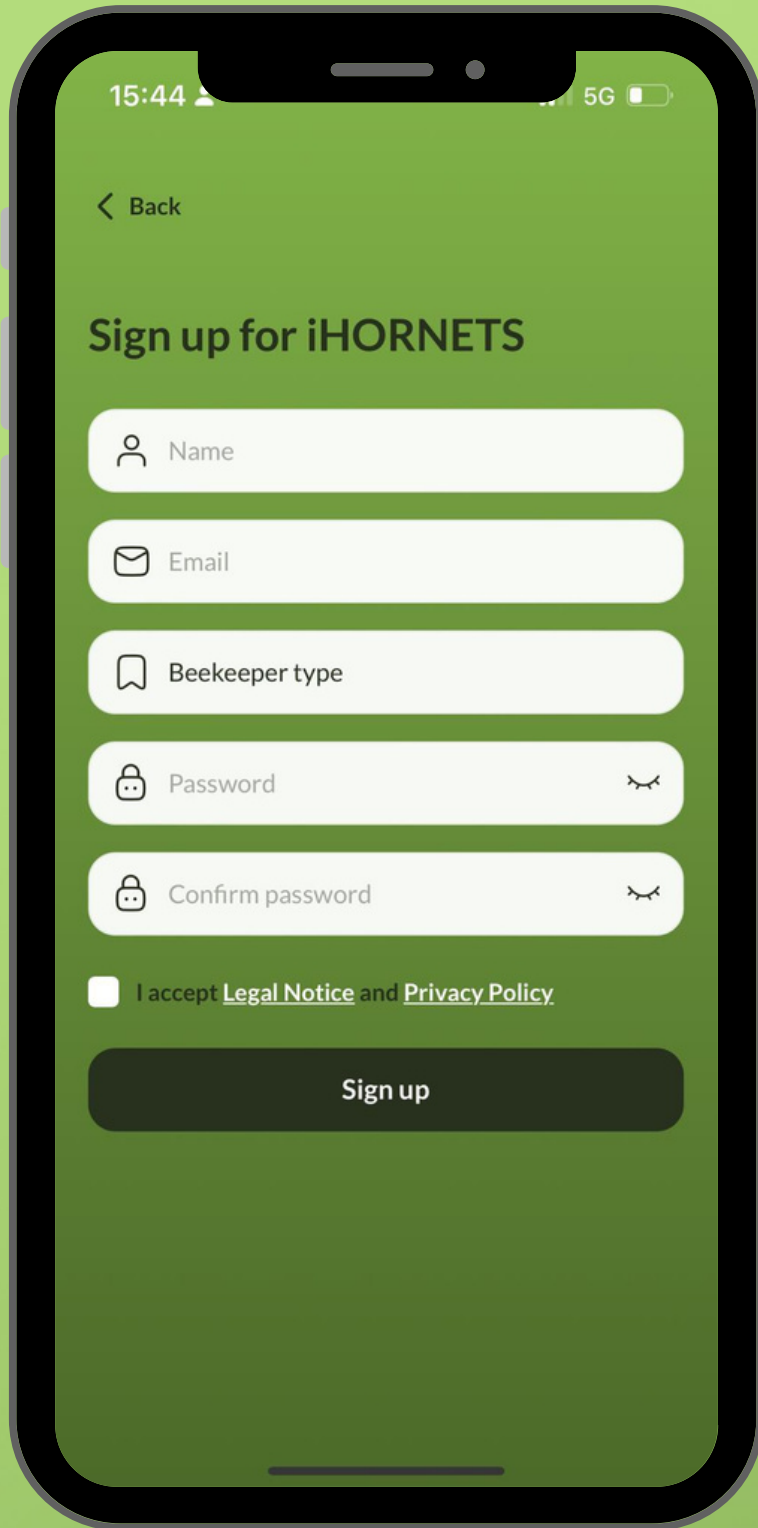


→ **Sign up** to register



@ihornetsapp
ihornetsapp@gmail.com

1. Sign up



15:44 5G

< Back

Sign up for iHORNETS

 Name

 Email

 Beekeeper type

 Password 

 Confirm password 

☐ I accept [Legal Notice](#) and [Privacy Policy](#)

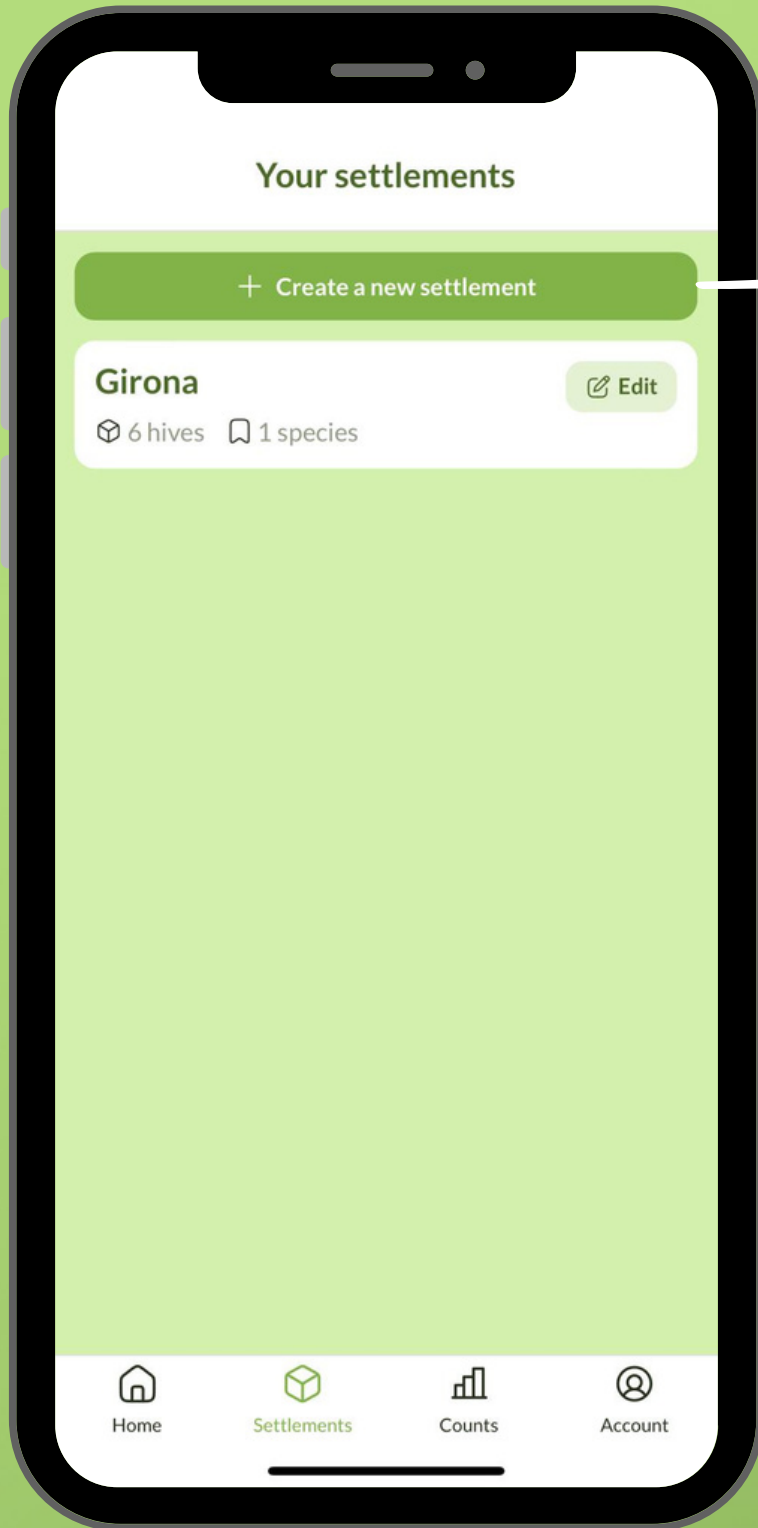
Sign up

Enter your **name**, **email**, and **password**, select your **beekeeper type** (*professional, non-professional, or self-consumption*, based on the number of hives), and click **sign up** to create your account



@ihornetsapp
ihornetsapp@gmail.com

2. Create a settlement



Start creating a settlement by clicking **"Create a new settlement"**



@ihornetsapp
ihornetsapp@gmail.com

2. Create a settlement

< New settlement

Settlement name

Apiary Puig Roca

Number of hives

15

Municipality

Palamós, Spain

☒ Mark position on map

Location helps us conduct studies on the impact in geographic areas more accurately

Región de les
Pyrenées
catalanes

Argeles-sur-Mer

E-15

Empuriabrava

Olot

Banyoles

L'Escalà

Girona

Platja d'Aro

i S'Agaró

Palamós

Create settlement

Home Settlements Counts Account

Give your settlement a name

Enter the number of hives

Enter the municipality

OPTIONAL: You can mark the exact location on the map by **moving the red pointer**



@ihornetsapp
ihornetsapp@gmail.com

2. Create a settlement

New settlement

Castelldefels

Google

Keyboard shortcuts | Map Data | Terms

Species
Select the species you want to count.

☐ *Vespa bicolor* ☐ *Vespa crabro*

☒ *Vespa orientalis* ☒ *Vespa velutina*

☐ Other

Protection measures
If you don't apply any, no option needs to be marked.

