

## • Introduction

- The city of Madrid, as in all urban areas in the center of the Iberian Peninsula, is home to two main species of synanthropic cockroaches in the sewer system and outdoor areas: the oriental cockroach (*Blatta orientalis*) and the American cockroach (*Periplaneta americana*).
- However, eventually the city has registered episodes related to exotic species. In April 2018, a pest control company discovered an outbreak of *Periplaneta australasiae* (Fabricius, 1775), Australian cockroach, in a technical area of a building in the center of Madrid. At the same time, a secondary focus of this species was discovered in the same building, several floors above, in the wastewater system of a public car park.
- This fact was immediately reported to the Madrid municipal vector control service. Quickly, from this municipal department a surveillance and control task force was organized to determine the extent of the pest infestation, establish protection measures in the surrounding environment of the affected area and achieve eradication of the invasive specimen.
- The presence concentrated especially in the clean water and wastewater networks, coexisting with *Blatta orientalis* in the parking (prevalent cockroach in Madrid for these habitats). The foci was considered “settled” due to the presence of numerous oothecae and nymphs, as well as the testimony of maintenance workers.

## • Material and Methods

Below we detail the sequence of actions taken from May to September 2018:

- Field inspection, including accessible sewer system, private property facilities, parking lot and outdoor surface areas (parks, streets, etc.).
- Research on existing technical and scientific bibliography and logistical preparation for the monitoring and treatment.
- Surveillance through visual inspection and the use of sticky traps, as well as treatment with insecticide baits in gel and solid format. These works were carried out in the sewer system of the area, other municipal pipes and landscaped areas, in a buffer 200 meters from the focus of the Australian cockroach. Environmental parameters (humidity and temperature) were also measured at each control point.
- Citizenship information through the Madrid municipal website and communication of the findings to other agents involved in vector control.
- Notification to the owners of homes, premises and buildings in the area about the obligation to keep their areas free of pests and notify the Madrid City Council of possible findings of Australian cockroaches.
- Management of all the information derived from the study through geographic information systems (GIS), a very important task in decision-making.

