

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.

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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 during a 30-second period.

3. Repeat the process

Repeat the count on additional hives (minimum: 5 hives per apiary).

IMPORTANT

- Counts must always be conducted on a SINGLE hive.
- Counts for the entire apiary should NOT be recorded.
- Observations with ZERO hornets are also extremely important and must 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



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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.

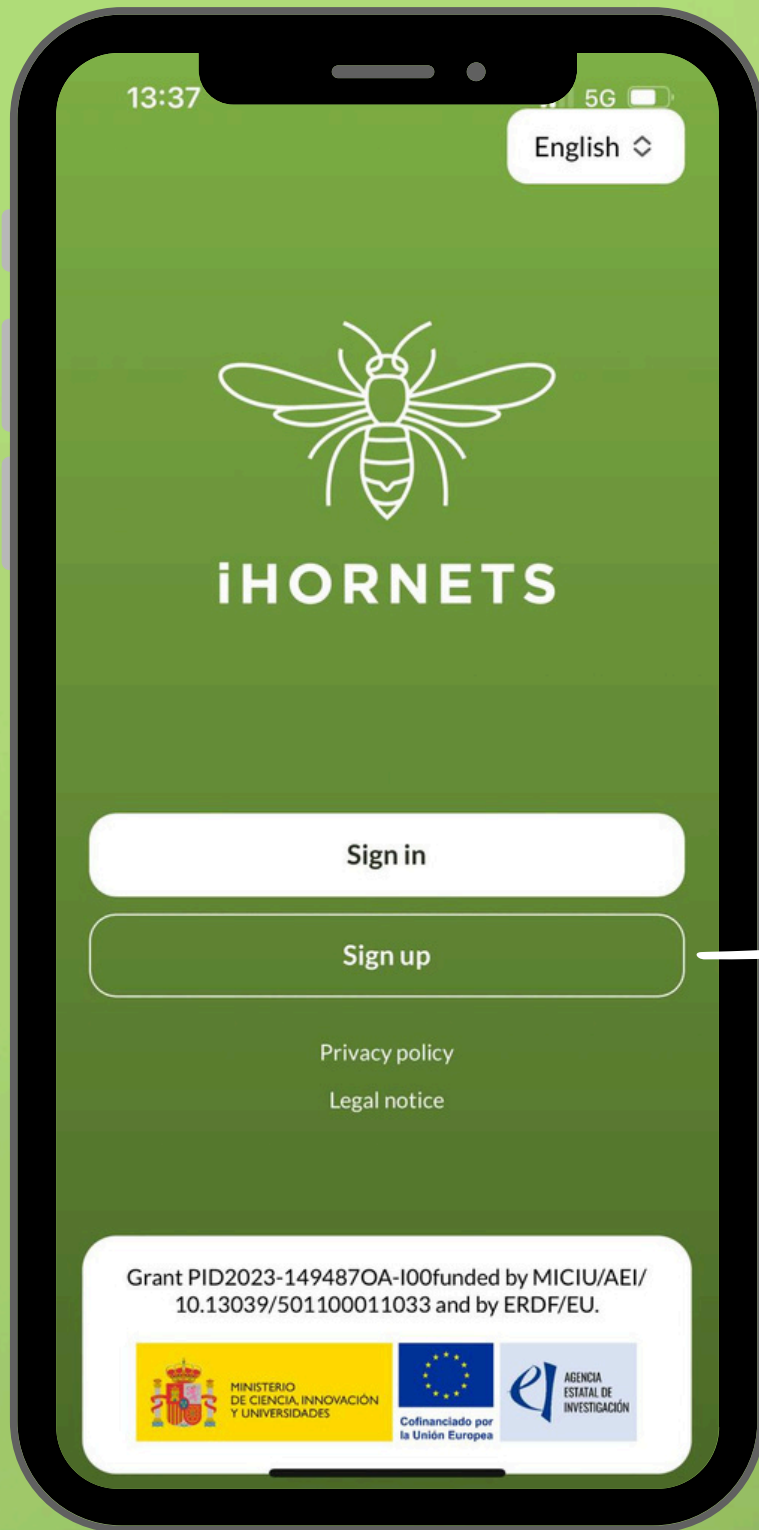
The tutorial will guide you through:

- Sign up (p5)
- Create a settlement (p7)
- Edit a settlement (p10)
- Start counting (p11)
- Save a count (p18)
- Continue counting (p20)
- Delete a counting (p22)
- Home page (p24)

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



1. Sign up

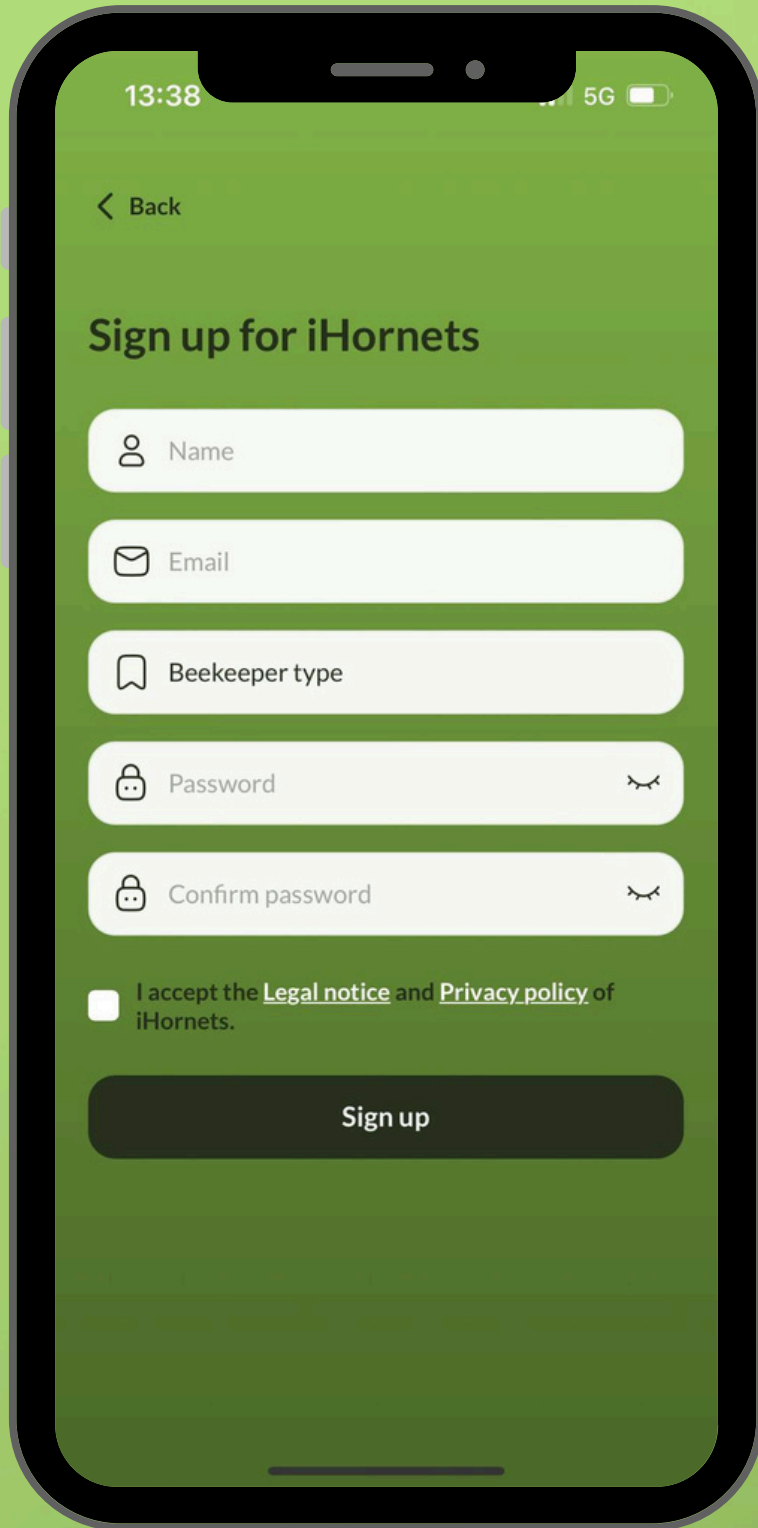


→ **Sign up** to register



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1. Sign up



13:38 5G

< Back

Sign up for iHornets

 Name

 Email

 Beekeeper type

 Password 

 Confirm password 

☐ I accept the [Legal notice](#) and [Privacy policy](#) of iHornets.