☒ Koldo trap ☐ Electric harp

☐ Muzzle ☐ Trap with attractant

☐ Chemical trojans ☐ Other

Create settlement

Home Settlements Counts Account

Select the **hornet species** in the apiary. If a species is not listed, select "Other" and provide its name

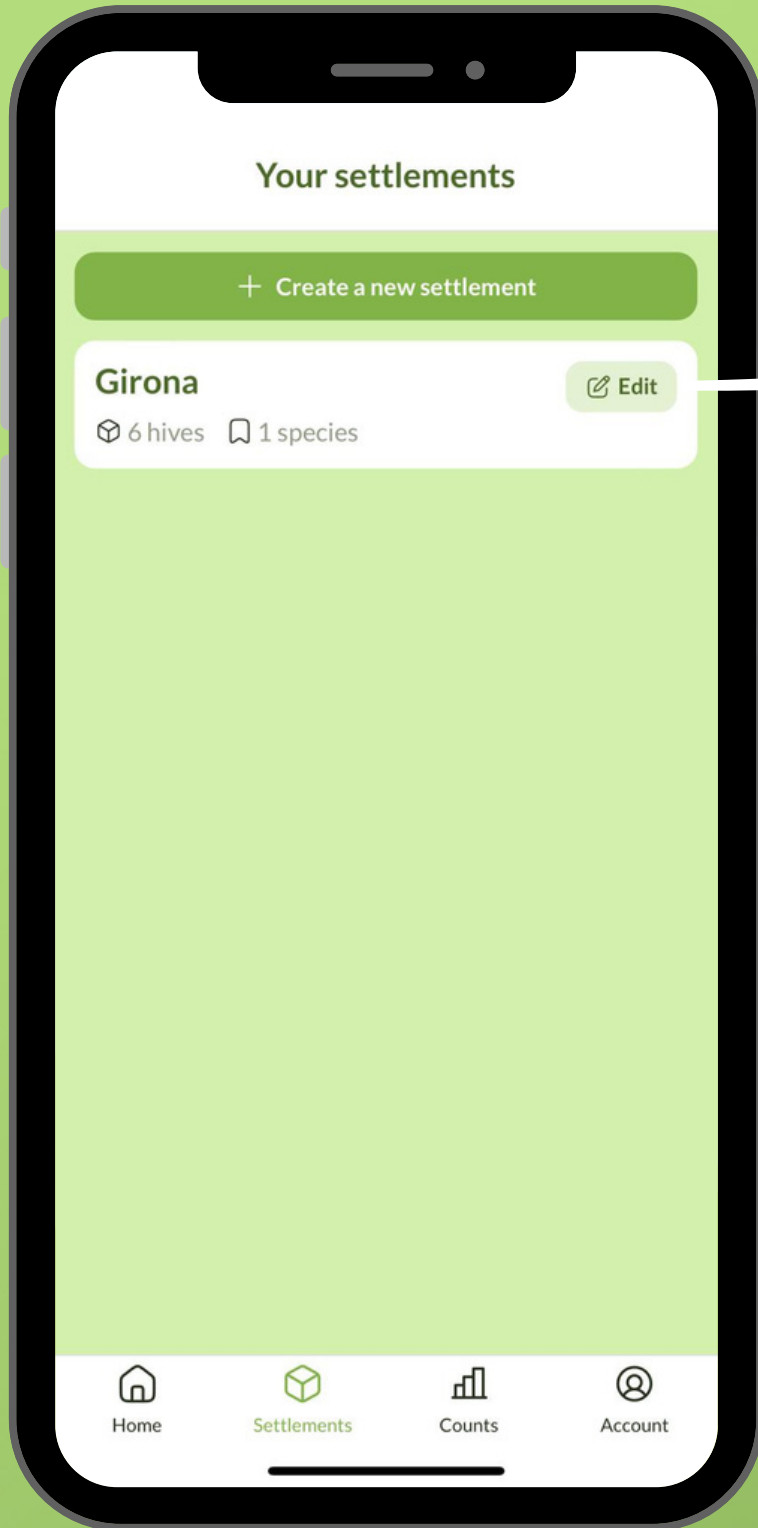
Next, select the **protection method** used in the apiary. If none applies, leave the field blank. If the method is not listed, select "Other" and specify it

Finally, click "Create settlement"