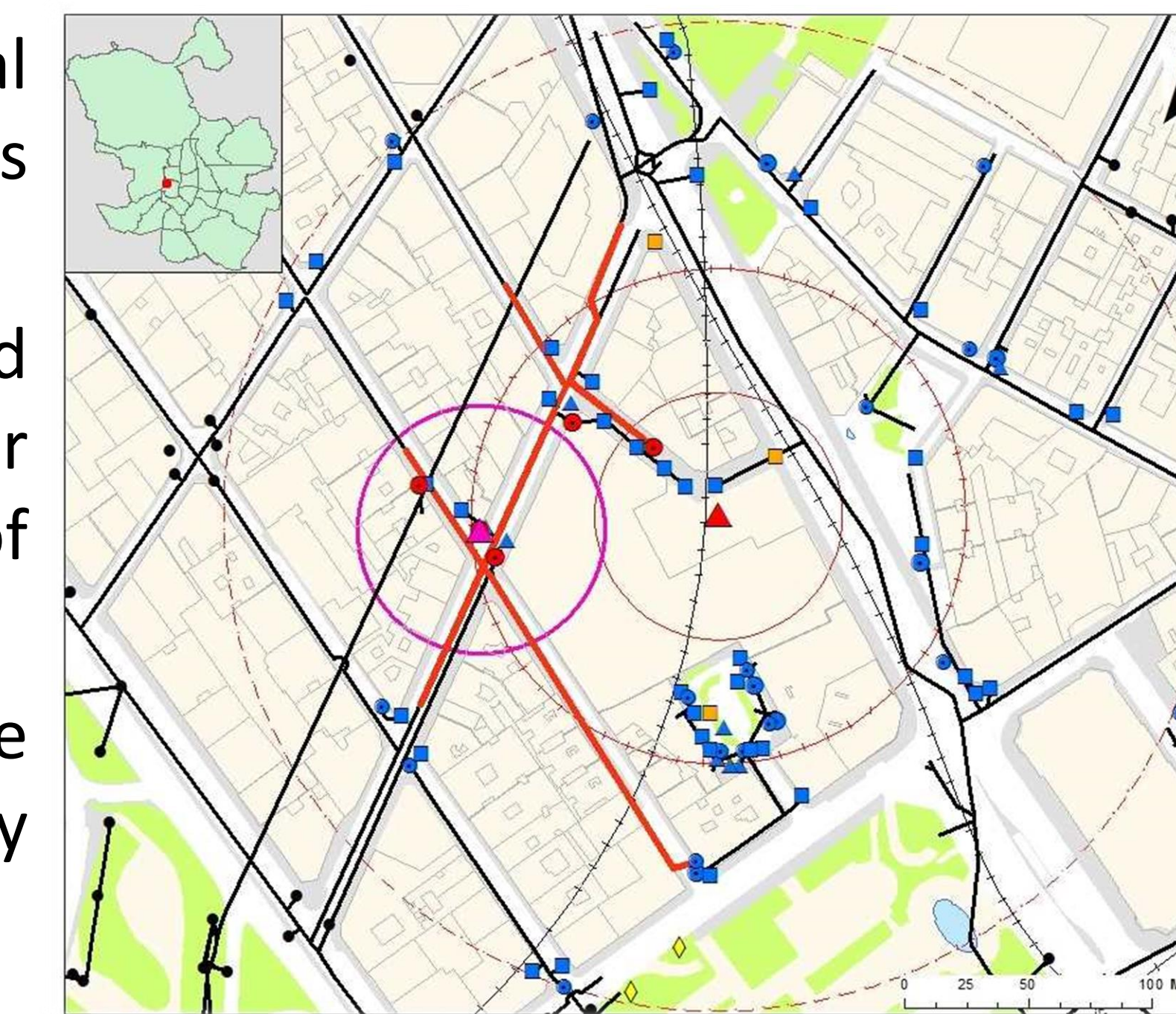


Fig. 1. Map, including: the original foci (red triangle); 50, 100 & 200m buffer; monitoring (yellow squares) and treatment sections (red lines and circles), sewer manhole confirmed presence (pink triangle), as well as other Sewer System elements (black lines and blue figures), streets, buildings and green areas.