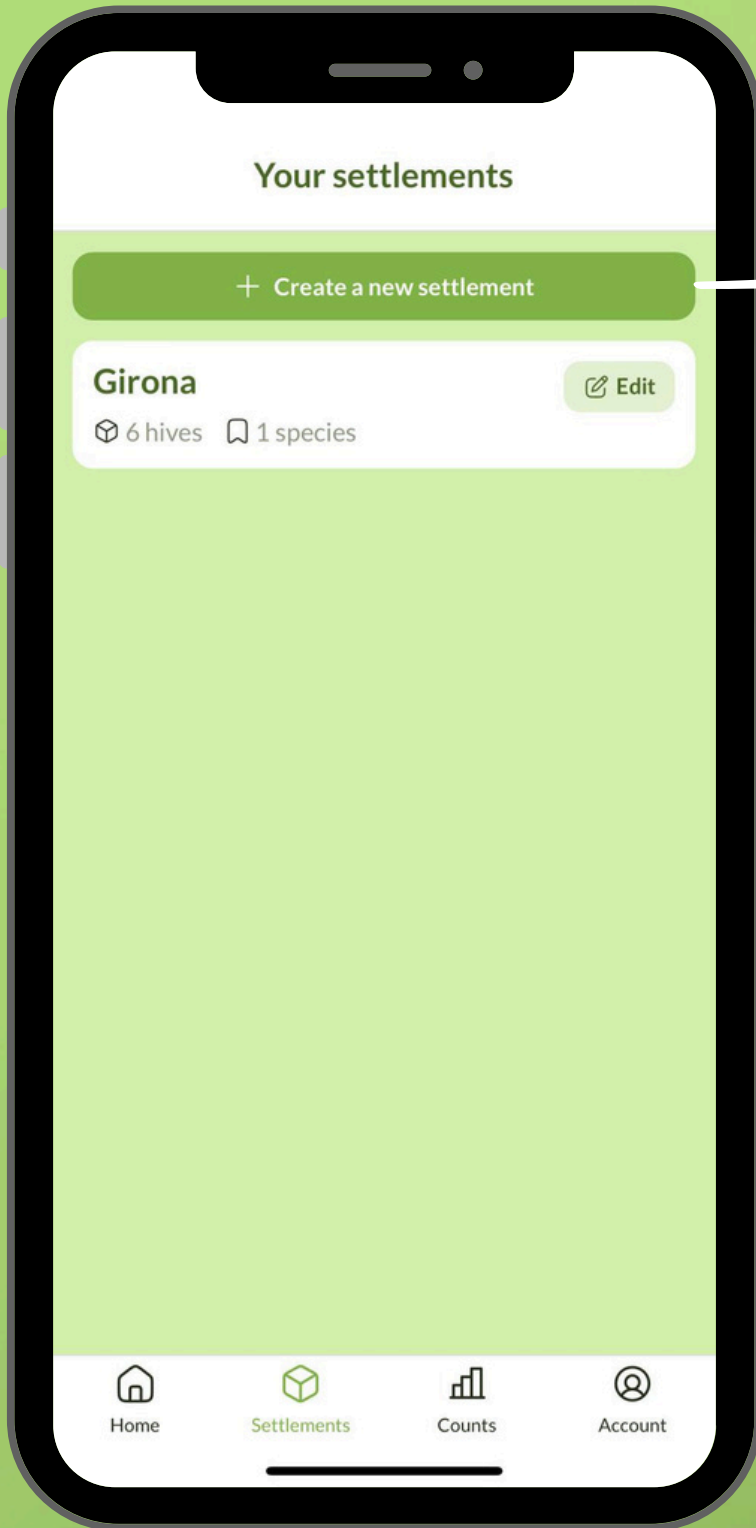
Sign up

Enter your **name**, **email**, and **password**, choose your **beekeeper type** (*professional, non-professional, or self-consumption based on the number of hives*) and **sign up** to use the app



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2. Create a settlement



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



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2. Create a settlement

< New settlement

Settlement name

Puig Roca

Number of hives

6

Municipality

Palamós, Espanya

☒ Mark position on map

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

Map showing the location of the settlement (Palamós, Espanya).

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**



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2. Create a settlement

< New settlement

☐ Mark position on map

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

Species types
Select the species you want to count.

☒ *Vespa velutina* ☐ *Vespa orientalis*

☐ *Vespa bicolor* ☐ *Vespa crabro*

☐ Others

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

☒ Koldo trap ☐ Electric harp

☐ Muzzle ☐ Trap with attractant

☐ Others

Create settlement

Home Settlements Counts Account

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

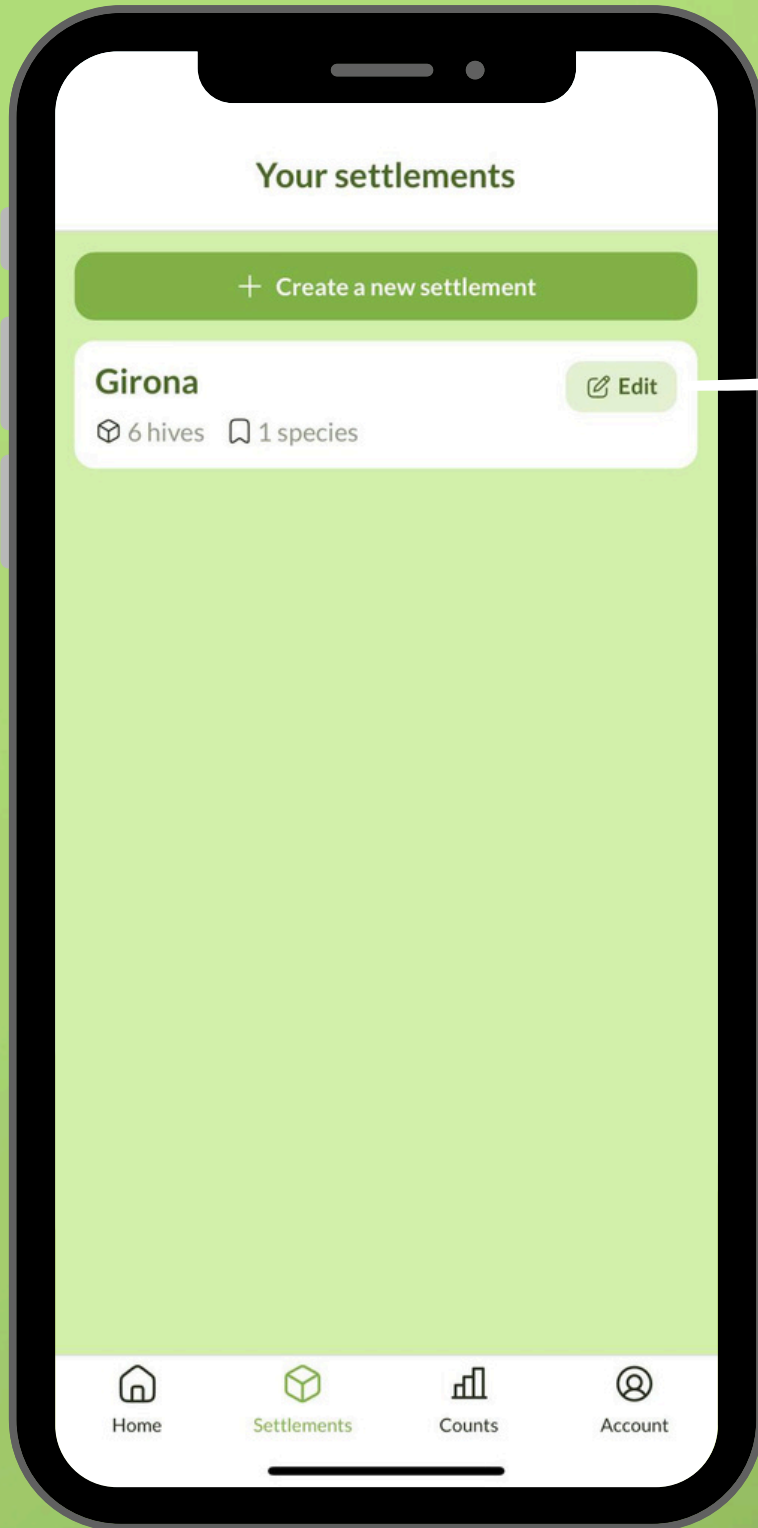
Next, select the **protection method** used in the apiary. If none applies, leave the selection empty. If the method is not listed, choose "Other" and specify it.

Finally, click "Create settlement"