@ihornetsapp
ihornetsapp@gmail.com

3. Edit a settlement

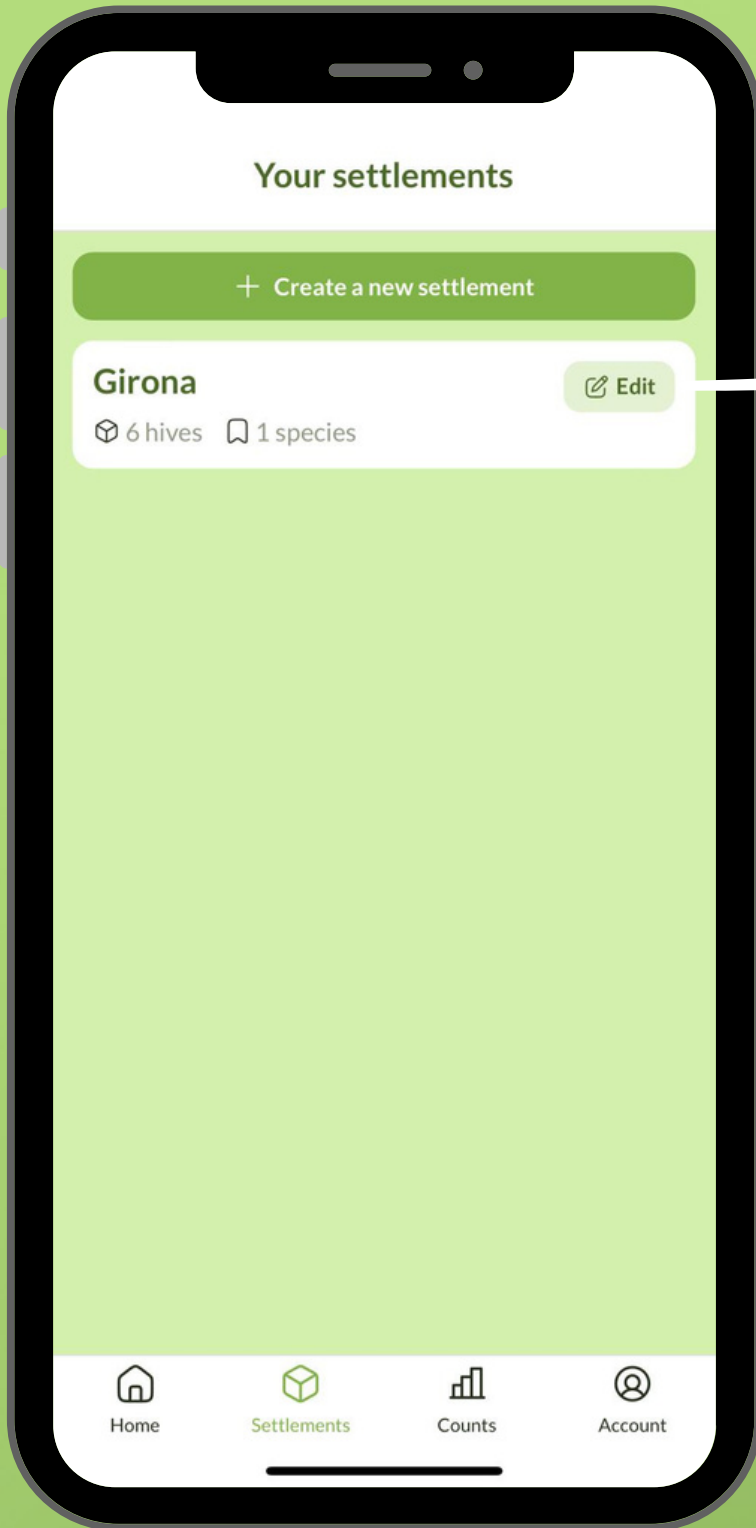


To modify an existing apiary, click the **Edit** button on the right



@ihornetsapp
ihornetsapp@gmail.com

4. Delete a settlement



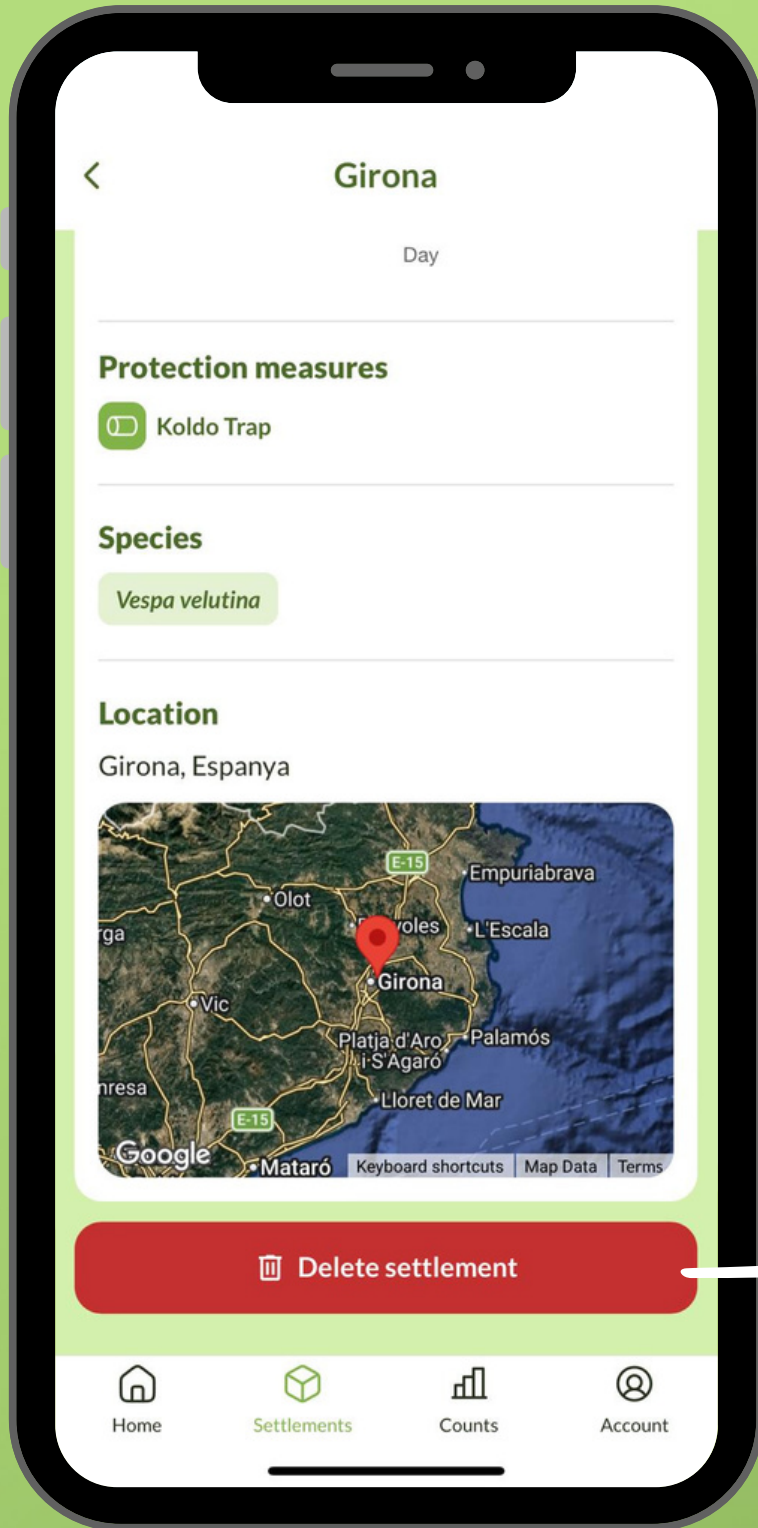
To **delete** an existing apiary, click on it and scroll to the bottom of the next screen



@ihornetsapp
ihornetsapp@gmail.com

4. Delete a settlement

WARNING: Deleting a settlement will permanently delete all associated counts. Before proceeding, make sure you really want to do this. This action cannot be undone.

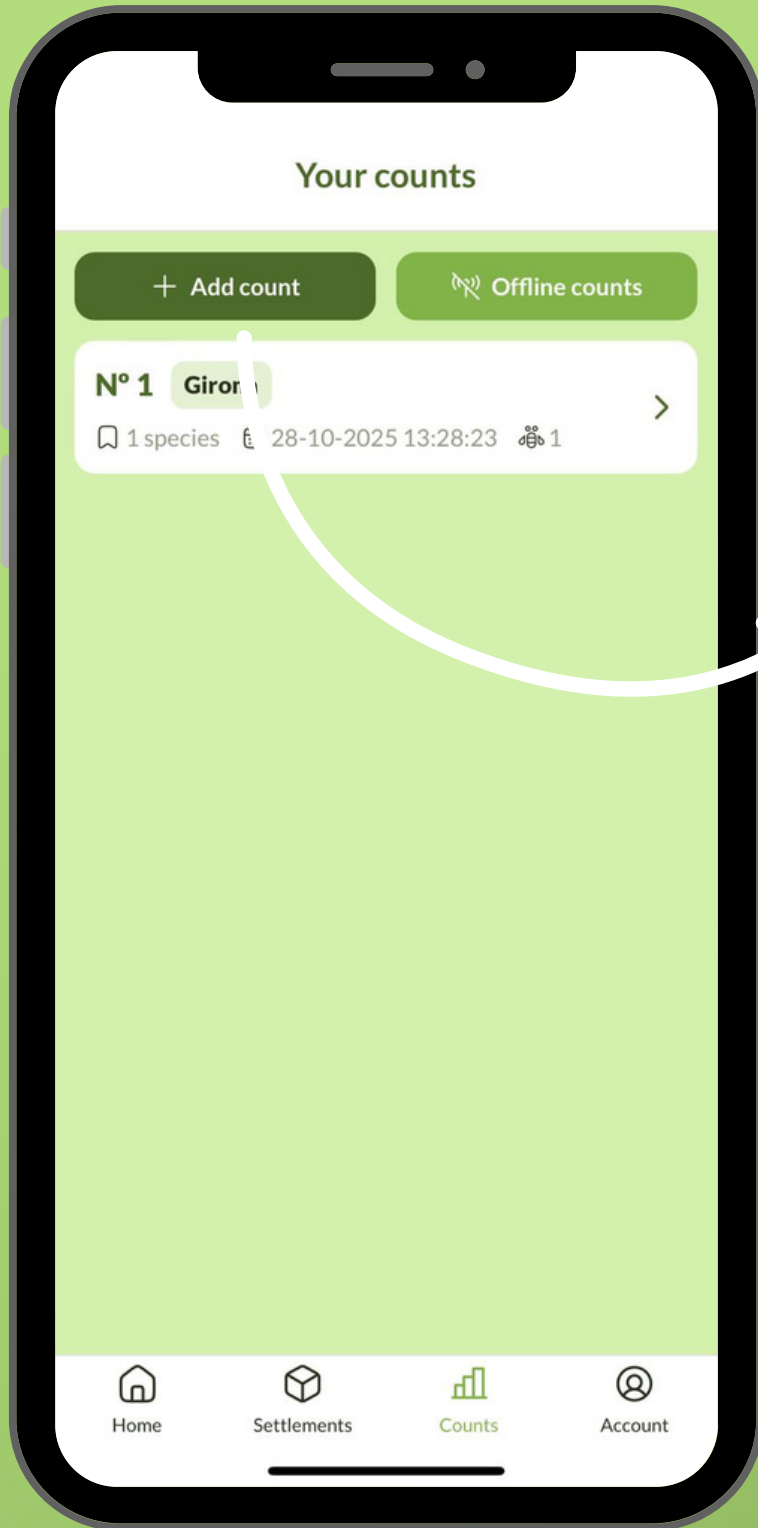


Press the "Delete settlement" button to remove the settlement and all the associated data



@ihornetsapp
ihornetsapp@gmail.com

5. Start counting

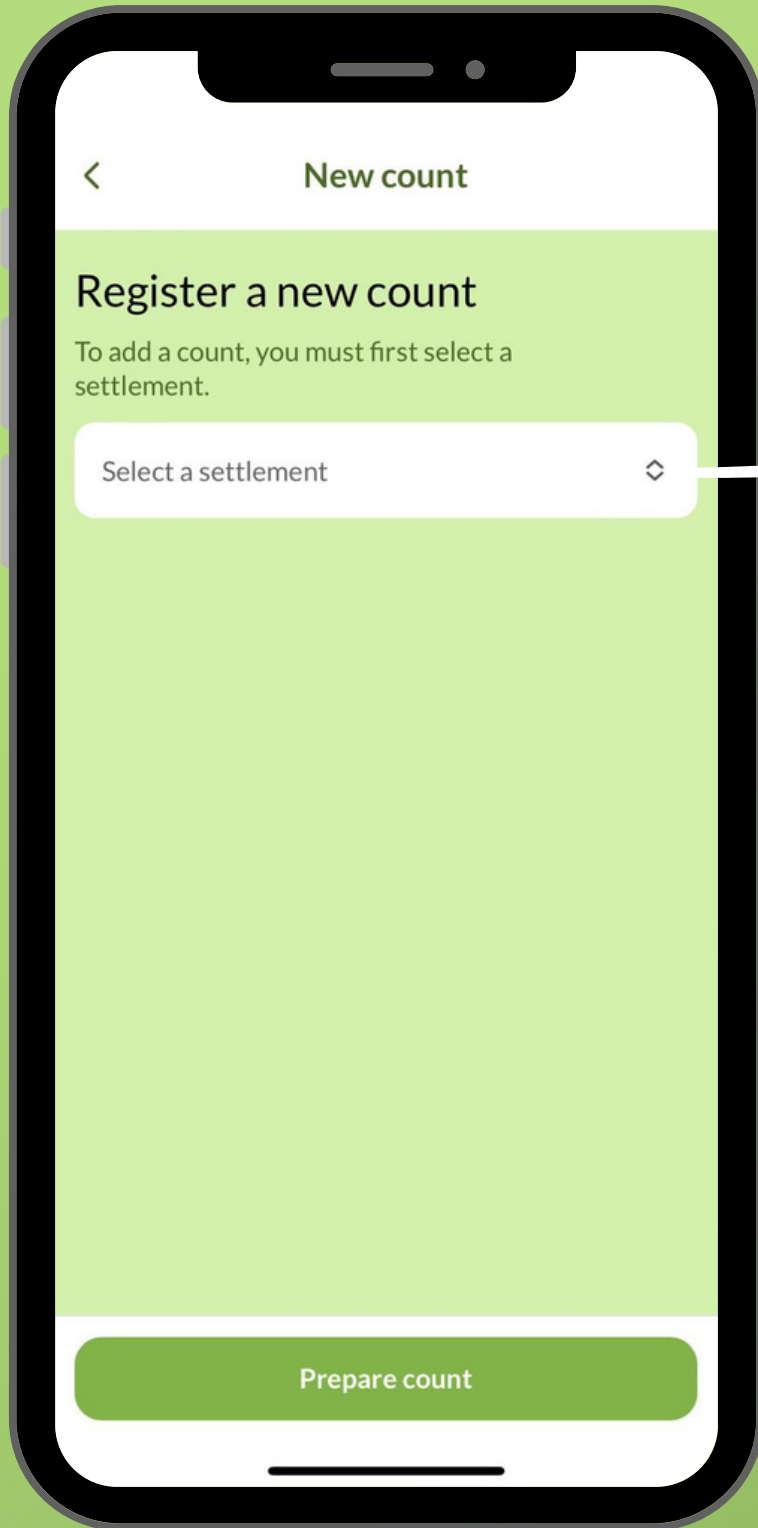


Start a count by clicking
Add count



@ihornetsapp
ihornetsapp@gmail.com

5. Start counting



Next, select the settlement in which you want to perform the count



@ihornetsapp
ihornetsapp@gmail.com

5. Start counting

Benlisquare, CC BY-SA 4.0.

