

MOSQUITO  ALERT

The new Integrated platform for the control of arboviruses in Catalonia (PICAT) is launched to integrate epidemiological information into the management portal of Mosquito Alert

*Mosquito Alert detects for the first time *Aedes japonicus* in Spain, another invasive species and vector of diseases*

The scientific work of Mosquito Alert receives the award 'City of Barcelona 2017' within the section of Earth and Environmental Sciences

Annual report

Mosquito Alert

2018


MOSQUITO ALERT

Mosquito Alert Annual Report 2018 - Citizen science project results

Authors: Marina Torres, Aitana Oltra, Frederic Bartumeus, Roger Eritja.

Design: Marina Torres (Communication Department, CREAM).

Photographs: Authors (under  Creative Commons, where indicated).

 Mosquito Alert

CEAB-CSIC, CREAM, ICREA, MEC.



Date of publication: december 2018

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About the project

1

Mosquito Alert is a citizen science observatory for monitoring and controlling tiger mosquitoes (*Aedes albopictus*) and yellow fever mosquitoes (*Aedes aegypti*), invasive species that are vectors of global diseases such as the dengue, chikungunya and Zika fevers.

Managers from public authorities use the Mosquito Alert platform as a new source of information for implementing monitoring and control measures. Users of the app, meanwhile, receive recommendations for keeping their homes free from the species in question.

The Mosquito Alert app enables citizen to report observations of such mosquitoes and their breeding sites. The data thus provided complement scientific work and make it possible to study the mosquitoes' distribution.

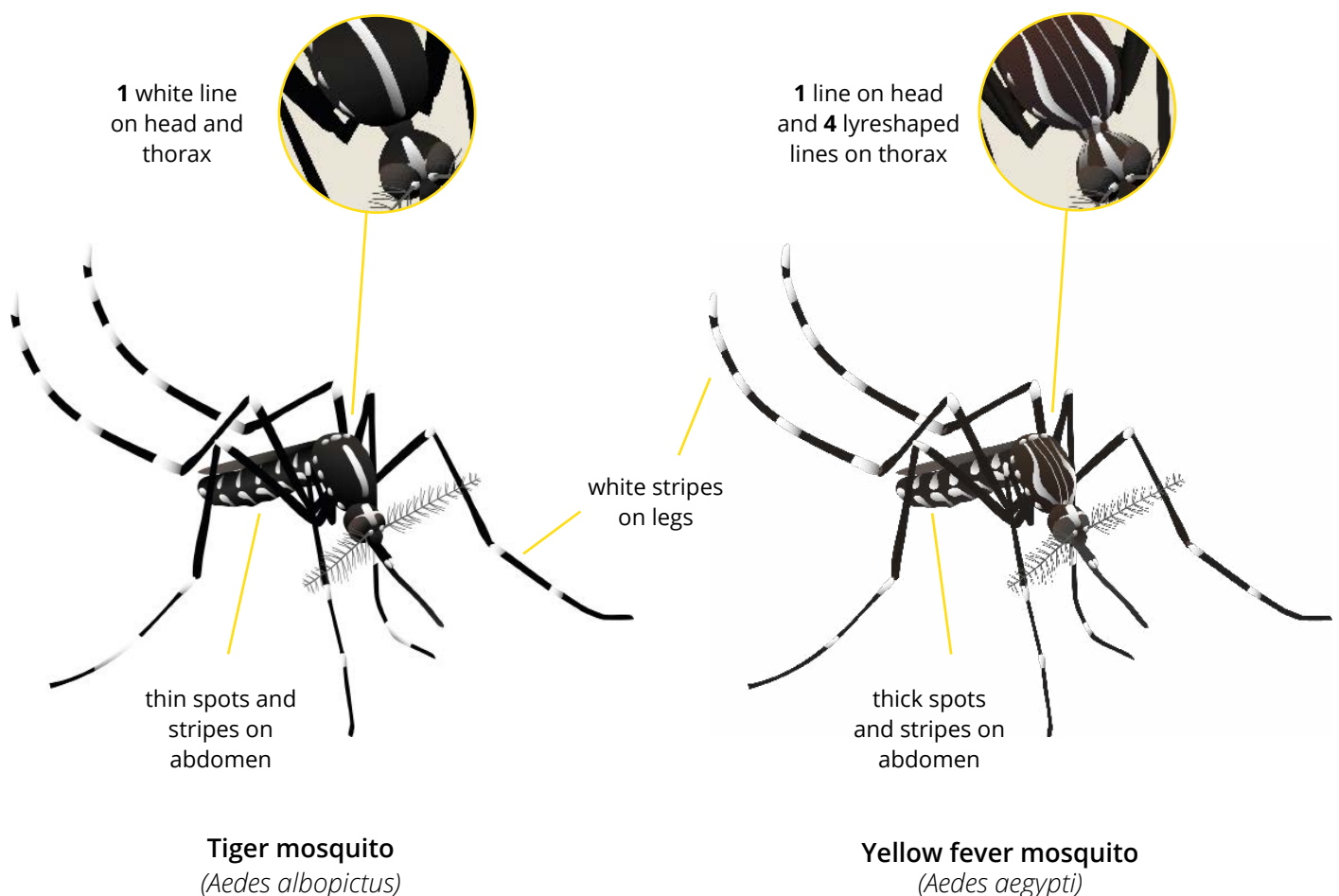
Mosquito Alert is an effective, inexpensive early-warning system that goes integrating in our health and research system.



The tiger mosquito and the yellow fever mosquito

Since 2004, the tiger mosquito has been spreading along the country's Mediterranean coast including interior areas of the Iberian Peninsula. In 2018, the tiger mosquito has been detected in the Extremadura and Madrid regions. In December 2017, the yellow fever mosquito was first detected in

Spain (Fuerteventura Island). Afterwards, it was eradicated but since this finding a new surveillance stage was opened in order to avoid the expansion of the species in the rest of the Canary Islands and prevent its arrival to the Iberian Peninsula.



Breeding sites

In urban areas, tiger and yellow fever mosquitoes breed in small receptacles containing stagnant water, mainly in urban and periurban areas (urban gardens, parks, etc.). Thanks to Mosquito Alert, citizen help surveillance and control agents to detect breeding sites in the public roads such as **gutters, drains and ornamental fountains**.

On private property, tiger mosquitoes breed in small receptacles containing stagnant water in yards or on balconies. As the public authorities are unable to apply treatments on such property, we raise awareness among citizens with a view to them eliminating possible breeding sites in their homes themselves.