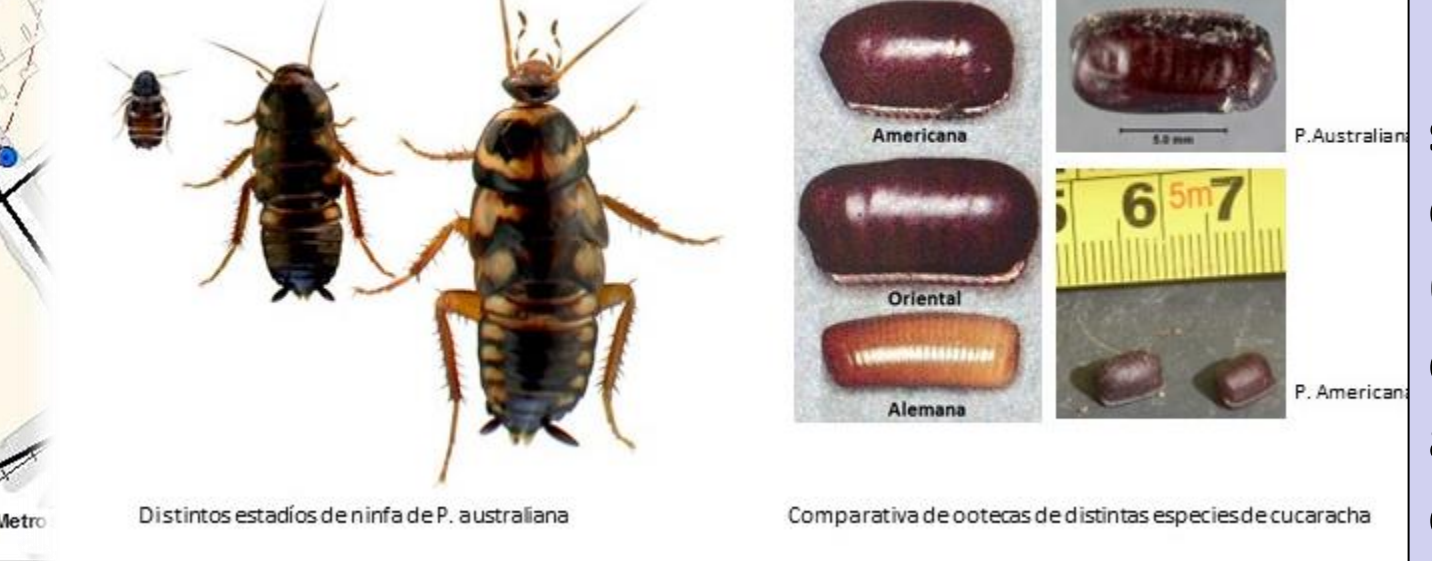


Fig. 2. Example of information shared in the Web with useful entomological data ([https://madridsalud.es/wp-content/uploads/2018/06/Cucaracha\\_Periplaneta\\_Australiana\\_FichainfoWeb\\_MadSal\\_may18\\_Vs2OK.pdf](https://madridsalud.es/wp-content/uploads/2018/06/Cucaracha_Periplaneta_Australiana_FichainfoWeb_MadSal_may18_Vs2OK.pdf))

## • Results

During the Australian cockroach surveillance work, two phases were developed, with the following results:

### Phase 1 (May-June)

- Fortnightly inspections were carried out, finding mostly oriental cockroaches (18 traps). Only one focus of American cockroach was detected in a sewer section that can be visited.
- The most notable finding corresponds to the capture of an adult female Australian cockroach, captured on May 21 in the adhesive trap installed in a sewer manhole, within 100 radius meters from the initial focus.



Fig 3. Image of a specimen of *Periplaneta australasiae* located during the study.

### Phase 2 (July-September)

- This circumstance led to a special work subzone, that was established within a 50 m radius buffer from the finding spot. This subzone was subjected to intense surveillance and control by means of insecticide baits until the end of the study.
- During the fortnightly check-ups, no cockroach was detected again.
- Although it has not been possible to determine the precise origin of the Australian cockroach outbreak, it is likely that the infestation originated from the introduction of infested material or packaging into the technical room of the building (primary focus). The subsequent colonization of the interior of that space and underground parking (secondary focus) would have occurred later.
- The infestation did not spread to municipal sewer collectors, being detained in the private buildings. This fact may be related to the environmental conditions of the public sewer system in the city of Madrid, conditioned by the external climate (dry and with extreme temperatures).
- Measurements carried out during the study established an average temperature of 19°C and 55% relative humidity, which do not favor *Periplaneta australasiae* according to the bibliography consulted.