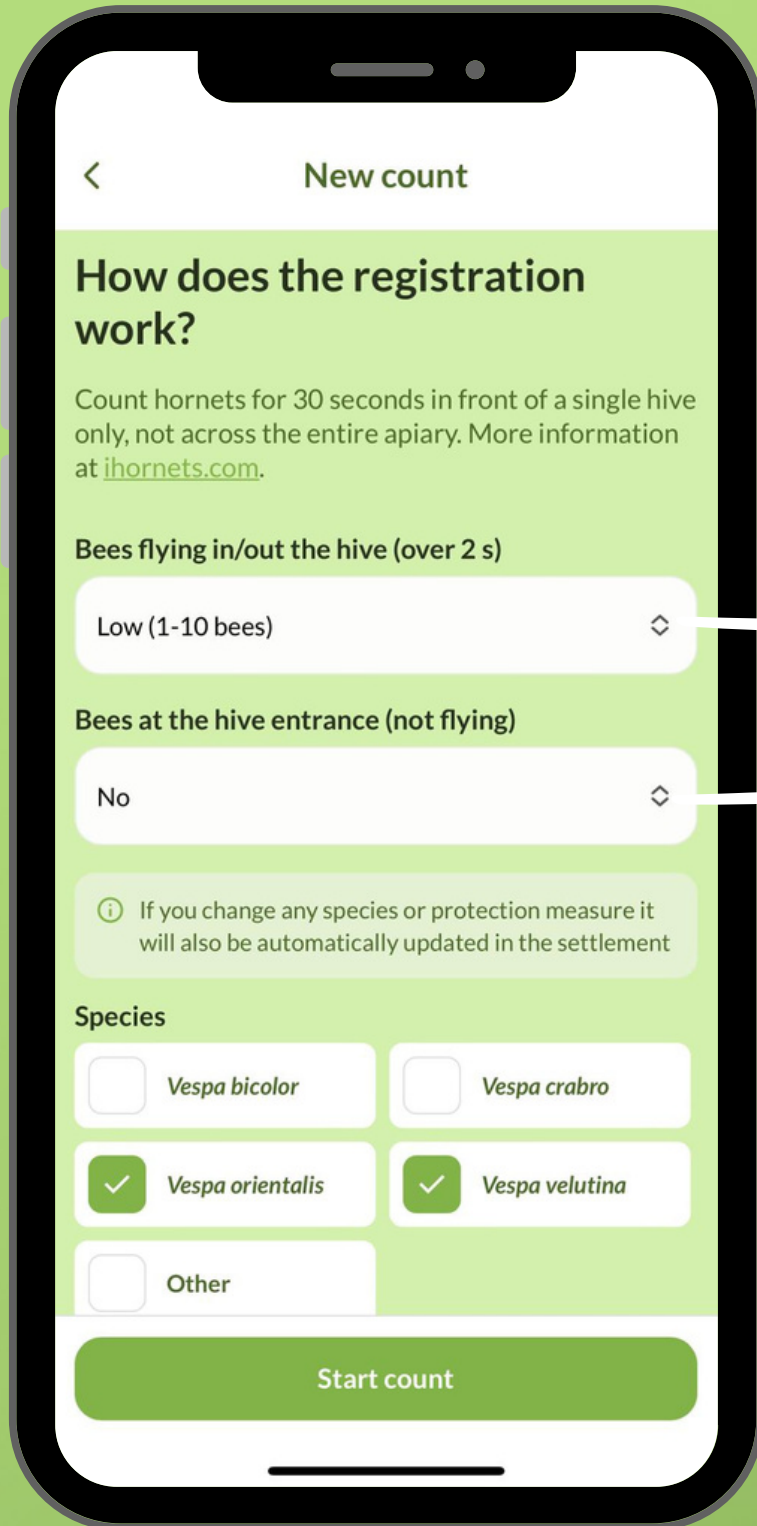


Select the level of observed **bee activity** based on the number of bees flying in and out the hive:

- *Null* (0 bees)
- *Low* (1-10 bees)
- *High* (>10 bees)

Indicate whether **bees are stopped at the entrance** of the hive:

- *Yes*
- *No*



< New count

How does the registration work?

Count hornets for 30 seconds in front of a single hive only, not across the entire apiary. More information at ihornets.com.

Bees flying in/out the hive (over 2 s)

Low (1-10 bees)

Bees at the hive entrance (not flying)

No

i If you change any species or protection measure it will also be automatically updated in the settlement

Species

☐ Vespa bicolor ☐ Vespa crabro

☒ Vespa orientalis ☒ Vespa velutina

☐ Other

Start count



@ihornetsapp
ihornetsapp@gmail.com

5. Start counting

< New count

No

If you change any species or protection measure it will also be automatically updated in the settlement

Species

☐ *Vespa bicolor* ☐ *Vespa crabro*

☒ *Vespa orientalis* ☒ *Vespa velutina*

☐ Other

Does the surveyed hive have protection measures?
If you don't apply any, no option needs to be marked.

☒ Koldo trap ☐ Electric harp

☐ Muzzle ☐ Trap with attractant

☐ Chemical trojans ☐ Other

Start count

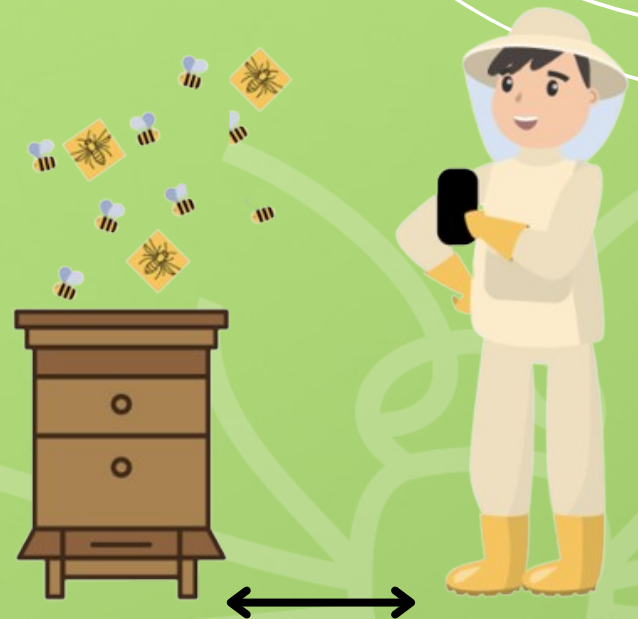
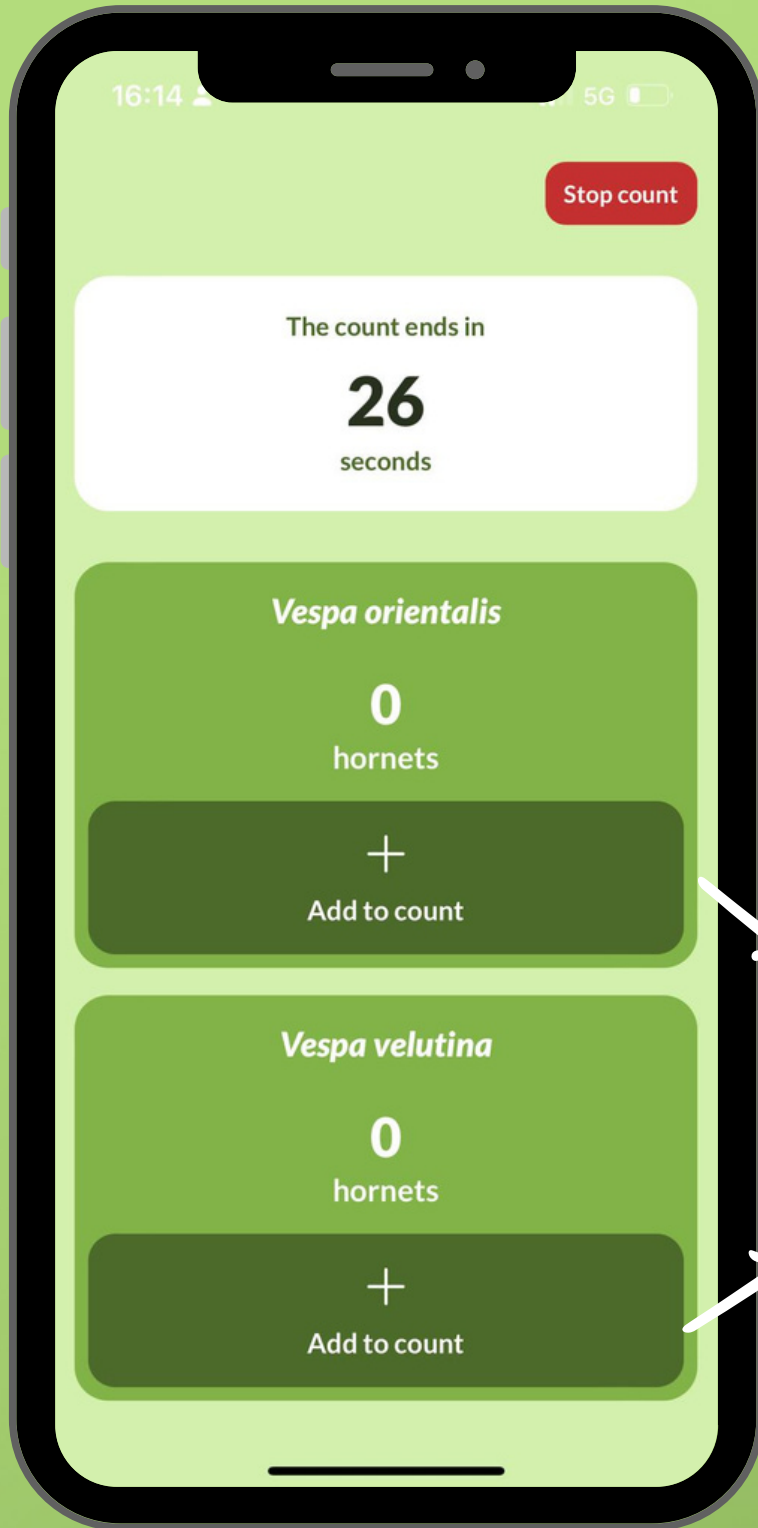
The hornet species and protection methods selected when creating the settlement are displayed here. Any changes made on this screen will be automatically updated in the settlement section

