

#### BEECONECT: a connected "flower" to measure the effects of radioactive contamination on the cognitive health of insect pollinators

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# BEECONECT: a connected "flower" to measure the effects of radioactive contamination on the cognitive health of insect pollinators

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## **CONTEXT**

- Insect pollinators, such as bees, flies, and butterflies, are declining worldwide. This is alarming since these animals are vital to the maintenance of terrestrial ecosystems and global food security.
- Pollinators heavily rely on learning and memory to forage on flowers. However, these cognitive abilities can be easily disrupted by a range of environmental stressors, even at low exposure levels (e.g. insecticides, heavy metals).
- If and/or learning processes often only has immediate subtle effects on individual behaviour, this can have long-term dramatic

consequences on populations, if food supply is compromised.

# **OBJECTIF**

The aim of **BEECONECT** is to study the **effects** of **radioactive contamination** on the **cognitive health** of **pollinators** (honeybees and other wild insects) in the **Fukushima Prefecture** (Japan).

### **HYPOTHESES**

Following the example of recent work on other environmental stress factors (e.g. neonicotinoid pesticides, heavy metals), we hypothesize that exposure to **radioactive pollution**, even at **very low levels**, can have **sub-lethal effects** on individual **cognitive abilities** with critical consequences on populations.

### **MATERIALS & METHODS**

- To assess the cognitive health of pollinators in the field, we will run **mass phenotyping** of thousands of pollinators (bees, hornets...) using a newly developed **automated** and non-invasive method: a connected "flower" in which the **insect must solve a task in a Y-maze** to obtain a **nectar reward**.
- Our system uses on-board artificial intelligence, enabling recognition of individual bees and species.





- The learning performance of each insect is recorded, then sent to a dedicated server for online data analysis.
- This device is the **first automated cognitive test ever deployed to measure cognition in insects**, and more broadly in invertebrates.





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