Distribution and diseases

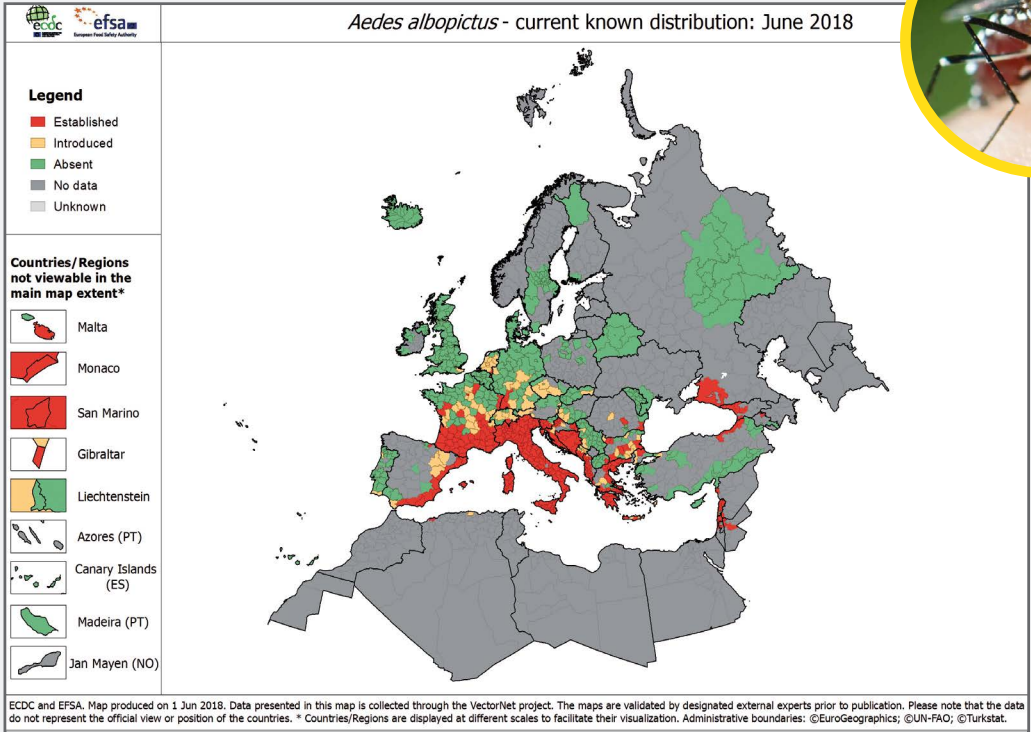
The tiger mosquito and the yellow fever mosquito can be vectors of dengue, chikungunya and Zika fevers. In Spain, these diseases are only imported cases from endemic areas. To the present there has not been autochthonous transmission until autumn 2018, when some cases of dengue were detected in the South of Spain and in Catalonia. The transmission risk of such diseases exists due to the human mobility and the presence of the mosquito during its most active period. To avoid the transmission of the viruses is crucial to know the presence of this species, minimize them in the areas

where they are established and control its expansion. The **tiger mosquito** can currently be found in Asia and South America, and it is widespread along the Mediterranean coast and part of Europe. In Spain there are more than 540 affected municipalities, according to data spanning 2004 and 2015. On the other hand, the **yellow fever mosquito** can be found in Africa, in countries close to the tropics and subtropics. Also in the South-East of the United States, in the North of Australia, in the East coast of the Black Sea and in Madeira. In December 2017 it was found in the Canary Islands, where it was been eradicated.

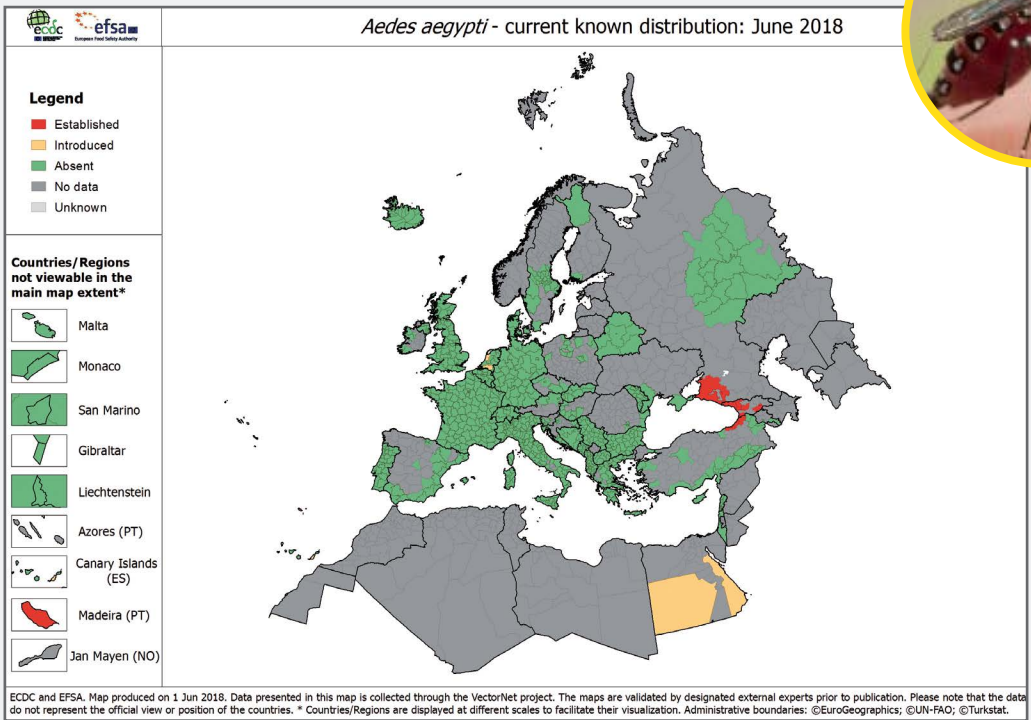


Photo: Roger Eritja ©

Distribution of the tiger mosquito in Europe (2018)



Distribution of the yellow fever mosquito in Europe (2018)



The Mosquito Alert project, a 360-degree observatory





Citizen observations

Collecting data

Citizens use the Mosquito Alert app to take and share geotagged photos of tiger or yellow fever mosquitoes and their breeding sites in public areas. They also receive notifications through it.



Expert validation

Validating data

A team of experts validate the photos and identify the species of mosquito shown. Validation results are sent to the users involved.



Interactive map

Collecting data

Validated sightings are published on an interactive map, where their details can be viewed, analysed and shared.



Science

Using data

We use the data citizens provide to study the distribution and spread of tiger and yellow fever mosquitoes.



Management

Using data

We collaborate with the public administration to improve the surveillance and control of the tiger mosquitos in areas where it has been established and to detect it in new areas. We promote direct communication between managers and citizen through notifications.



Education & community building

Rising awareness and communication

More and more territories are applying control measures and sending in data via the app, thanks to the project's tools for communication, information and education. We also involve schools using open schooling methodologies and the project has begun to be implemented in many other countries.



Results and achievements in 2018

2

2.1 Technological platforms

Website and app



New page

We have updated the "Science" section including the research topics of the project.