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3. Edit a settlement

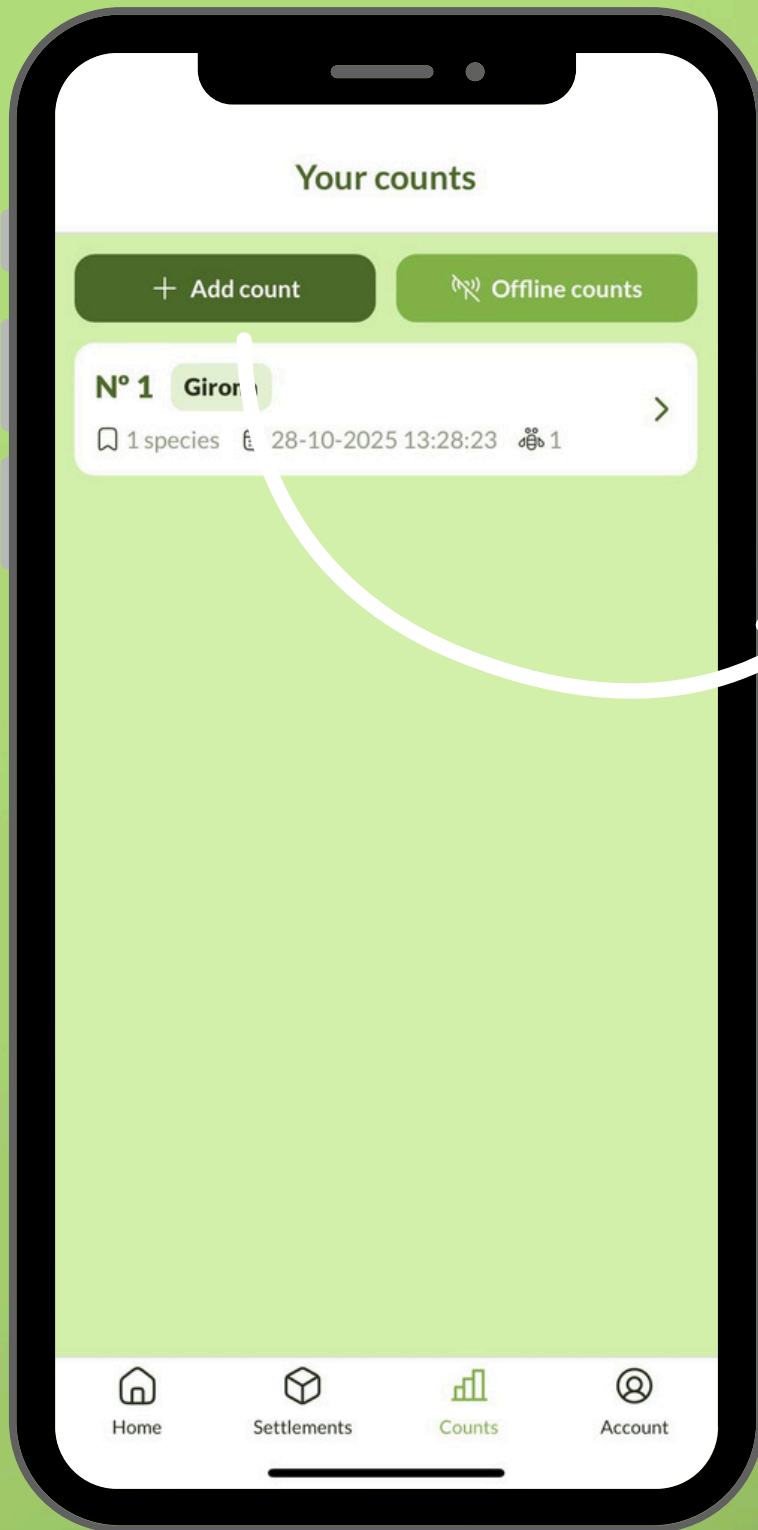


To modify an existing apiary, click the **Edit** button on the right



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4. Start counting

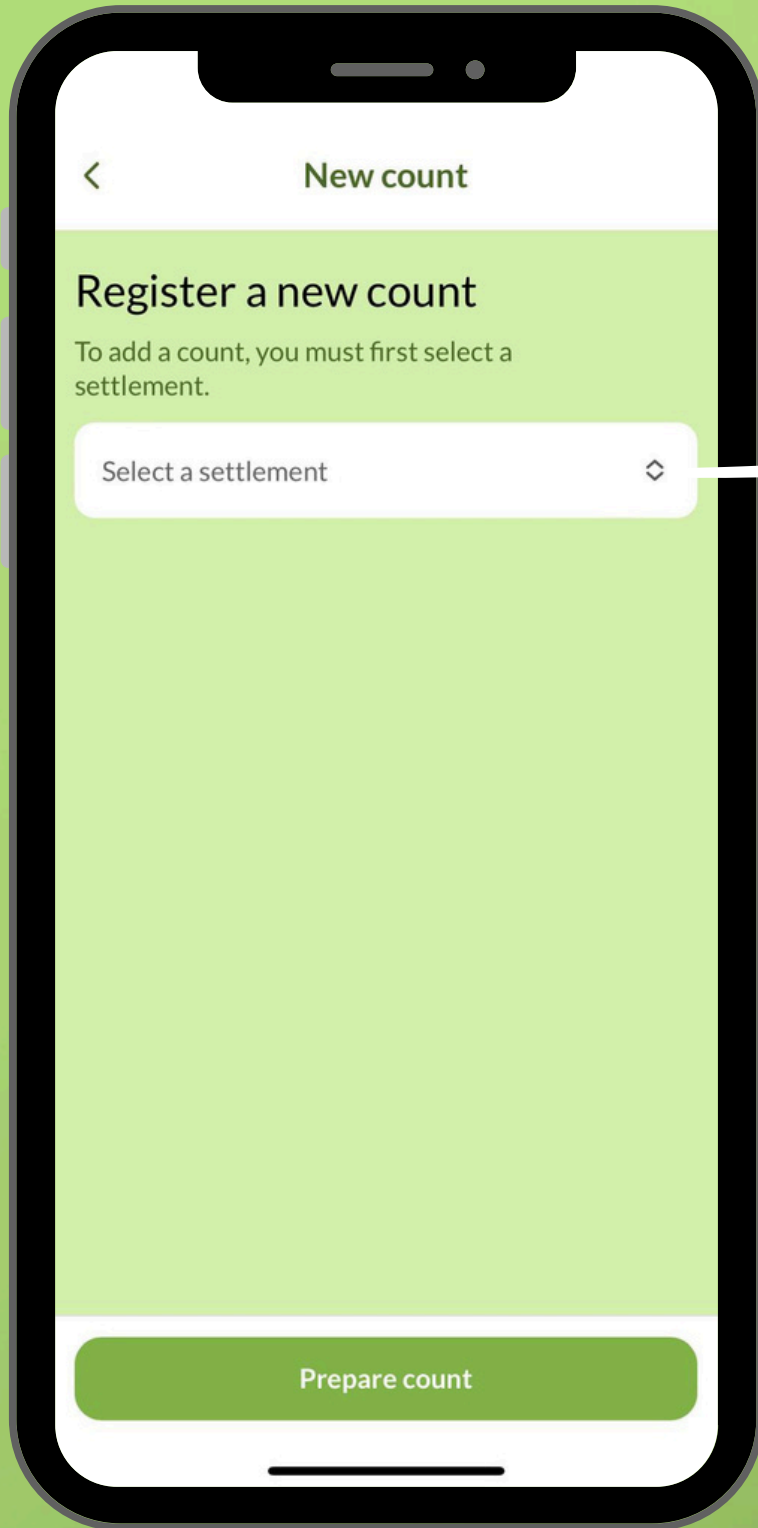


Start a count by clicking
Add count



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4. Start counting



The image shows a smartphone screen with a white header bar containing a back arrow and the text "New count". Below the header, the screen has a light green background. The main heading is "Register a new count", followed by the instruction "To add a count, you must first select a settlement." Below this is a white rectangular selection box with the placeholder text "Select a settlement" and a small diamond icon on the right. At the bottom of the screen is a green button with the text "Prepare count".

Next, select the settlement in which to perform the count



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4. Start counting

Benlisquare, CC BY-SA 4.0.

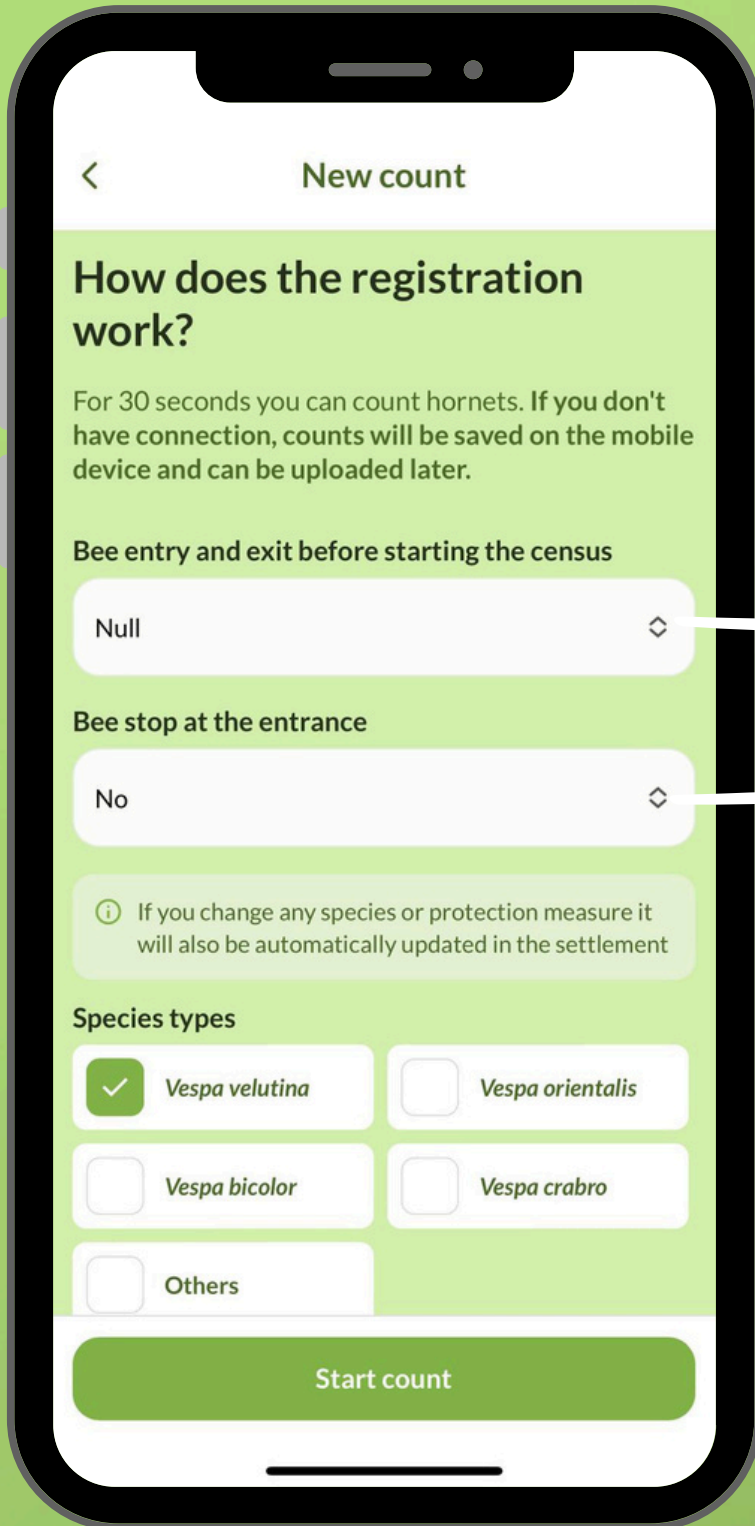


Select the level of observed **bee activity** based on the number of bees entering and exiting the hive:

- *null* (0 bees)
- *low* (1-5 bees)
- *high* (>5 bees)

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

- *yes*
- *no*



The screenshot shows the 'New count' screen of the app. At the top, there is a back arrow and the title 'New count'. Below this, a section titled 'How does the registration work?' explains that for 30 seconds, users can count hornets, and counts will be saved on the mobile device if there is no connection. The main form has two dropdown menus: 'Bee entry and exit before starting the census' with 'Null' selected, and 'Bee stop at the entrance' with 'No' selected. Below these is an information box stating that changing species or protection measures will update the settlement. The 'Species types' section has five options: 'Vespa velutina' (checked), 'Vespa orientalis', 'Vespa bicolor', 'Vespa crabro', and 'Others'. At the bottom is a green 'Start count' button.



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4. Start counting

< New count

Bee stop at the entrance

No

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

Species types

☒ *Vespa velutina* ☐ *Vespa orientalis*

☐ *Vespa bicolor* ☐ *Vespa crabro*

☐ Others

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

☒ Koldo trap ☐ Electric harp

☐ Muzzle ☐ Trap with attractant

☐ Others

Start count

The species and protection methods entered during the creation of the settlement will be displayed here.

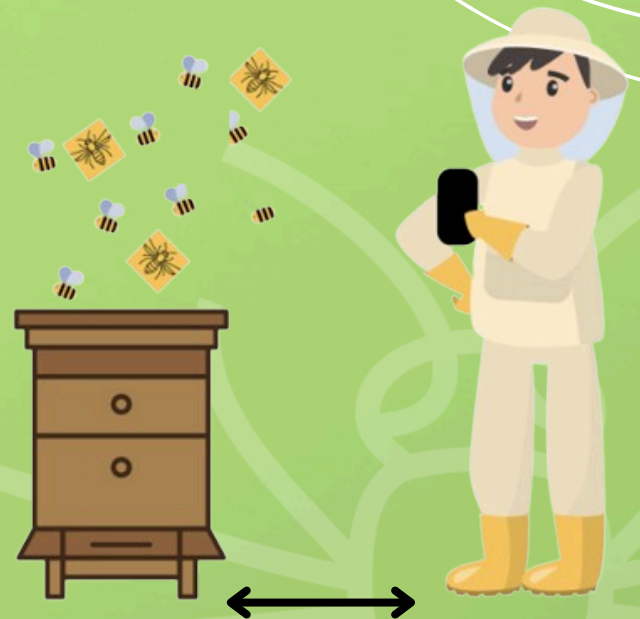
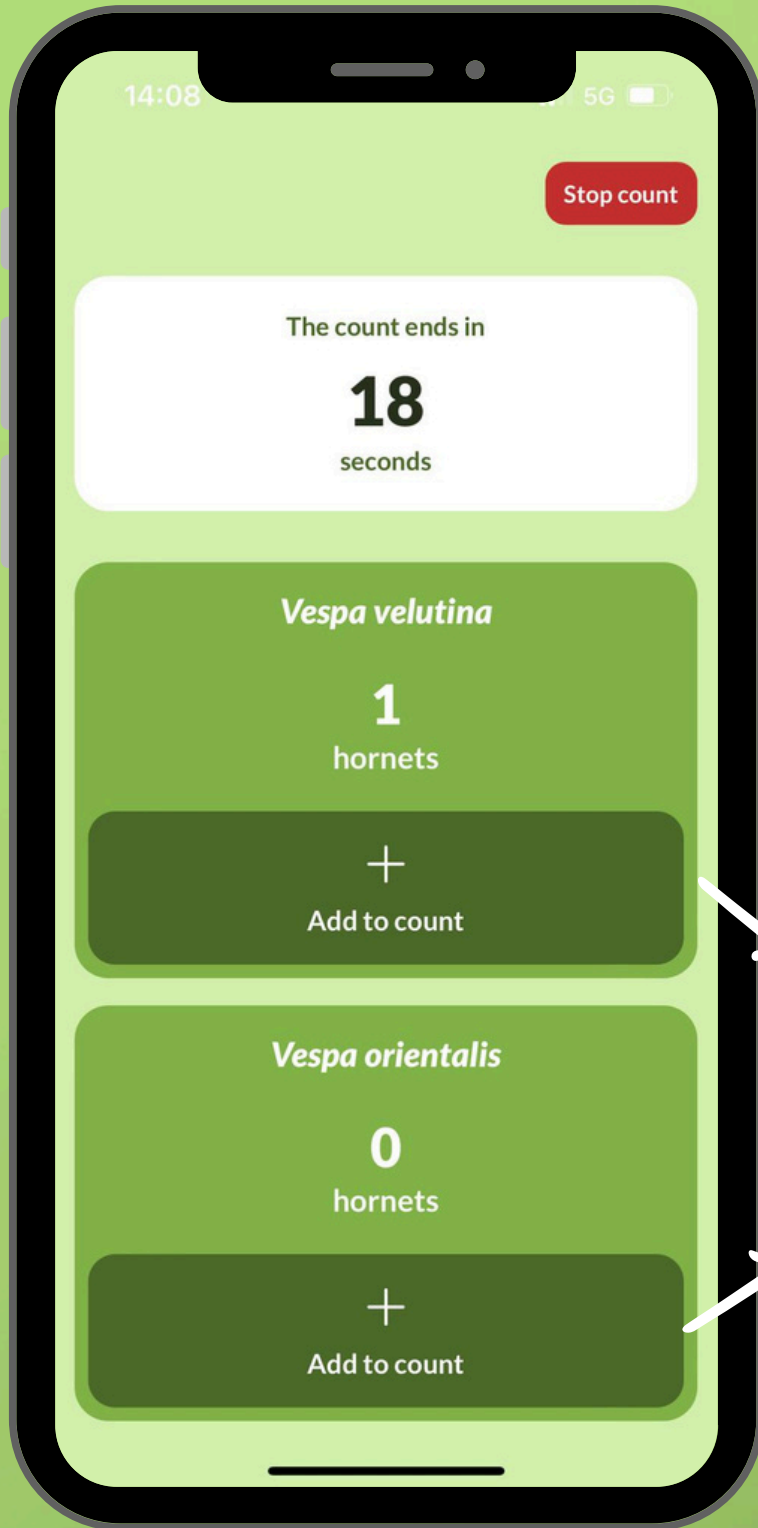
Any modifications will be automatically updated in the settlement information