Click **Start count**



@ihornetsapp
ihornetsapp@gmail.com

5. Start counting



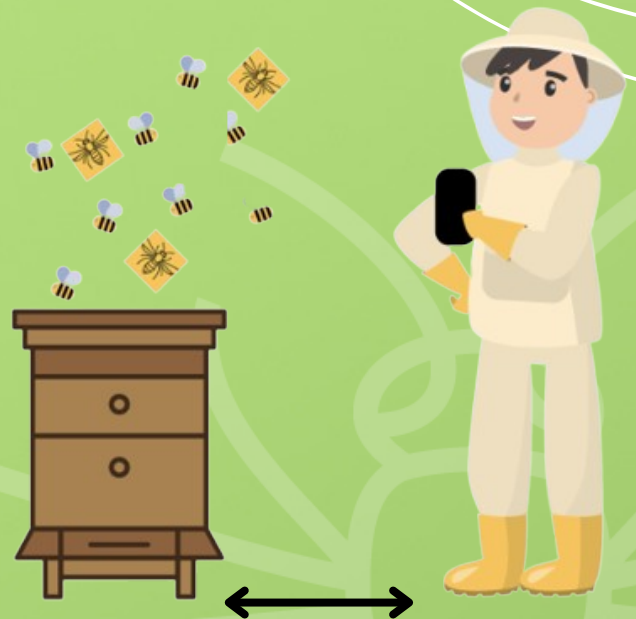
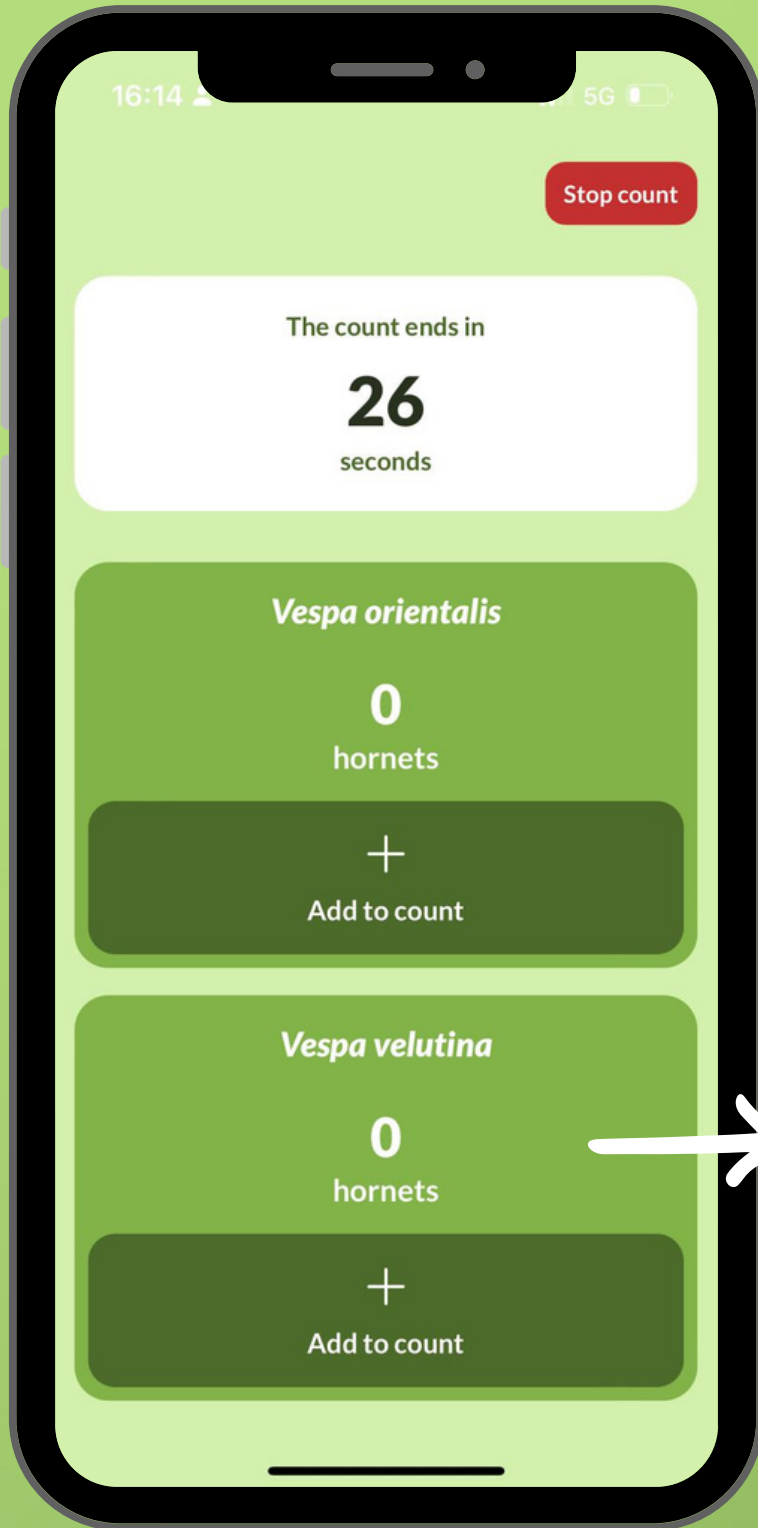
Stand 1-2 m from the hive

For 30 seconds, click the corresponding box each time you see a hornet of the selected species