New features of the app

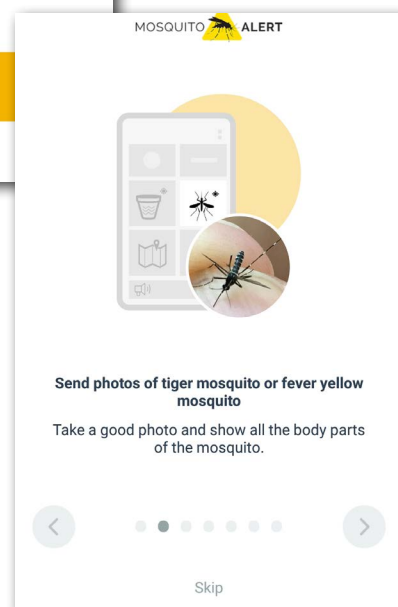
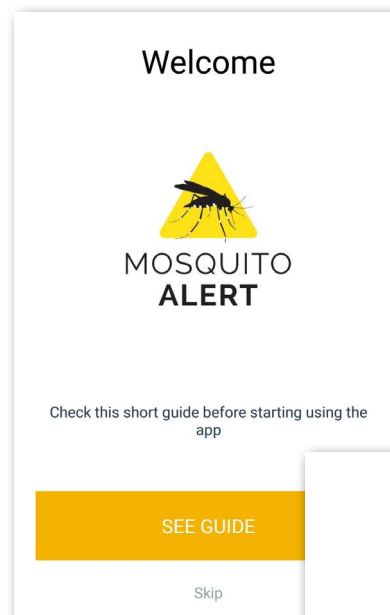
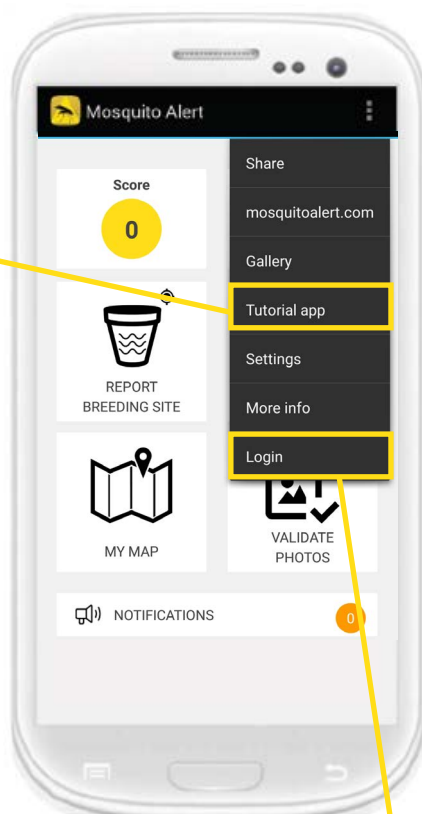
- 1 App guide:** we have included a tutorial with basic instructions that opens automatically when some uses the app for the first time. It can be checked anytime from the menu.
- 2 Login system:** now anyone can participate as a registered user using extern accounts saving the data and scoring. It ables to login from different devices and recuperate data if the app is installed again.

The app in figures

	2018	Accumulated 2014 - 2018
Downloads (Android + iOS)	12.000	57.000
* Reported observations of tiger mosquito	2.262	12.300
* Reported observations of yellow fever mosquito	12	18
Reported observations of breeding sites	766	3.117

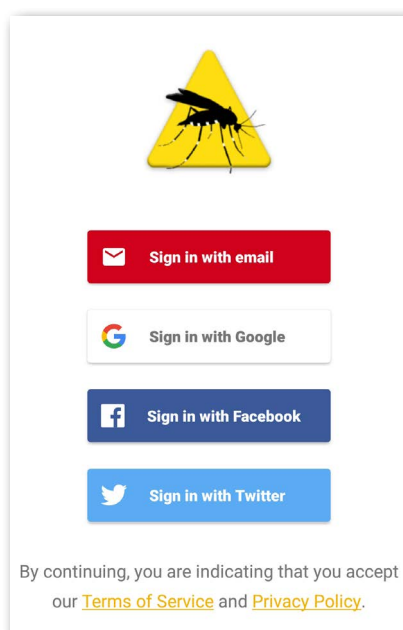
* total number of reported observations before expert validation

1

App
guide

2

Login



Public observations map

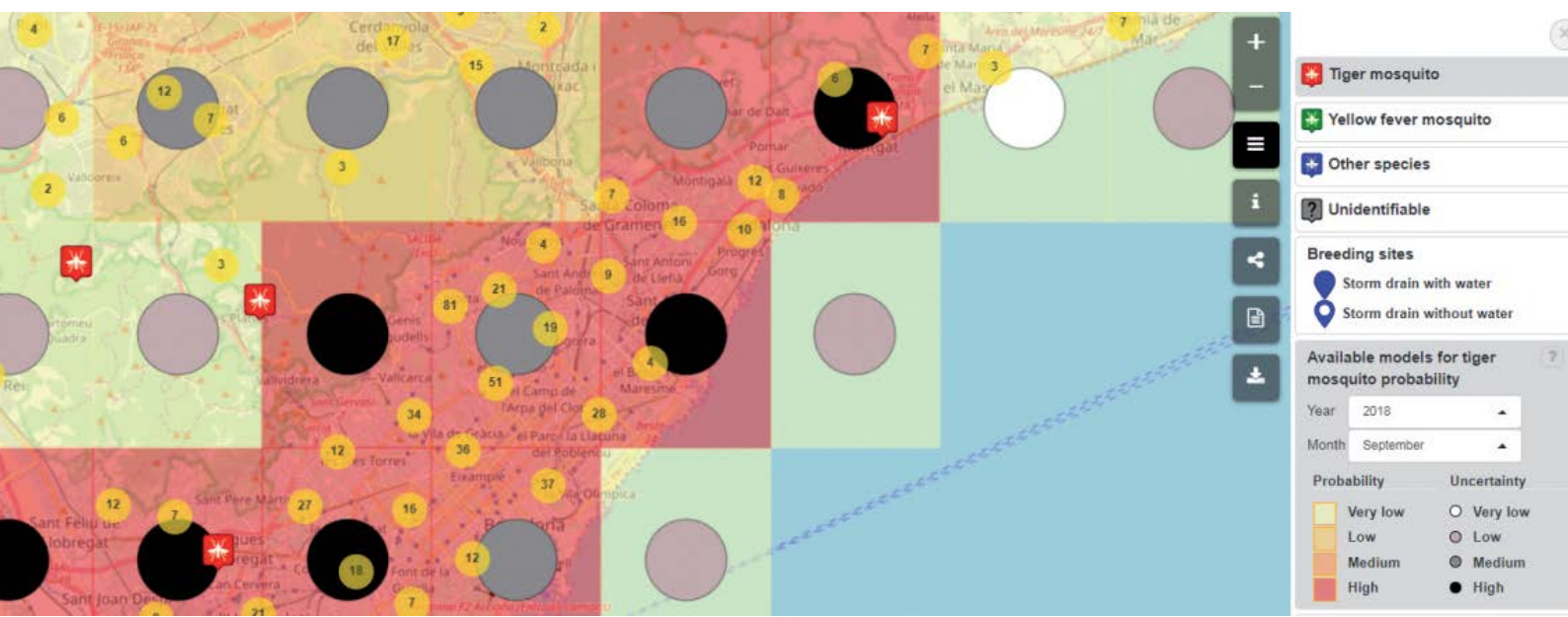


Validated sightings are published on Mosquito Alert's interactive map. This interface can be used to view, analyse and export all such reports since 2014.