Click **Start count**



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4. Start counting



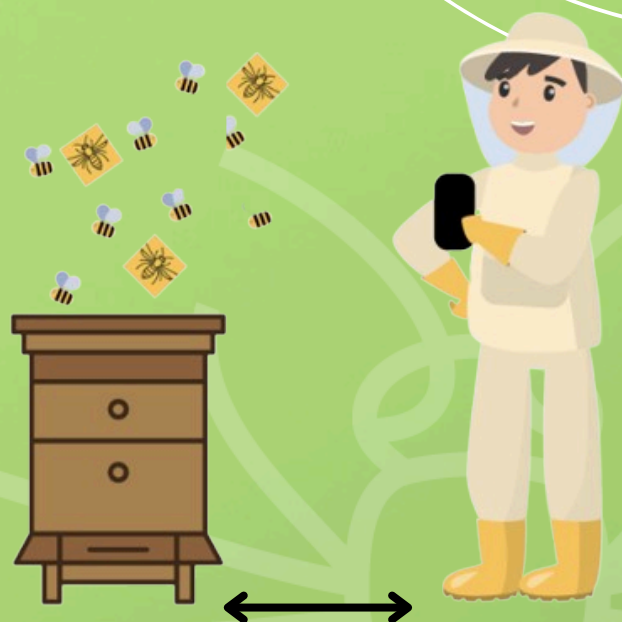
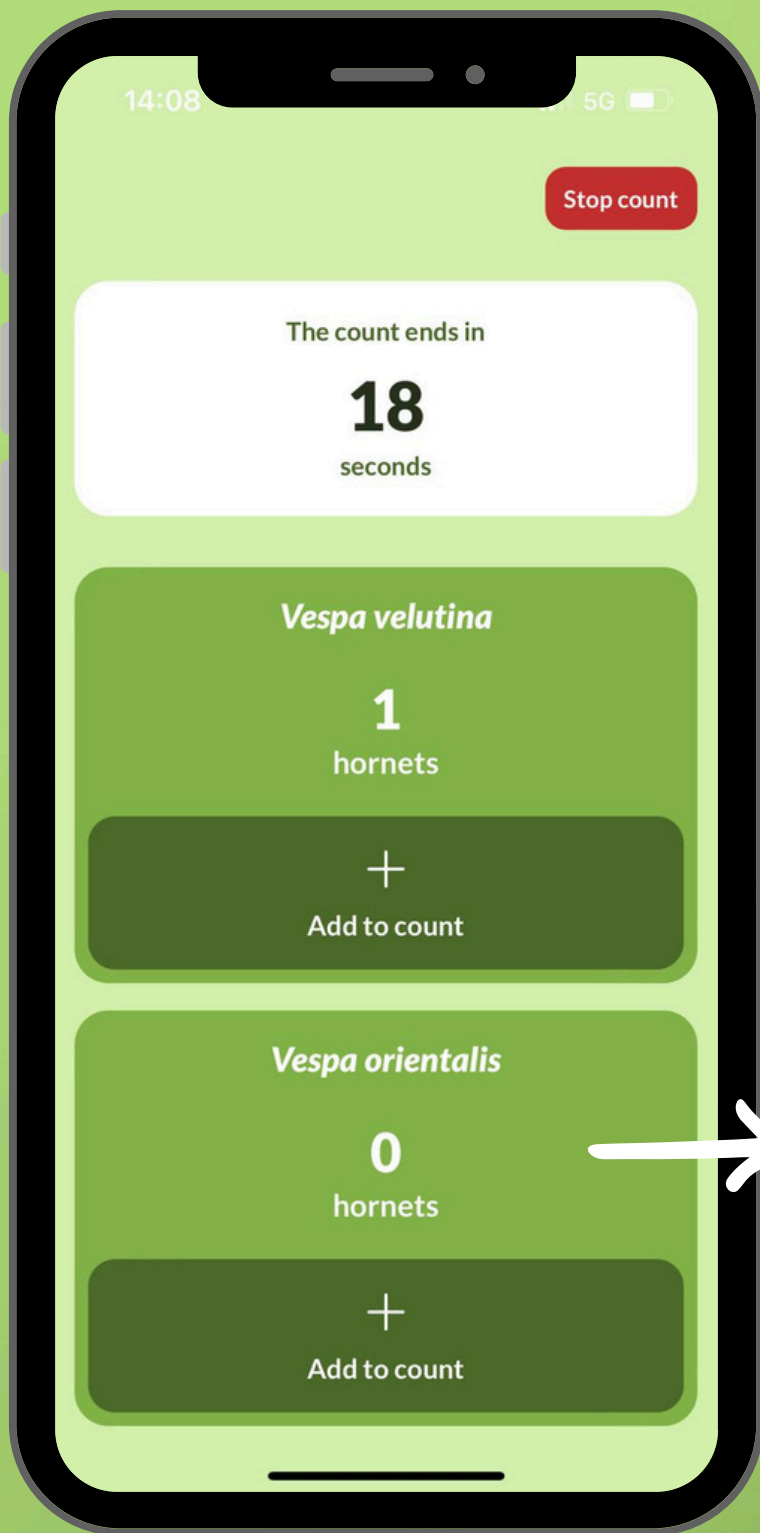
Stand 1-2 m from the hive

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



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4. Start counting



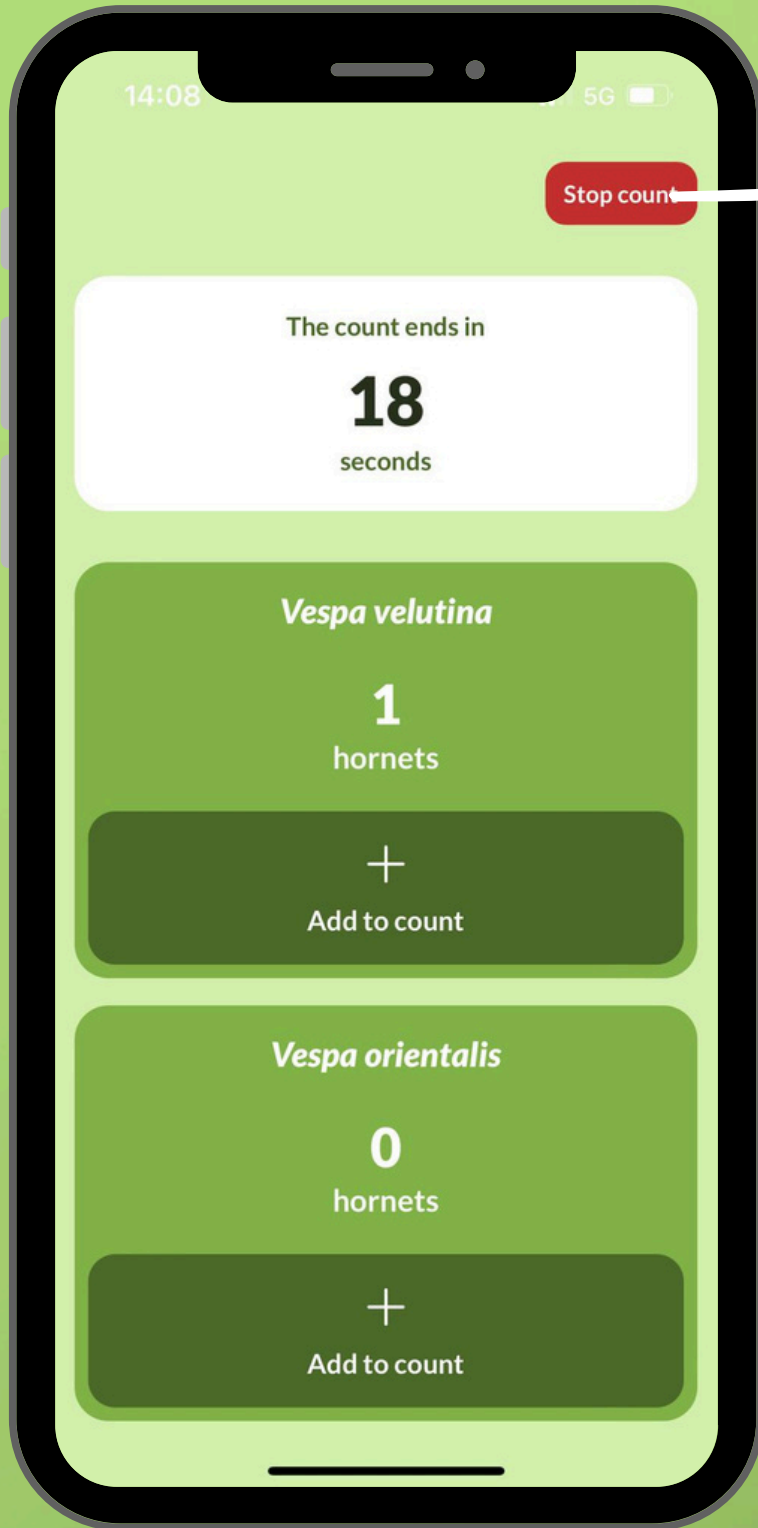
Stand 1-2 m from the hive

Please **limit your count to the hive in front of you**. If you do not observe any hornets during the 30-second period, this still represents 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.