@ihornetsapp
ihornetsapp@gmail.com

5. Start counting



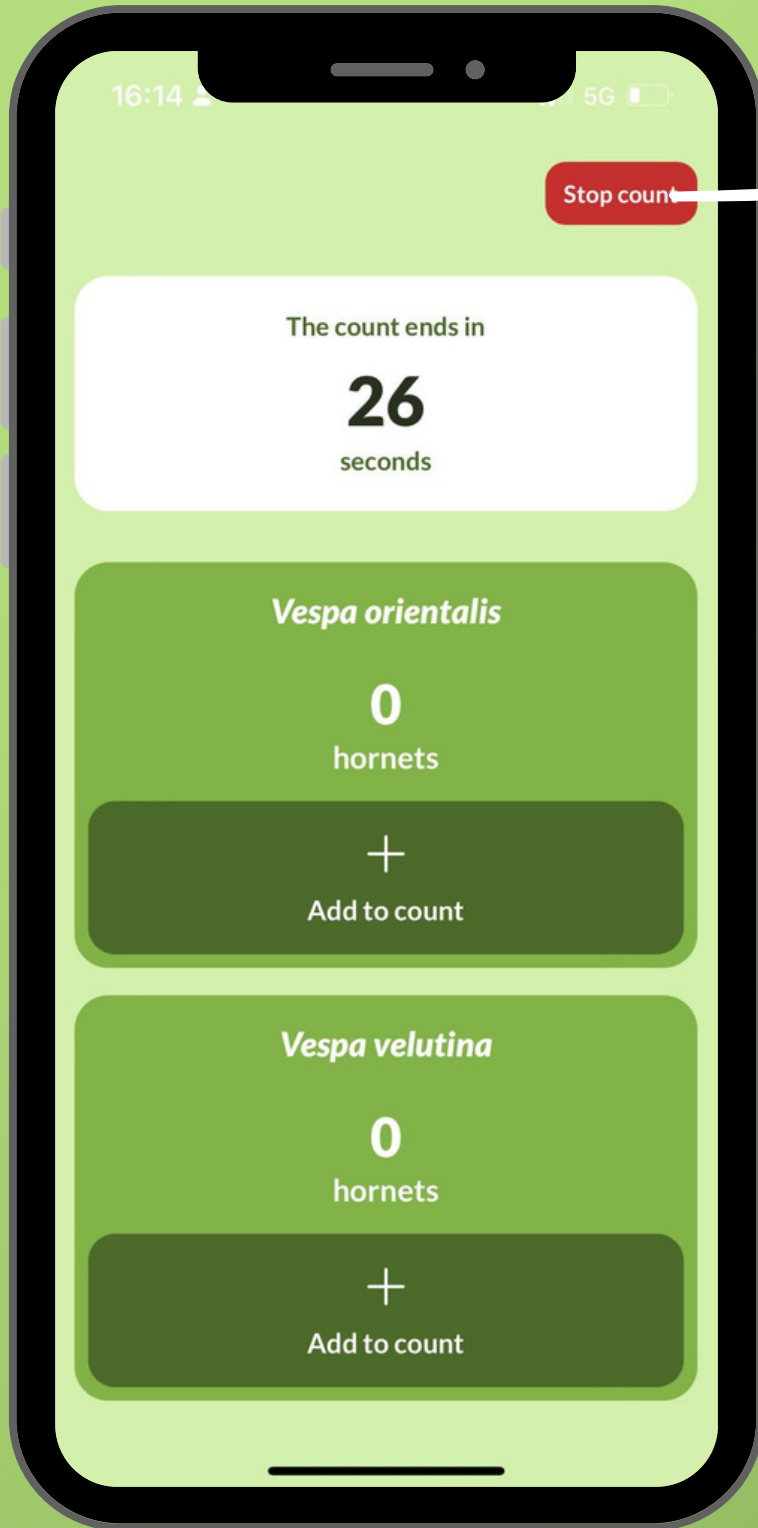
Stand 1-2 m from the hive

Please **limit your count to the hive in front of you**. If you do not observe any hornets during the 30-second counting period, this is still a valid and important result -even if hornets are visible near other hives. Remember, **zero counts matter** and are essential for detecting differences in hornet activity



@ihornetsapp
ihornetsapp@gmail.com

5. Start counting

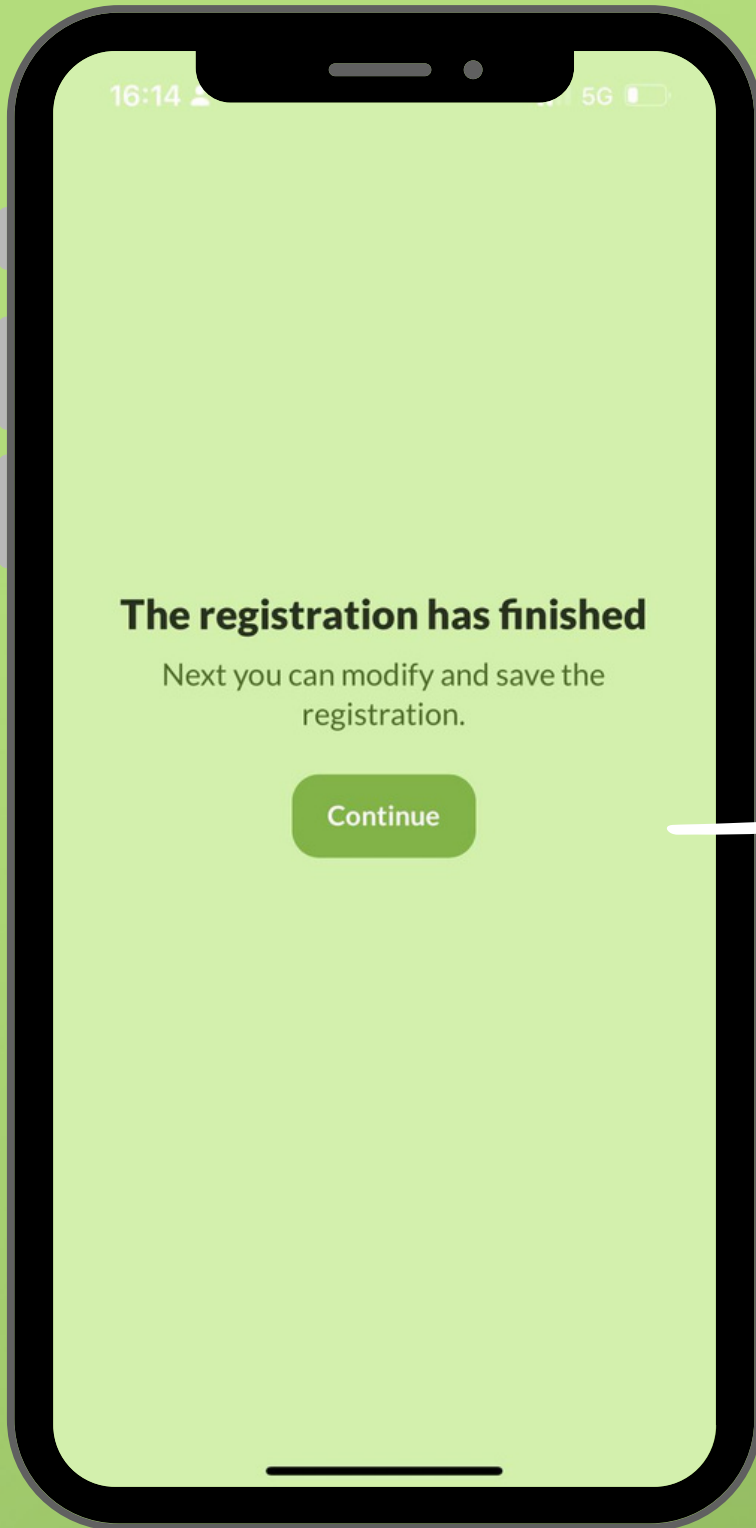


You can stop the count at any time if you encounter a problem



@ihornetsapp
ihornetsapp@gmail.com

6. Save a count



Once the 30-second count is complete, review the information and make any necessary changes before saving. This helps ensure that the record is accurate



@ihornetsapp
ihornetsapp@gmail.com

6. Save a count

< Save count

Bees flying in/out the hive (over 2 s)

Low (1-10 bees)

Bees at the hive entrance (not flying)

No

Does the surveyed hive have protection measures?
If you don't apply any, no option needs to be marked.