In 2018, thanks to the collaboration of Dipsalut (Girona Provincial Council's public health body) and the work of SIGTE (Geographical Information Systems and Remote Sensing Service from the University of Girona) has developed a **model** that calculates the probability of the presence of the tiger mosquito in those areas in Spain where there are participants with the app installed. The model

updates weekly and produces monthly estimations of the probability to find tiger mosquitos in a specific area. It has been developed using the observations reported by the participants with the app Mosquito Alert. In this first phase, the model does not include climate or environmental information, but only models a probability of alert eliminating biases inherent to the collection of citizen data. **The results of the model can be consulted by selecting the layer in the legend "Probability of Tiger Mosquito".**

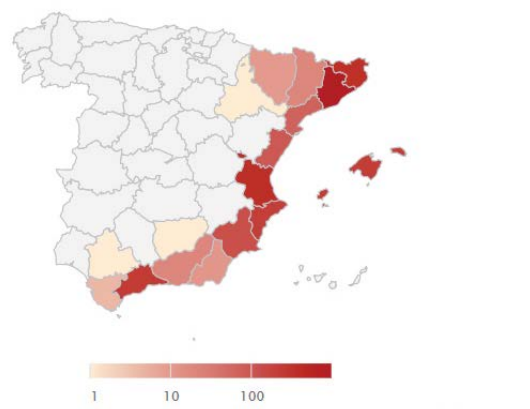
[> Go to the map](#)



Data visualization

In 2018 the project has developed a visualization data tool using real-time interactive graphics which allows to consult the participation rate in different areas and analyze data quality. Some of these graphics have been designed with Datawrapper portal (<https://app.datawrapper.de/>) and they can be consulted in the Participation statistics page. > [Más información](#)

Confirmed mosquito tiger observations, 2014–2018



Observations received at Mosquito Alert (2014-18)

In Summer there is the major amount of citizen observations in coincidence with the most active period of the tiger mosquito.

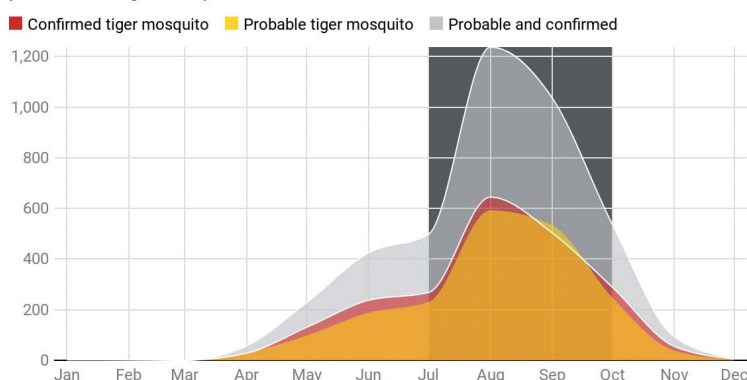
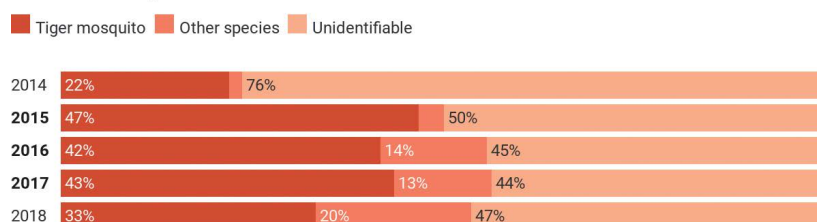


Chart: CC by Mosquito Alert • Source: [Mosquito Alert](#) • [Get the data](#) • Created with Datawrapper



Species of mosquito received in Mosquito Alert (2014-18)

The observations validated as tiger mosquito represent nearly the 50% of the total observations received in Mosquito Alert



Year 2018: only from January to June.

Chart: CC by Mosquito Alert • Source: [Mosquito Alert](#) • [Get the data](#) • Created with Datawrapper

Citizen validation



Another goal is to obtain citizen that identifies the tiger mosquito and the yellow fever mosquito quickly and effectively, **without the need for expert validation**. Thanks to the Scifabric work and their expertise in creating crowdcrafting platforms, (=crowdcrafting), we have a map in which citizen validations made with the app can be showed.

The map shows all the tiger mosquito reports that have been validated by 5 participants minimum. Each photo has a fiability value according to all validations, so they have a final percent of fiability. In addition, the map shows the most active months in terms of validations and allows to visualize them in every municipality.

[> Go to the map](#)