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4. Start counting

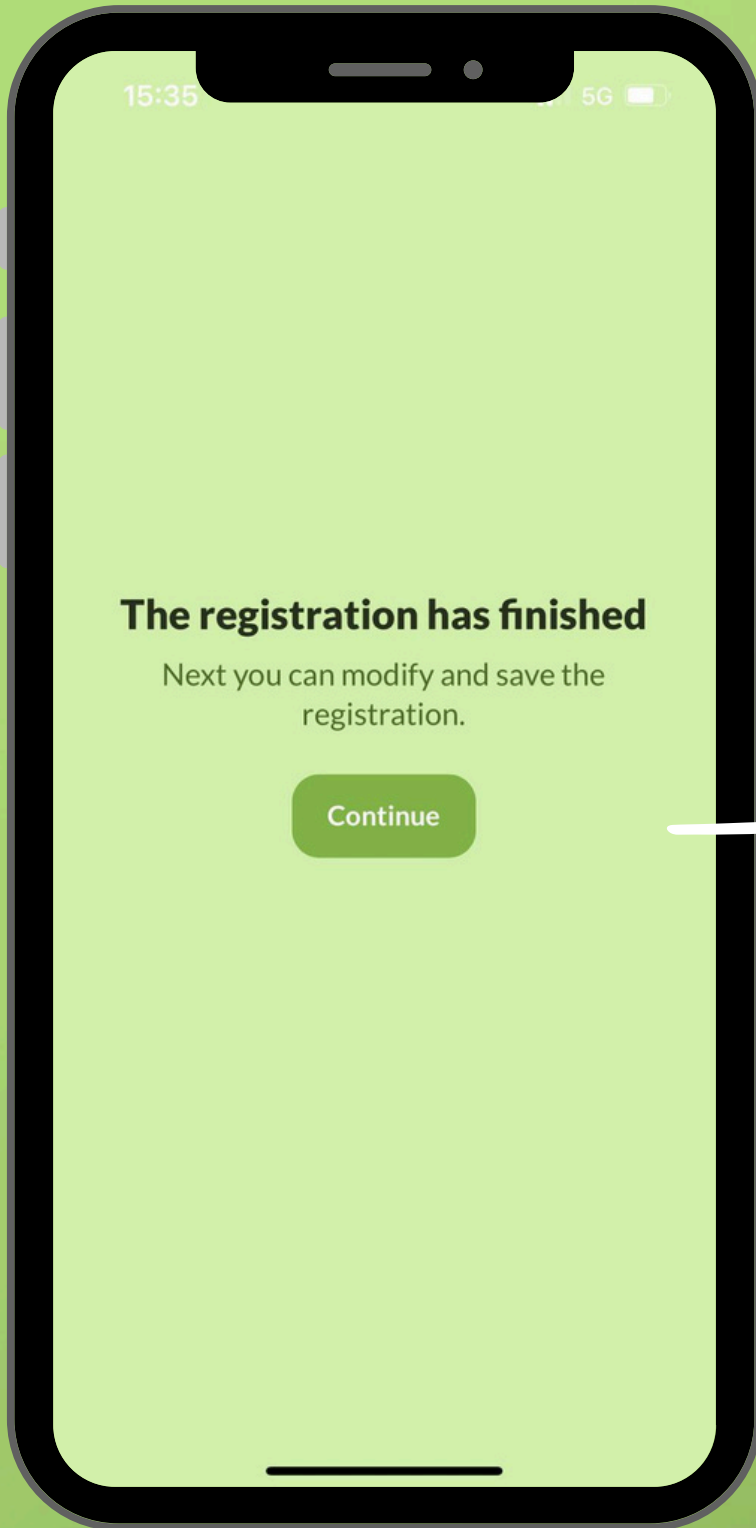


You can stop the count at any time if you encounter a problem



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5. Save a count

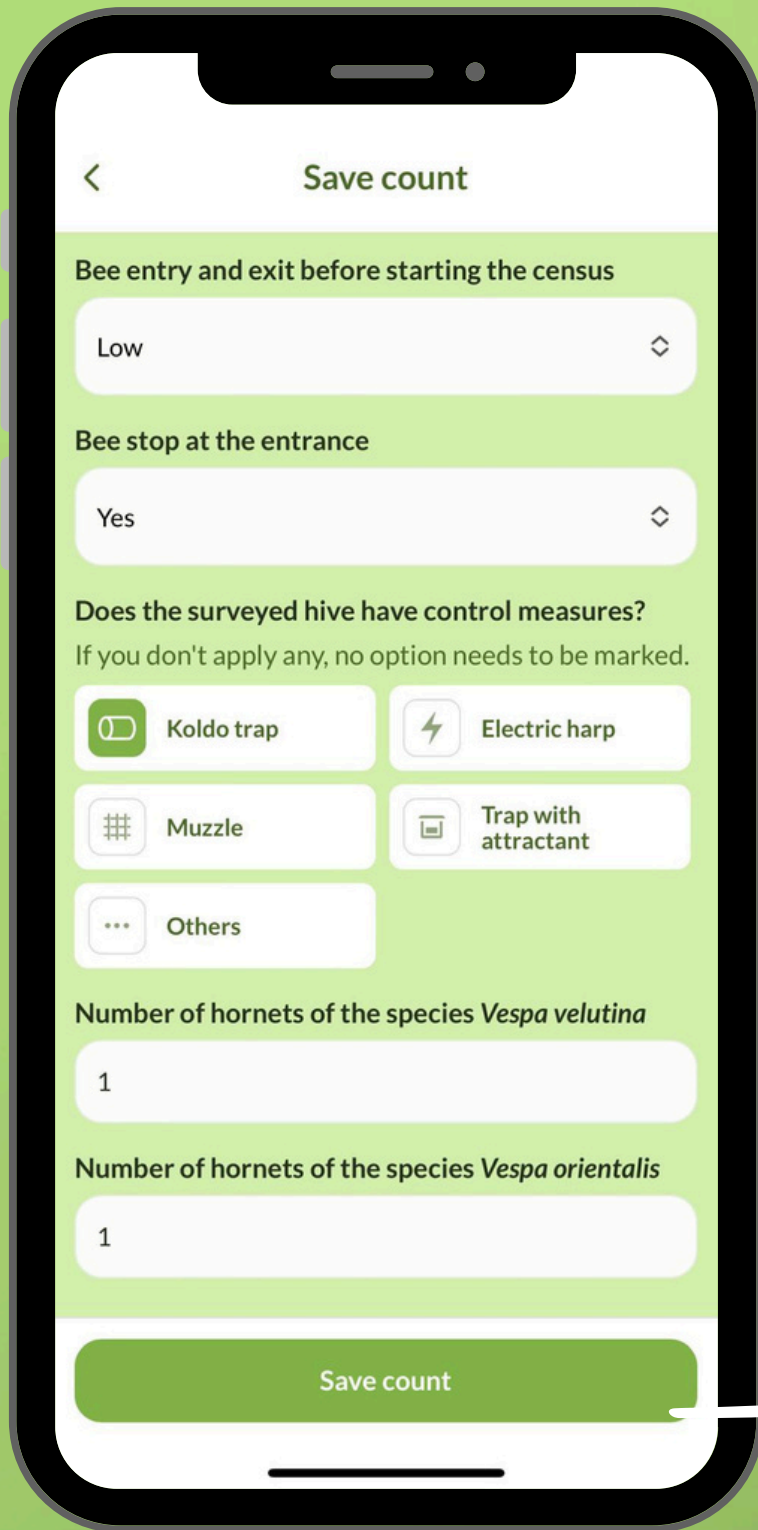


Once the 30-second count is finished, you will be asked to continue by reviewing the information and making any necessary changes before saving. This ensures that the record is accurate.



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5. Save a count



The screenshot shows a mobile app interface titled "Save count". It features several input fields and buttons. The first section is "Bee entry and exit before starting the census" with a dropdown menu set to "Low". The second section is "Bee stop at the entrance" with a dropdown menu set to "Yes". The third section is "Does the surveyed hive have control measures?" with a note "If you don't apply any, no option needs to be marked." Below this are five buttons: "Koldo trap", "Electric harp", "Muzzle", "Trap with attractant", and "Others". The fourth section is "Number of hornets of the species *Vespa velutina*" with a text input field containing "1". The fifth section is "Number of hornets of the species *Vespa orientalis*" with a text input field containing "1". At the bottom is a large green button labeled "Save count".