Koldo trap Electric harp

Muzzle Trap with attractant

Chemical trojans Other

Number of hornets of the species *Vespa orientalis*

1

Number of hornets of the species *Vespa velutina*

0

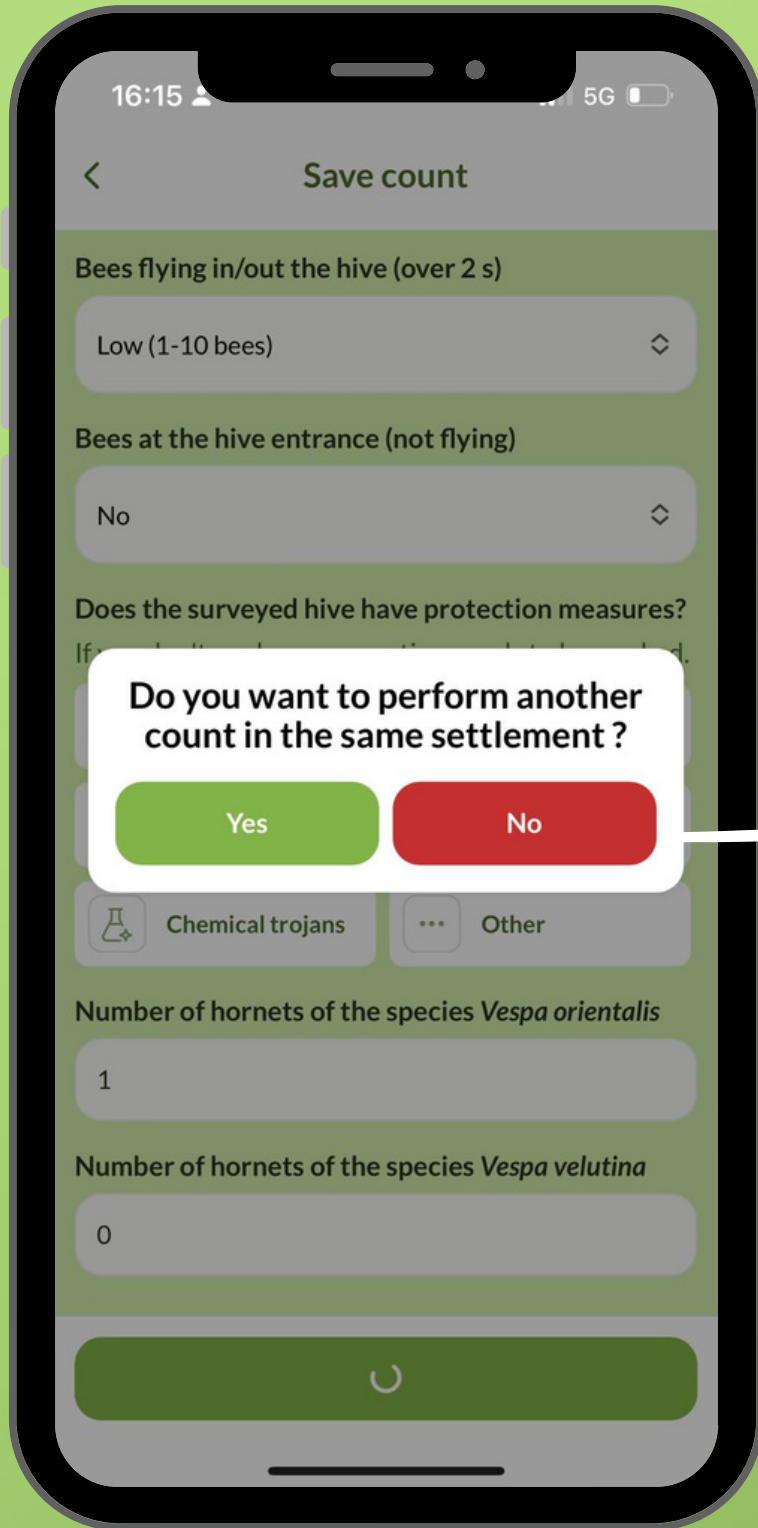
Save count

You must click **Save count** to ensure the count is recorded



@ihornetsapp
ihornetsapp@gmail.com

7. Continue counting



16:15 5G

< Save count

Bees flying in/out the hive (over 2 s)

Low (1-10 bees)

Bees at the hive entrance (not flying)

No

Does the surveyed hive have protection measures?

If:

Do you want to perform another count in the same settlement?

Yes No

Chemical trojans ... Other

Number of hornets of the species *Vespa orientalis*

1

Number of hornets of the species *Vespa velutina*

0

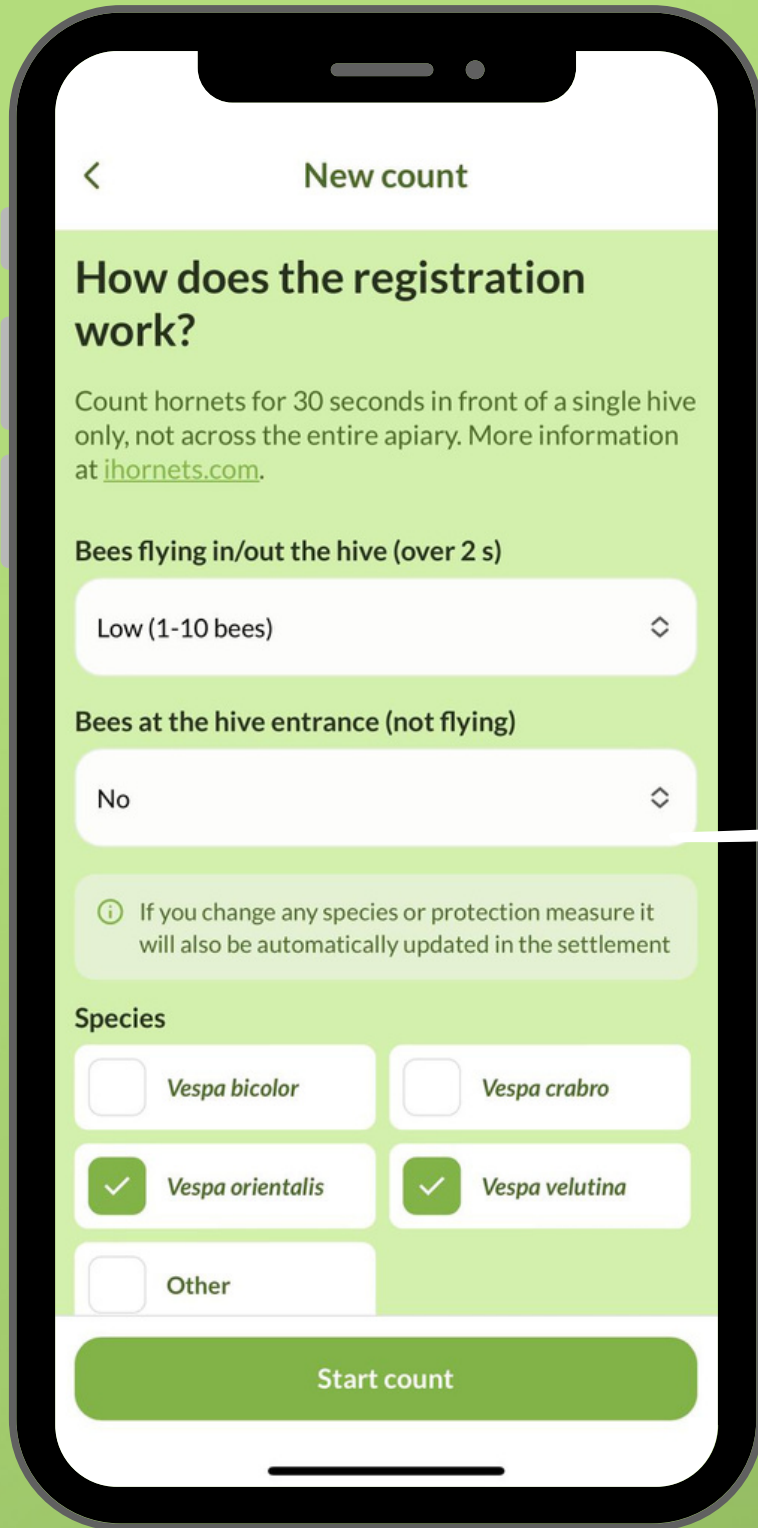
⌂

Once the count has been saved, you will be asked whether you want to **record another count**



@ihornetsapp
ihornetsapp@gmail.com

7. Continue counting



< New count

How does the registration work?

Count hornets for 30 seconds in front of a single hive only, not across the entire apiary. More information at ihornets.com.

Bees flying in/out the hive (over 2 s)

Low (1-10 bees)

Bees at the hive entrance (not flying)

No

If you change any species or protection measure it will also be automatically updated in the settlement

Species

☐ *Vespa bicolor* ☐ *Vespa crabro*

☒ *Vespa orientalis* ☒ *Vespa velutina*

☐ Other

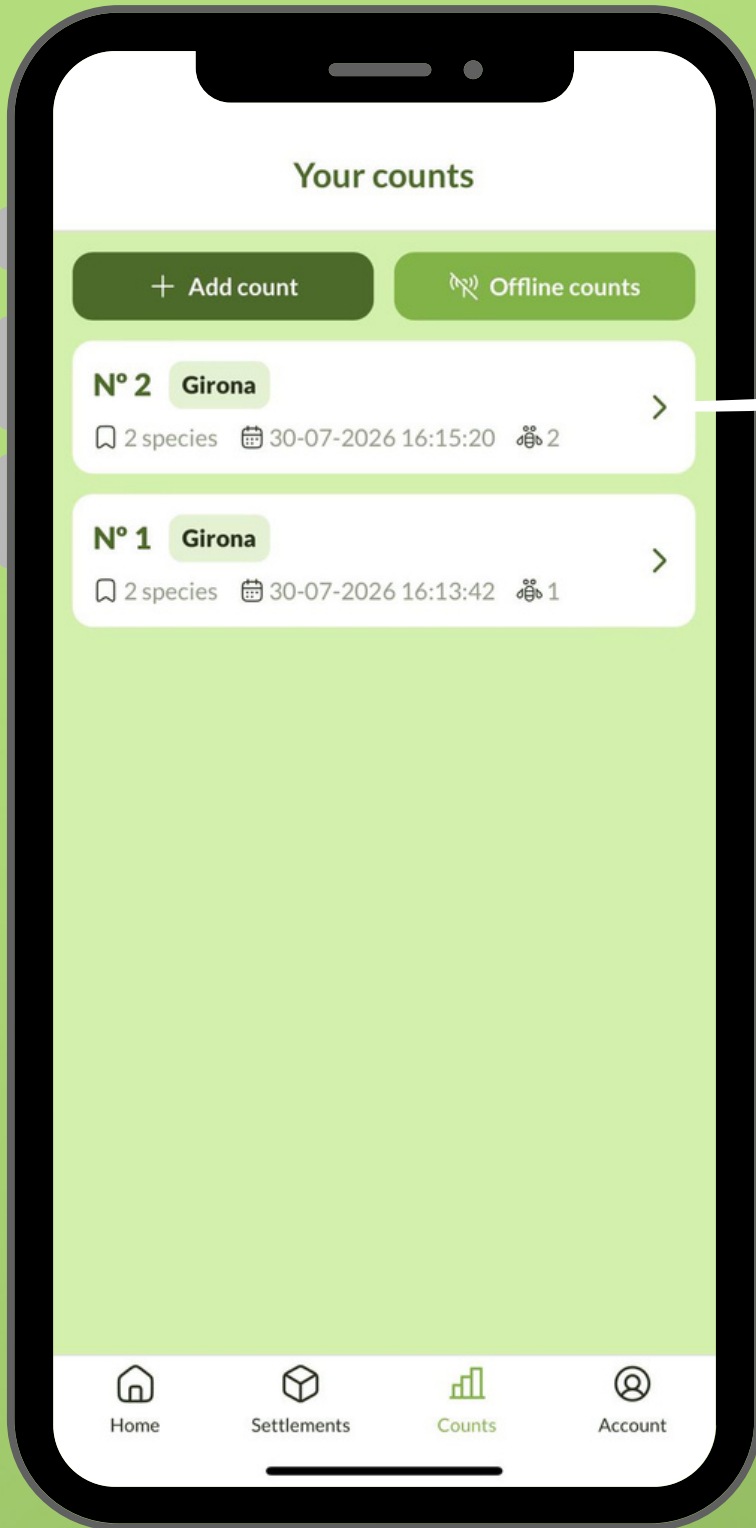
Start count

To make data entry easier, the new count will inherit the information from the previous one. You can modify it before starting the next count