pybossa
scifabric

MOSQUITO ALERT About

Busca por ciudad, provincia, país o código postal

Tigre

74.00% 50 personas

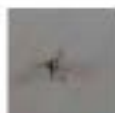
Torredembarra, España



Tigre

60.00% 50 personas

Torredembarra, España



Tigre

54.55% 11 personas

Gerona, España



Tigre

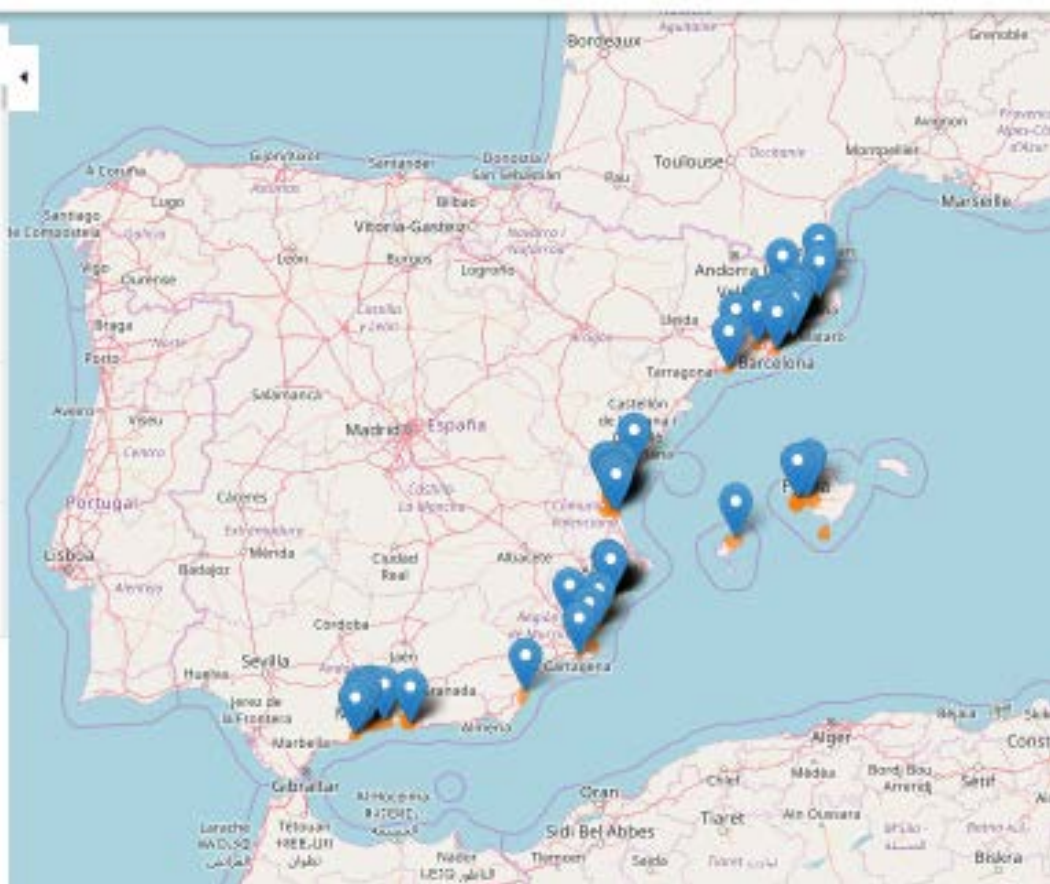
100.00% 5 personas

Vila-real, España



Distribución por meses para últimos resultados

Desde Junio 2014 - Octubre 2017





2.2 Citizen observations

Expert validation

A team of entomologists analyzes only the observations that contain a photo. This year, Daniel Bravo from the University of Extremadura, has been incorporated in the validation team. For each observation, 3 experts identify the species of mosquito independently. Another expert check the result of these validations and if they are

tiger mosquito or yellow fever mosquito the assignation is **“possible”** or **“confirmed”** categories depending on the quality of the photo. The final result is published in the public map and notified to the participant with a notification. Sometimes the experts add notes together with the result.



Roger Eritja

Expert validation supervisor Entomologist of the Baix Llobregat Mosquito Control Service



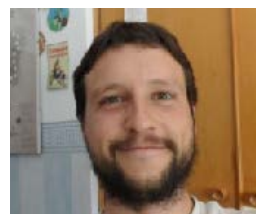
Mikel Bengoa

Expert in tiger mosquito control. Director of the consultancy Moscard Tigre



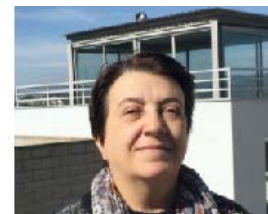
Sarah Delacour

Coordinator of the National Plan of entomological surveillance at airports and ports against vectors of diseases



Ignacio Ruiz

Expert in Medic and Veterinary Entomology. Researcher at Center of Biomedical Research of La Rioja (CIBIR)



Maria Ángeles Puig

Expert in biology and ecology of aquatic insects. Researcher of CEAB-CSIC



Rosario Melero-Alcíbar

Expert in Medic and Veterinary Entomology. Entomology Coordinador of Fundación IO. Researcher at Entomological Surveillance National Plan of ports and airports



Pedro María Alarcón-Elbal

Medical Entomology-Veterinary expert. Lecturer and researcher at Universidad Agroforestal Fernando Arturo de Meriño de Jarabacoa, Dominican Republic



Santi Escartin

Director of XATRAC. Participates in the Tiger Mosquito Surveillance Programme of Girona and coordinates breeding sites cartography in Tarragona and Girona



Simone Mariani



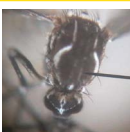
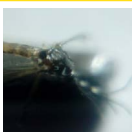




Mosquito's ecology expert. He collaborates with different projects about monitoring and cartography of its populations in Catalonia



Daniel Bravo

PhD in Veterinary. Expert in Applied Veterinary Entomology. Researcher at Universidad de Extremadura.

Results of expert validation

Categories	Confirmed tiger mosquito	Possible tiger mosquito	Confirmed yellow fever mosquito	Possible yellow fever mosquito	Other species	Unidentifiable	Breeding sites	Without foto
Number of reports	643	567	9 *	3 *	580	1336	813	877
Characteristics	White line on head and thorax identify	Other characteristics typical of the species identified	Lyre-shaped lines in thorax identify	Other characteristics typical of the species identified	Characteristics of other species of mosquito identified	No identifiable characteristics of any particular species	Not validated by an expert but the wrong ones are discarded	Not validated
Examples								

* Out of the Iberian Peninsula.

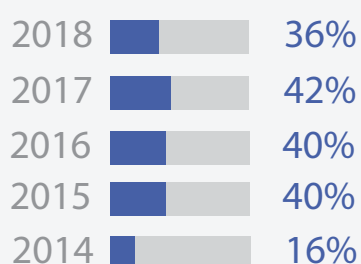
	Total	Daily average (from May to November)
Number of reports receives during 2018	3.138	17
Number of validated reports ("unidentifiable" and "without photo" not included)	1.802	9
Number of validated reports with the "confirmed tiger mosquito" category	643	3

Reliability of citizen data

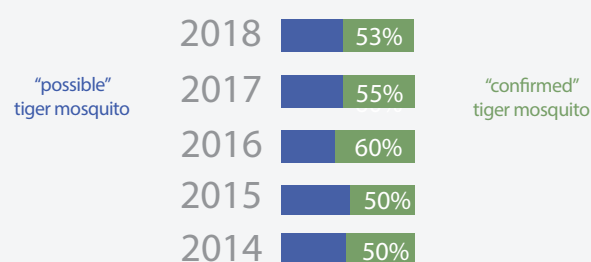
In 2018, the **36%** of all the validated reports were **"confirmed tiger mosquito"**. The number of confirmed observations continue growing up,

being higher than the "possible" ones, although there are less confirmed observations than the year before.

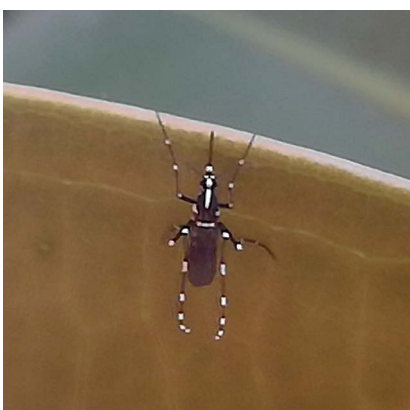
% of validated reports with the "confirmed" category



% of validated reports with the "confirmed" category in relation to those in the "possible"



Selection of some of the best photos made by the participants during 2018 classified as “confirmed tiger mosquito”