< Save count

Bee entry and exit before starting the census

Low

Bee stop at the entrance

Yes

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

Koldo trap

Electric harp

Muzzle

Trap with attractant

Others

Number of hornets of the species *Vespa velutina*

1

Number of hornets of the species *Vespa orientalis*

1

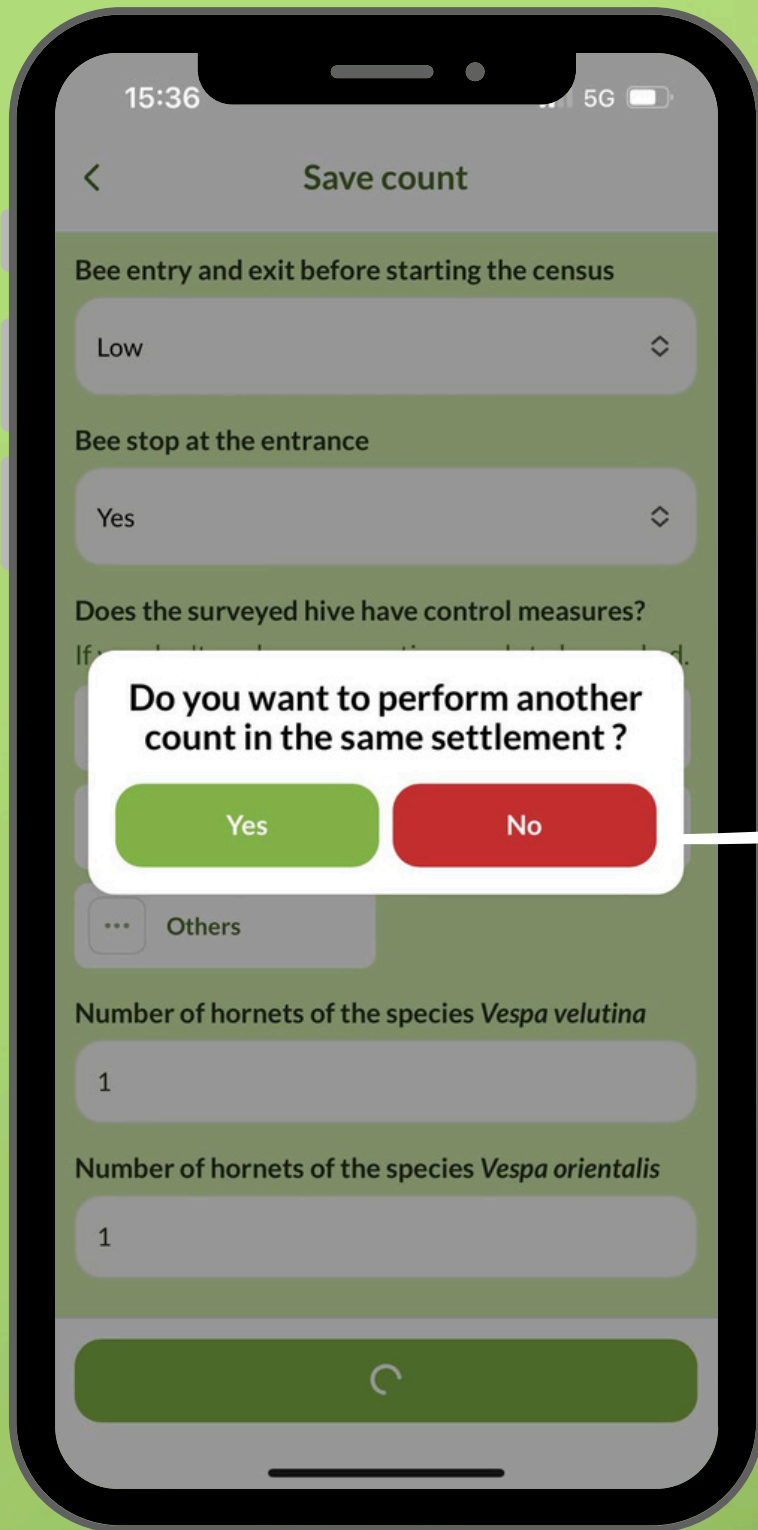
Save count

You must press **Save count** to make sure the count is recorded



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6. Continue counting



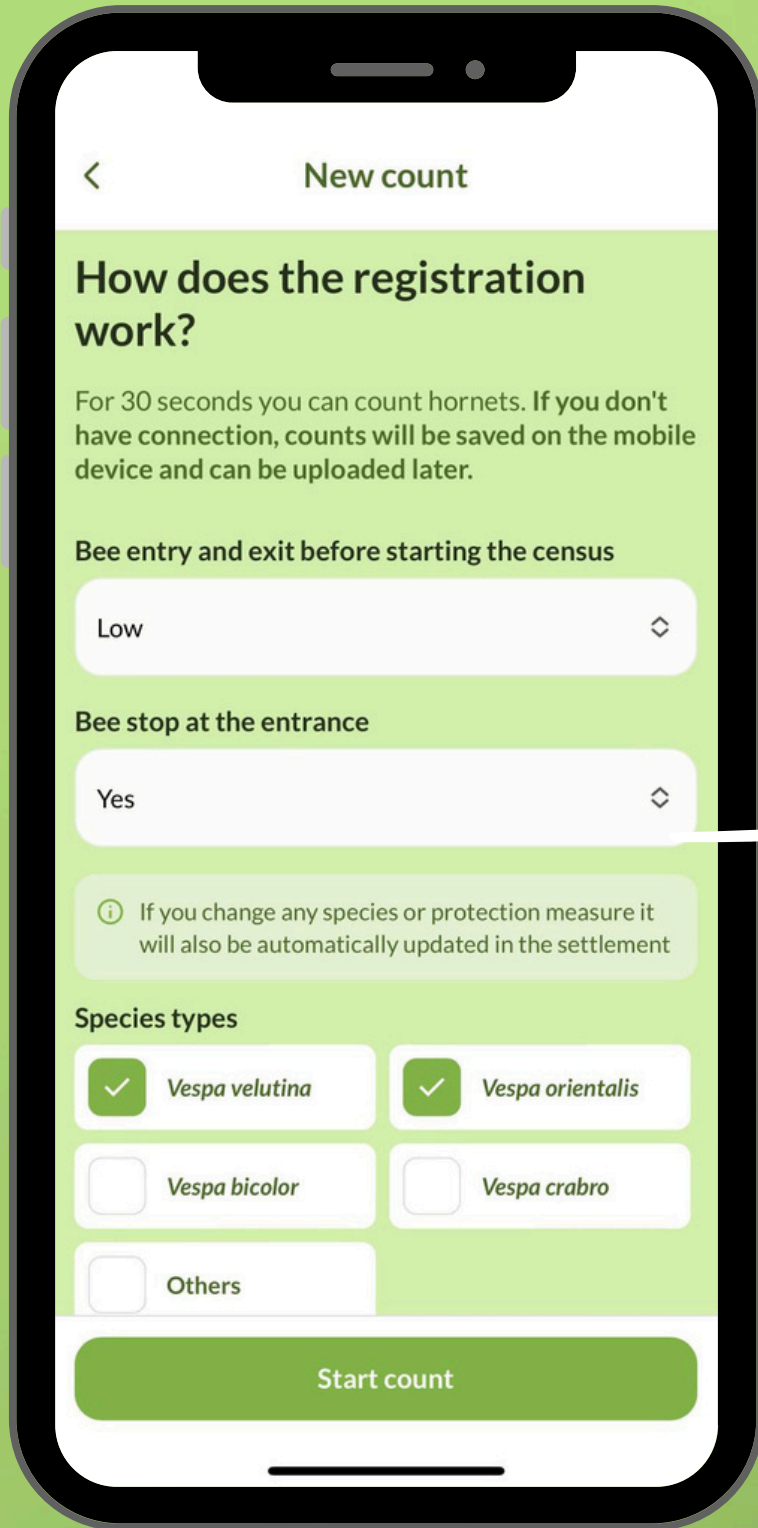
The image shows a smartphone screen with the 'Save count' app. The status bar at the top shows the time 15:36, 5G signal, and battery level. The app title 'Save count' is at the top. Below it, there are three dropdown menus: 'Bee entry and exit before starting the census' (set to 'Low'), 'Bee stop at the entrance' (set to 'Yes'), and 'Does the surveyed hive have control measures?' (partially visible). A modal dialog box is overlaid on the screen with the text 'Do you want to perform another count in the same settlement?' and two buttons: 'Yes' (green) and 'No' (red). Below the dialog, there is an 'Others' button with three dots. At the bottom, there are two text input fields for 'Number of hornets of the species *Vespa velutina*' and 'Number of hornets of the species *Vespa orientalis*', both containing the number '1'. A green bar with a white circular arrow icon is at the very bottom.

Once the count is saved, you will be asked whether you want to **continue recording new counts**



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6. Continue counting



The screenshot shows a mobile app interface titled "New count". At the top is a back arrow and the title. Below is a section "How does the registration work?" with explanatory text. This is followed by two dropdown menus: "Bee entry and exit before starting the census" (set to "Low") and "Bee stop at the entrance" (set to "Yes"). A light green informational box contains a note about automatic updates. The "Species types" section has five checkboxes: "Vespa velutina" and "Vespa orientalis" are checked, while "Vespa bicolor", "Vespa crabro", and "Others" are unchecked. A green "Start count" button is at the bottom.

< New count

How does the registration work?

For 30 seconds you can count hornets. If you don't have connection, counts will be saved on the mobile device and can be uploaded later.