@ihornetsapp
ihornetsapp@gmail.com

8. Delete a counting

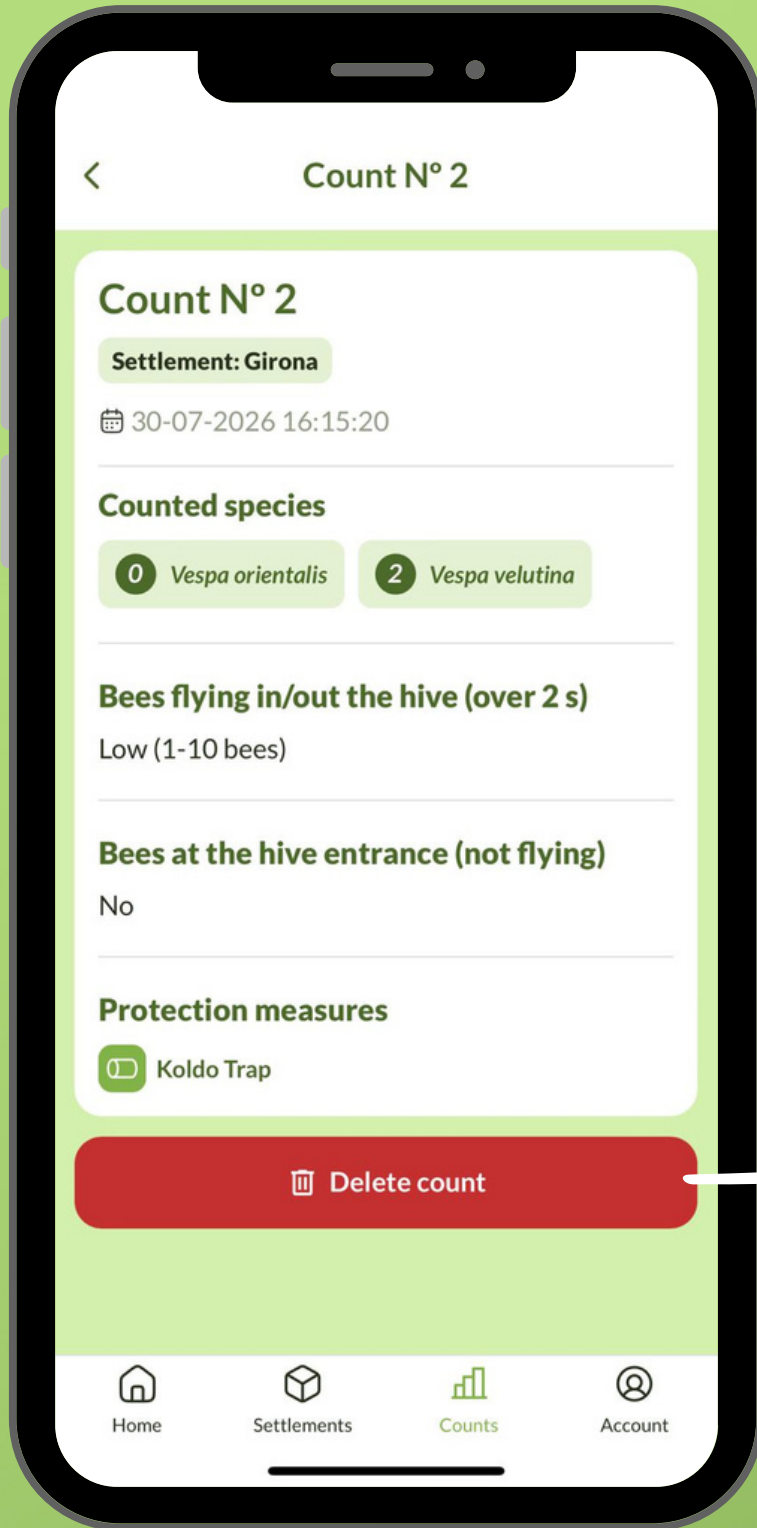


If you realize that you made an error during the count after you have already saved it, you can delete the count by selecting it from the list of counts



@ihornetsapp
ihornetsapp@gmail.com

8. Delete a counting

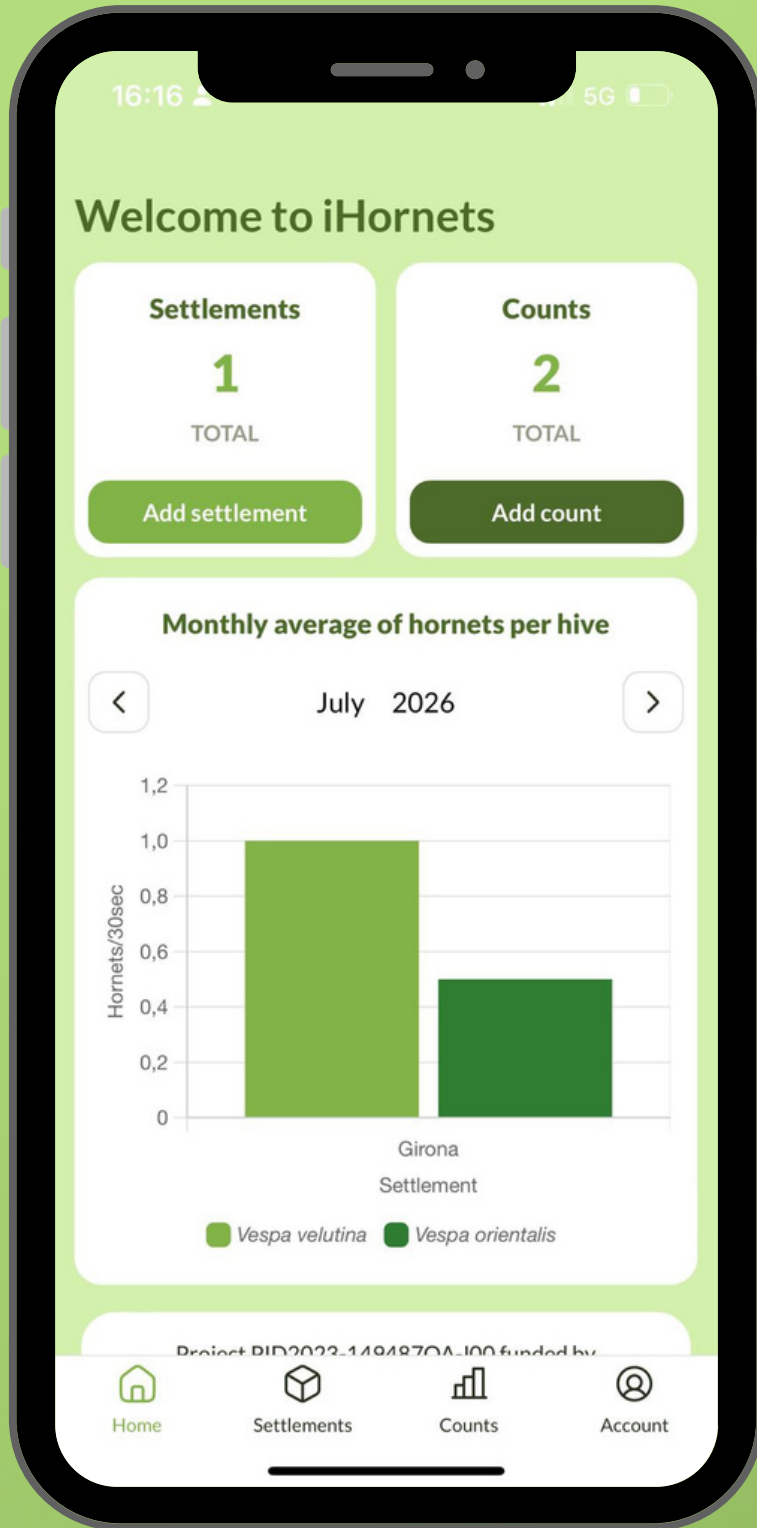


Once the count is selected, click the **Delete count** button



@ihornetsapp
ihornetsapp@gmail.com

9. Home page



The home page displays a **summary of the created settlements and recorded hornet counts**, as well as a graph showing the average monthly hornet activity for each apiary



@ihornetsapp
ihornetsapp@gmail.com

10. Doubts?

If you have any questions
about using the app or
encounter any problems,
please contact us at:

ihornetsapp@gmail.com



@ihornetsapp
ihornetsapp@gmail.com

Funding

Developed by:



Universitat
de les Illes Balears

CTFC



in collaboration with:



**INSTITUUT
NATUUR- EN
BOSONDERZOEK**



**UNIVERSITÀ
DI PISA**



**Centro de
Investigação
de Montanha**

**université
de TOURS**

Funder: Project PID2023-149487OA-I00,
funded by MICIU/AEI/10.13039/501100011033
and by FEDER/UE.



@ihornetsapp
ihornetsapp@gmail.com