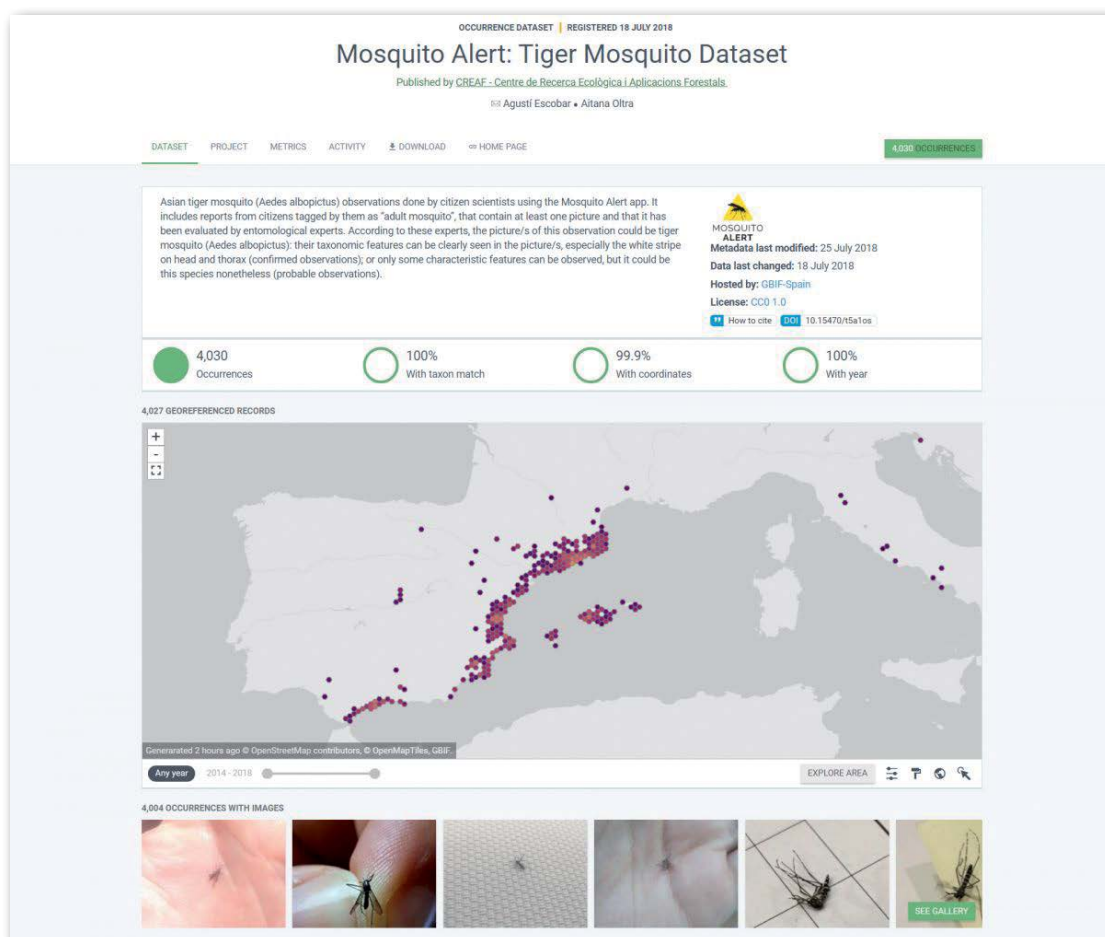


Observations available in open access

Mosquito Alert has published a dataset containing more than 4,000 photo-based georeferenced observations of the Asian tiger mosquito (*Aedes albopictus*) gathered by citizen scientists through the Mosquito Alert app. This data is also available in the Data National Portal. In GBIF there are more than one billion observations of biodiversity from all over the world, which 30,605 are of tiger mosquito.

The 13% of this total are citizen science data given through Mosquito Alert. Being part of GBIF gives a higher value to the citizen participation with the Mosquito Alert app, since the quality of the data is evidenced and all the observations can be consulted and used through this global platform.

[> More information](#)



2.3 Science

First detection of *Aedes japonicus* in Spain thanks to citizen scientists

It is an invasive insect capable of transmitting diseases such as **West Nile virus**. The mosquito was found in Asturias (North Spain) when a person sent a photo of the insect with the Mosquito Alert app. This is the first time that such species has been detected in the Iberian Peninsula and the South of Europe. The finding was evaluated by entomologists of the Mosquito Alert platform, together with members of the University of Zaragoza responsible of the entomological surveillance project of the Ministry of Health. The Coordinated Health Alerts Centre sent a first [Rapid Risk Assessment Report](#), including in the recommendations to use ci-

tizen science as a method to evaluate the extension of the affected area in the territory. It is known that in the laboratory conditions this species can infect with dengue and Chikungunya, a part of transmit the West Nile virus. However, currently the risk of autonomous transmission by this species is very low.

[> Más información](#)



Real photo of an individual captured in the area and analyzed in the laboratory.



Innovating in the management of mosquito-borne diseases

The traditional methods for the surveillance and control of the mosquito-borne diseases are being affected by economical restrictions as demands and the scale of the actuation are growing. In an article published in ***Trends in Parasites***, Mosquito Alert suggest that citizen science can offer a solution to solve this problems, although many changes in the public health models and systems would be needed previously.

> [More information](#)

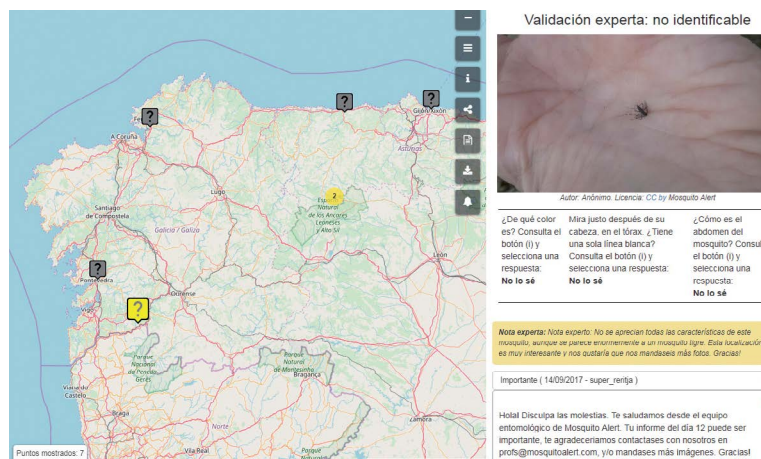
First cite of *Aedes vittatus* in Galicia (north of Spain)

In September 2017 a participant of Mosquito Alert sent a photo of a mosquito thinking that it would be a tiger mosquito. In March 2018, after receiving a real individual, the team of the validators confirmed in a publication in *Anales de Biología* that it was an *Aedes vittatus*, an autoctonous mosquito which already exists in several regions of Spain, but now it has been first detected in Galicia. Currently there is no risk in Spain for the human health because of this finding. On the other hand, in Africa this species is related to many yellow fever outbreaks and in the laboratory it can transmit other diseases.

> [Más información](#)



Photo: El desinsectador.com



Scientific articles published

- Eritja, R. y Bartumeus, F.(2018). **Mosquitos invasores a través de la mira del teléfono: contexto, retos y oportunidades**. Boletín de la Sociedad Española de Entomología Aplicada (SEEA), 3.
- Bartumeus, F. et al (2018). **Citizen Science: A Gateway for Innovation in Disease-Carrying Mosquito Management?**. Trends in Parasitology.
- Roger Eritja, Marga Rubido-Bará, Sarah Delacour-Estrella, Mikel Bengoa, Ignacio Ruiz-Arrondo & Comunidad Mosquito Alert (2018). **Ciencia ciudadana y biodiversidad: primera cita de Aedes (Fredwardsius) vittatus (Bigot, 1861) (Diptera: Culicidae) en Galicia, mediante el proyecto Mosquito Alert**. Anales de Biología 40: 41-45.
- Palmer JRB, et al (2018). Global Mosquito Alert. Chapter 15, pp. 210-215. In: **Citizen Science: Innovation in open science, society and policy**. Eds. Susanne Hecker, Muki Haklay, Anne Browser, Zen Makuch, Johannes Vogel, and Aletta Bonn. UCL Press, London.