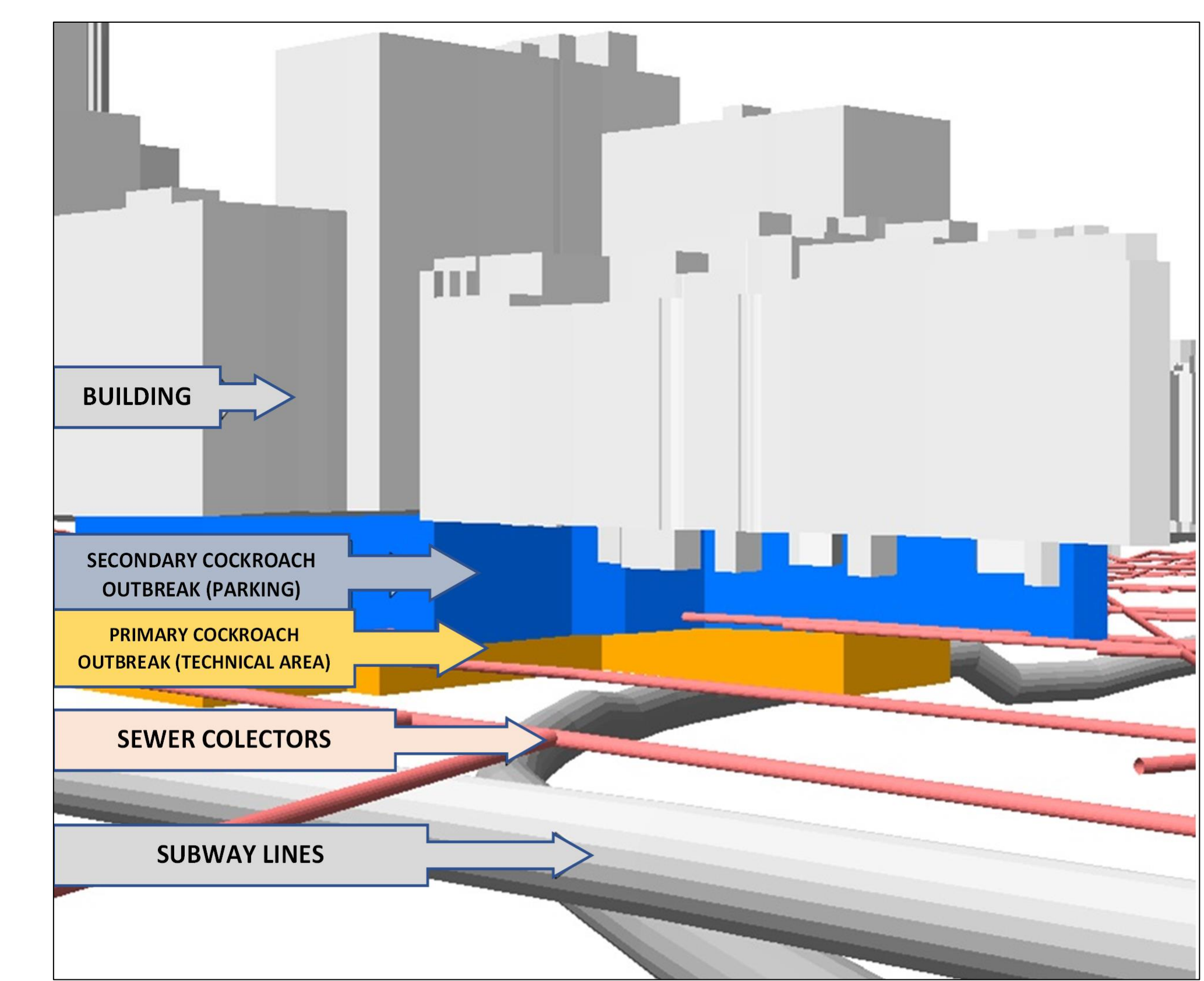


Fig 4. Diagram of the location of infested areas.

## • Conclusions & Further Research

- Although the environmental factors in Madrid do not seem to favor the spread of the Australian cockroach, the rapid deployment done by the municipal vector control service was a very important measure to contain the species in the study area.
- In any case, this foci could not have been managed, or even detected, by municipal services, without prior communication from the private company. This fact highlights the importance of these types of measures and flows of communication and coordination.
- Even if the situation is under control on public sections in the area, it is not undisputable that these or other undetected infestations of the Australian cockroach or other invasive species in private premises are still active in the city.
- This experience is very positive for future similar situations, with undesirable invasive species that can be considered urban pests. Quick coordinated actions can limit or eradicate these species in early stages of their introduction in our cities.
- The events related to exotic species of cockroaches recorded in Spain and other European countries in recent years, in the context of globalization and climate change in which we live, should keep all agents involved in environmental health alert.
- It is a priority to stop the expansion of these species of synanthropic cockroaches, potentially dangerous for public health.