Bee entry and exit before starting the census

Low

Bee stop at the entrance

Yes

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

Species types

☒ *Vespa velutina* ☒ *Vespa orientalis*

☐ *Vespa bicolor* ☐ *Vespa crabro*

☐ Others

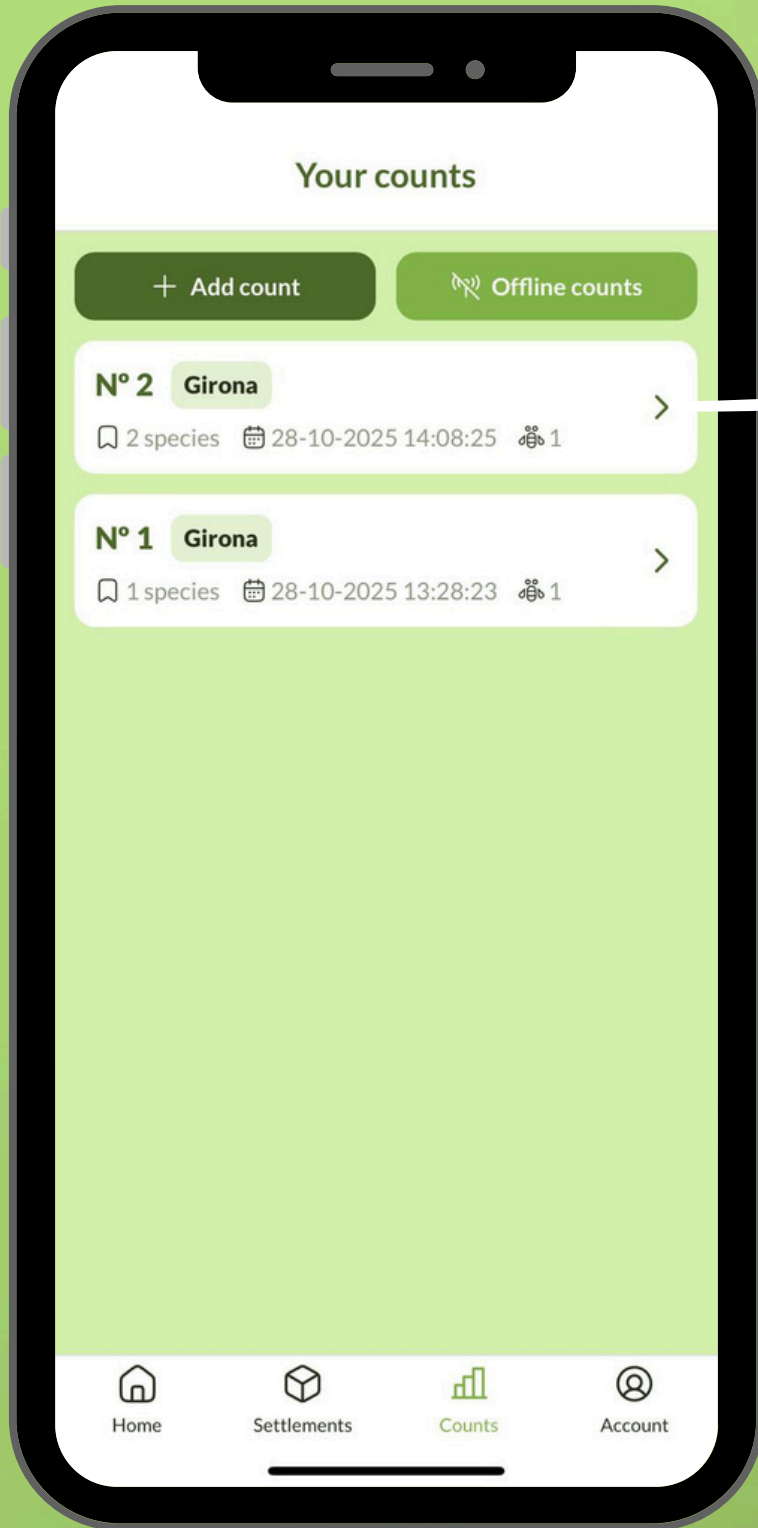
Start count

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



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7. Delete a counting

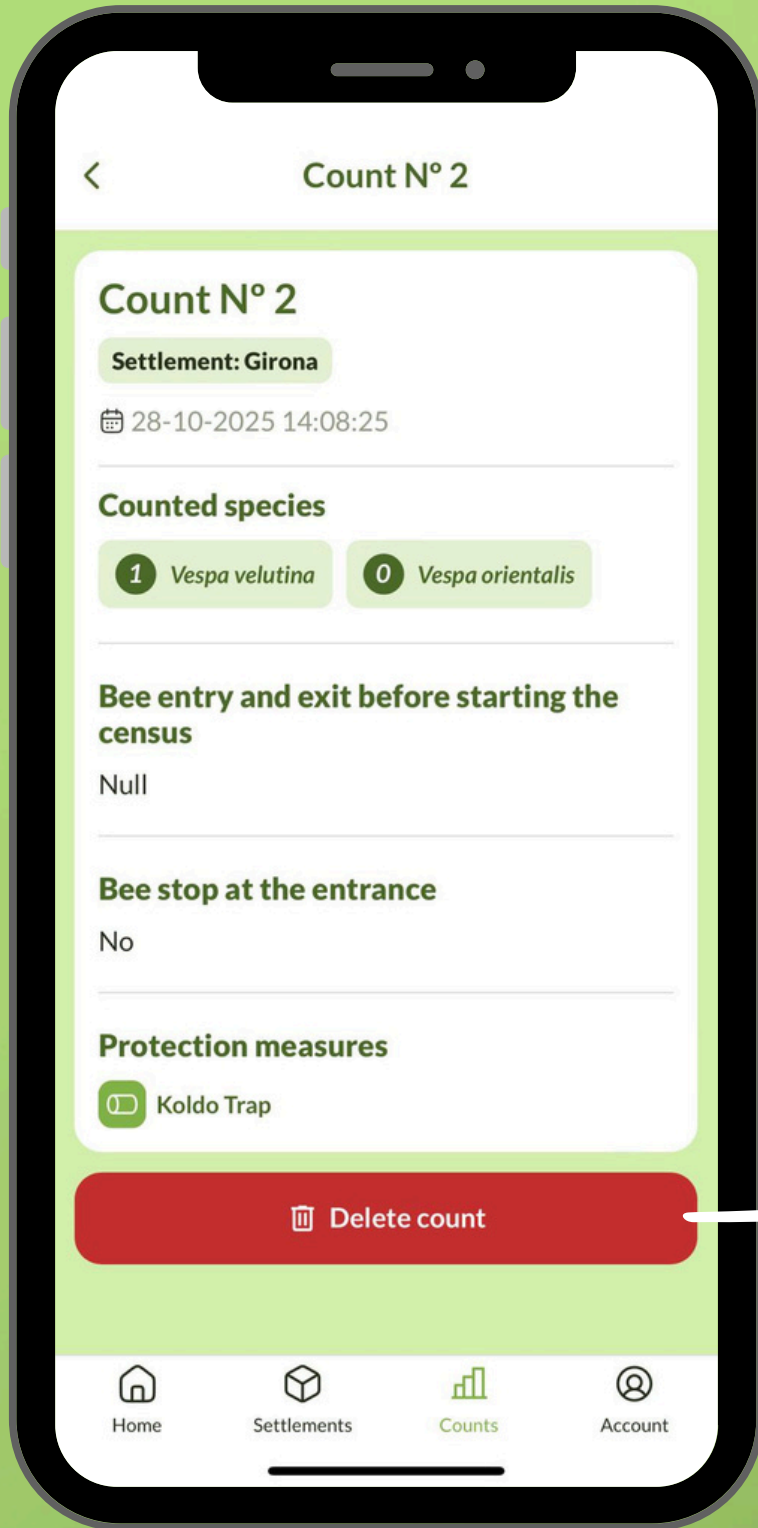


If you realize that an error occurred during counting and you already saved the count, you can delete it afterward by selecting it from the list of counts



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7. Delete a counting

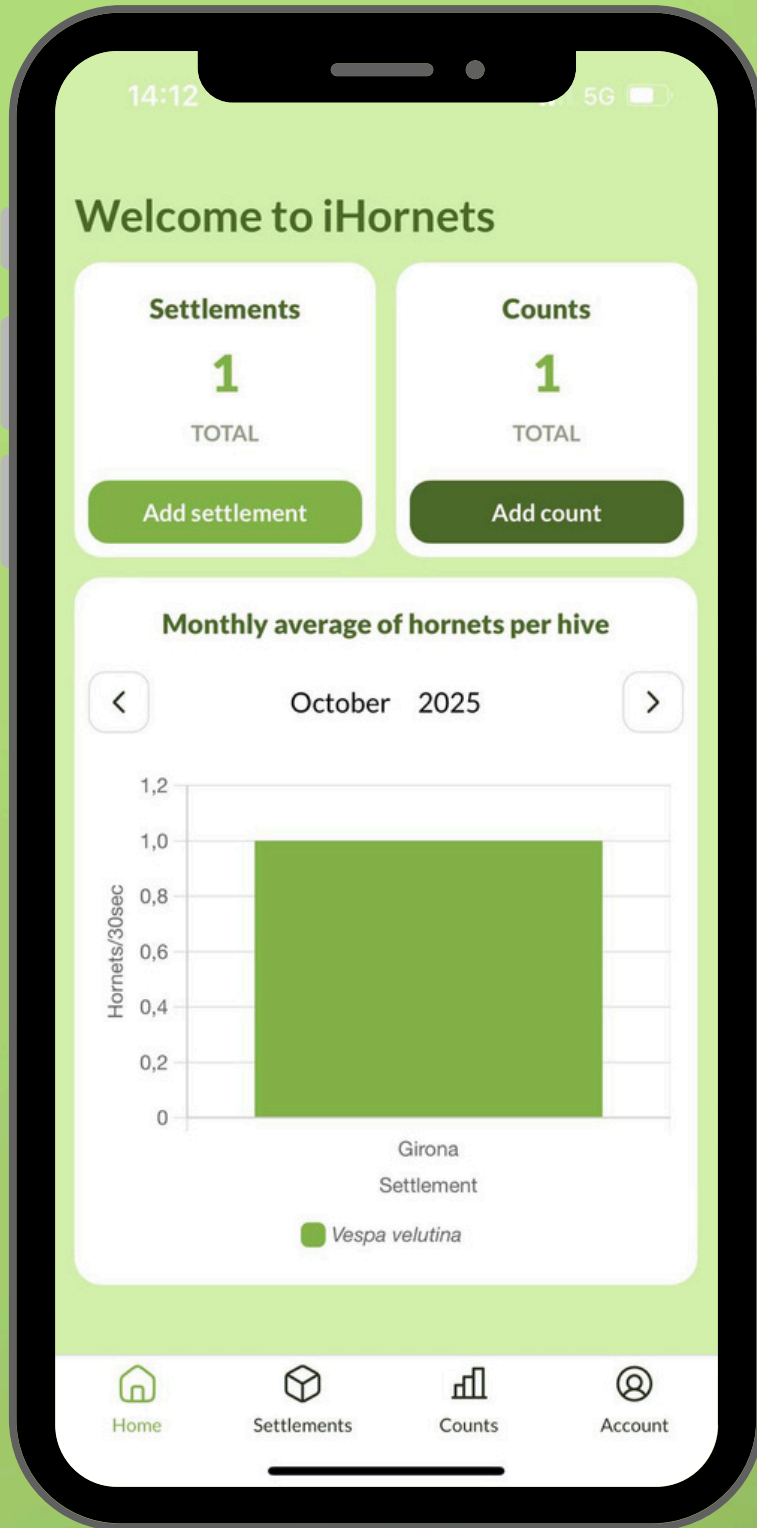


Once the item is selected, click the **Delete count** button



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8. Home page



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



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9. Doubts?

If you have any doubt with
the use of the app or any
problem, please contact us at:

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