Citations in other publications

- Bueno, R. **Dengue returns to Spain: first autochthonous cases in the south of the country**. The International Society for Neglected Tropical Diseases. Octubre 2018.
- MOOC. **"Concepts and Practice of Responsible Research and Innovation"**. Módulo 3 "Inspiring case". HEIRRI project. Centre d'Estudis de Ciència, Comunicació i Societat de la UPF.
- Mathieu Bazin, Craig R. Williams (2018). **Mosquito traps for urban surveillance: collection efficacy**

and potential for use by citizen scientists. Journal of Vector Ecology, 43:1.

- Malek R. et al (2018). **Coupling Traditional Monitoring and Citizen Science to Disentangle the Invasion of Halyomorpha halys**. ISPRS Int. J. Geo-Inf. 2018, 7(5), 171.

Knowledge transfer

- **Identificación del mosquito Aedes japonicus en Asturias**. Evaluación Rápida de Riesgo. Centro de Coordinación de Alertas y Emergencias Sanitarias. MSCBS. 27/7/18.
- Tyson E, et al (2018). **Global Mosquito Alert: Building citizen science capacity for surveillance and control of disease-vector mosquitoes**. Workshop Report, vol. 2, Wilson Centre.
- Equipo Mosquito Alert. **Mosquito Alert ofrece herramientas gratuitas de soporte a acciones de seguimiento y control del mosquito tigre**. INFOPLAGAS, nº82. Agosto 2018.
- Equipo Mosquito Alert. **El transporte accidental en coche como mecanismo de dispersión del mosquito tigre: un factor clave para su seguimiento y control**. INFOPLAGAS, nº83. Octubre 2018.

Presentations in conferences

- 26/11-1/12 Citizen Science Training School: Where Science meets Society - Citizen Science as an emerging tool to expand research horizons. Sicilia.
- 24-25/11 GranaDDDa 2018 Divulgación. Granada.
- 14-16/11 Directors Forum 2018. Ecsite. Science enga-

gement organisations as citizen labs. Museu de Ciències Naturals de Barcelona.

- 4-5/10 Oltra et al. Engaging in the Quadruple Helix innovation framework: bringing together citizens, academics, educators, and the public health sector in the fight against disease vectors. In BDEBATE Open science: from values to practice. Building a roadmap for transformative change. Cosmocaixa Barcelona.
- 20/9 Palmer, J. Envisioning the expertise of the future (European Food Safety Authority). EFSA Conference.
- 4-6/6 Eritja, R. Global Summit of Pest Management Services for Public Health and Food Safety. Lisboa.
- 12/6 Eritja, R. Community participation in the control of disease vectors: Old questions, new approaches. Oxford.
- 16-17/5 Bueno, R. Análisis del riesgo vinculado a la introducción del mosquito tigre en la ciudad de Madrid. IV Congreso Ciudades Inteligentes.
- 16-18/5 Bartumeus, F., Molina, I., F. Isheid (HIV, Hepatitis and Emerging Infectious Diseases). (Marseille, France) A Platform for the Integrated Control of Arbovirolos in CATalonia (PICAT).
- 14-18/5 Bartumeus, F. ISESSAH-InnovSur. Mosquito

Alert: three years tracking disease-vector mosquitoes in Spain with the help of citizen science. Montpellier.

- 17/5 Palmer, J. Vector-borne and water-related disease workshop. The Wilson Centre. Washington DC.
- 24/5 Bartumeus, F. Seminari DATA-SCIENCE: #BigData con ciencia ciudadana (estadística espacial). Universitat de Barcelona.
- 7-9/5 Compte M. 2018. The Mosquito Alert map implementation. A citizen science use case. GIS Service (SIGTE), University of Girona.

Acknowledgements and awards

- 1st Award Ex Aequo. Didactic Materials of Interactive and Non-Interactive Sciences, Science in Action Prize XIX. October 2018.
- Distinction of the Superior Council of Scientific Research to the Director of Mosquito Alert, Frederic Bartumeus, for his scientific merits in the academic period 2017-2018. June 2018.
- City of Barcelona Award 2017. Earth and Environmental Sciences. February 2018.



2.4 Management

Collaboration with administrations in the monitoring and control of the tiger mosquito in cities where it is already established or in those where the species begins to be a problem.

Collaboration agreements with the public administration

University of Extremadura

The University of Extremadura (UEX), the Ministry of Health of the Junta de Extremadura and the citizen science platform Mosquito Alert have initiated a collaboration agreement to detect the tiger mosquito in this Autonomous Community. Several dissemination actions have been carried out to promote participation. In June, tiger mosquitoes were detected in different parts of the region during the “Tiger Mosquito Vigilance Plan”.

[> More information](#)



Parasitology team of the UEX. Photo: UEX



Barcelona

Continued collaboration with the Public Health Agency of Barcelona (ASPB), that validates data sent from participants in the city and include this data in their surveillance and control programs since 2015. This year there are 60 areas of surveillance in the city. During 2018, a total of 152 incidences were sent with the app and answered by the ASPB. 139 of them were inspected and in 16 tiger mosquito activity was detected, followed by treatment actions in the breeding sites.

Thanks to the ASPB the educational material has been developed together with the Environmental Association Xatrach. This year 271 students from 5 different centres have participated doing several sessions in the classrooms and outdoor activities with the technicians of the ASPB.

[> More information](#)

C S B Consorci Sanitari
de Barcelona

+B Agència
de Salut Pública



Photo: Xatrach



Photo: Aj. Viladecans

Convenio con ANECPLA

For the second year, the collaboration with the National Association of Environmental Health Companies (ANECPLA) has promoted the use of the app among its members, fostering the exchange of knowledge between professionals and the project. From Mosquito Alert several informative articles have been elaborated for the Infoplagas magazine, as well as to look for synergies in social networks and in both blogs.

> [More information](#)



Region of Girona

The collaboration agreement with Dipsalut (Public Health Agency of the Diputació de Girona) has made it possible to obtain useful tools for the territory in order to manage the health risk posed by mosquitoes that transmit diseases. During 2018, the team of the Geographic Information

Systems and Space Remote Sensing Service (SIGTE) of the University of Girona has carried out the maintenance of the management portal and has incorporated the prediction model for the presence of the tiger mosquito. The model is based on citizen data and can be consulted freely.



Photos: SIGTE

City of Valencia

The Health Department of the City of Valencia has adopted another year the Mosquito Alert app as another tool for monitoring the tiger mosquito in the city. With the app, citizen can report incidents related to the tiger mosquito in a more agile and fast.



AJUNTAMENT DE VALENCIA

On the other hand, the Valencia City Council uses the Mosquito Alert management portal to complement the tiger mosquito surveillance program.

Community of Madrid

Since the collaboration of 2016, the Community of Madrid maintains Mosquito Alert in the Program of Entomological Surveillance and Sanitary-Environmental Control of Transboundary Vectors of Arboviruses (Dengue, Chikungunya and Zika). On September 21, 2018 the General Directorate of Public Health of the Community of Madrid **confirmed the presence of tiger mosquito in the Community**. The samplings were made within the framework of the Regional Vector Surveillance and Control Plan with interest in Public Health of the Community of Madrid, with the collaboration of the Faculty of Biological Sciences of the Complutense University of Madrid.



Comunidad de Madrid

Between 2014 and 2016 the Mosquito Alert platform has already received several suspicious photos of tiger mosquitoes near Madrid, which probably corresponded to tiger mosquitoes but they did not get to check on the ground. This situation highlights the importance of citizen science for monitoring the tiger mosquito and how it can help follow-up programs.

[> More information](#)



Generalitat de Catalunya



[> More about PICAT](#)

The Infectious Diseases Service of Vall d'Hebron is coordinating the development of a warning system for the risk of the appearance of autochthonous arboviruses such as Zika, dengue or chikungunya in Catalonia within the framework of a PERIS research project (Strategic Plan of Research and Innovation in Health). This warning system or prediction engine will be the final tool resulting from the Integral **Platform for the Control of Arboviruses in Catalonia (PICAT)**, coordinated by Vall d'Hebron and that integrates the information of different organisms involved in the control of these diseases. The forecast is that this prediction engine will be operational in the summer of 2019.

On the other hand, the PICAT includes a calibration part for traps of adult mosquitoes of tiger mosquito with information campaign. This is to validate that it is just as effective the result that a trap can show with the notices that citizens make. To do this, an experiment has been designed together with the ASPB to make this comparison. The ASPB is placed in different strategic points of the city and some of them are inside the Zoo.



Zoo of Barcelona

During the fall of 2018, a campaign was held to ask visitors to the site and staff that if they see tiger mosquitoes during their visit, they will notify them by sending a photo with the Mosquito Alert app.

> [More information](#)



Sponsorships with pest control companies

In 2018, the company Lokímica S.A. has been a “Gold” sponsor of Mosquito Alert. Lokímica S.A. is the leading company in Spain in environmental health and expert in pests, including the tiger mosquito. It is also the main provider of services in Environmental Health in many of the municipalities of the Spanish geography.



With this agreement, Lokímica S.A. has joined the Mosquito Alert project with the aim of disseminating the use of the application among the citizens of the municipalities where it works to get more information on the distribution of the tiger mosquito. On the other hand, the professionals use the Mosquito Alert management portal where they can consult all the observations sent by the citizens and be able to act faster with this incident system and be able to communicate in real time with the users of the app through the system of notifications.



2.5 Internationalisation and global collaboration agreements

- **AIM-COST Aedes Invasive Mosquitoes COST (European Cooperation in Science & Technology):** It is the first European network dedicated to invasive mosquitoes that transmit diseases in Europe. The project brings together a network of researchers from more than 29 European countries and neighboring regions. During 4 years it will allow to establish synergies between scientists, managers and other actors to improve the prevention of public health risks caused by *Aedes* mosquitoes. Frederic Bartumeus, director of Mosquito Alert, coordinates a task within the COST project, with the aim of promoting methodologies based on citizen science for the monitoring and control of these species on a European scale.
- **Global Mosquito Alert Consortium:** It is a global initiative that brings together all citizen science projects that aim to address the global problem of the transmission of diseases through mosquitoes. The objective is to integrate data and procedures of all of them to generate a global warning platform. The initiative comes from an international workshop led by the European Citizen Science Association (ECSA), the Woodrow Wilson International Center for Scholars, and the United Nations Environment Program (UNEP) in April 2017, at its headquarters in Geneva.

John Palmer at The Wilson Centre. Photo: NASA Precipitation



2.6 Community building and outreach

Divulcation articles in the blog

During 2018 we have published 9 divulgation articles related to the tiger mosquito and the yellow fever mosquito and other content related to the project.

> [Go to the blog](#)

Communication indicators

- **Twitter:** 1.850
- **Facebook:** 4.337
- **Total of annual visits:** 27.700
- **Newsletter:** 301 subscriptions

Specialized publications or divulgation works

- Torres M. **Acabar amb el mosquit tigre és cosa de tots.** Revista Espiadimonis, núm 36. *Associació Hàbitats*. Primavera 2018.
- Bravo D., Torres M., Reina D., Pérez J.E., Serrano F.J., Frontera E.M. (2018). **El mosquito tigre: un enemigo que debemos detectar lo antes posible.** Badajoz Veterinaria. *Revista del Colegio Oficial de Veterinarios de Badajoz*. Núm 11. Junio 2018.

Informal meeting with members of the Citizen Science Office of Barcelona. Photo: Oficina CC Bcn



Citizen science networks

Our community has grown and has consolidated in a local and european scale, thanks to the support of the Citizen Science Office of Barcelona, the European Citizen Science Association (ECSA) and the Spanish Observatory of Citizen Science.



Rising awareness activities for the general public and scholarship

- 27/2-2/3. YOMO Festival del móvil. Ciencia y tecnología para jóvenes. Barcelona
- 16/3. Saló de l'ensenyament. Barcelona
- 26/5. Ciència al Carrer. Lleida.
- 1/6. Jornada Ciència Ciutadana: Conservem allò que coneixem. Museu del Ter. Manlleu.
- 9-10/6. Festival de la Ciència. Carpa con la Oficina de Ciencia Ciudadana de Barcelona. Parc de la Ciutadella. Barcelona
- 21/11. Reptes, idees i solucions per fer ciència ciutadana útil i amb impacte. XV Jornada CREA-SCB-ICHN. Barcelona.



Educational project in schools

In 2017, Mosquito Alert together with the Xatrac Environmental Association and the Spanish Foundation for Science and Technology (FECYT), launched an innovative project aimed at educational centers to bring the Mosquito Alert citizen science platform to a young audience, to promote experimentation and awakening scientific vocations.

During the 2017/2018 academic year, the educational project for the city of Barcelona was coordinated by the Urban Pest Surveillance and Control Service of the Public Health Agency of Barcelona (ASPB).

A total of 5 centers in Barcelona participated, with a total of 271 students participating.

Centres:

- INS Montserrat: 1º de Bachillerato.
- INS La Sedeta: 1º y 3º de ESO.
- INS Dr. Puigvert: 2º de ESO.
- INS Narcís Monturiol: 1º d'ESO.
- INS Pau Claris: 2º de ESO.

Other centres that have participated independently:

- Institut Escola Lloret de Mar: 4º de ESO (grupo adaptado).
- British College of Gavà: Year 7 (6º de Primaria), Year 8 (1º de ESO) y Year 9 (2º de ESO).



Photos: Xatrac



Activity with the media

During 2018 we have prepared **5 press releases** with a total of **109 appearances** in the media (radio, television and online and written press). The project is a reliable and rigorous source of information for journalists who want to deal with the topic of the tiger mosquito and other related topics.

> [Press office](#)

Selection of appearances in the media

TELEVISION



Betevé informativos (septiembre 2018)



TVE informativos (agosto 2018)



TV3 informatius (junio 2018)



TV Región de Murcia (abril 2018)



Cugat.cat / La Xarxa (junio 2018)

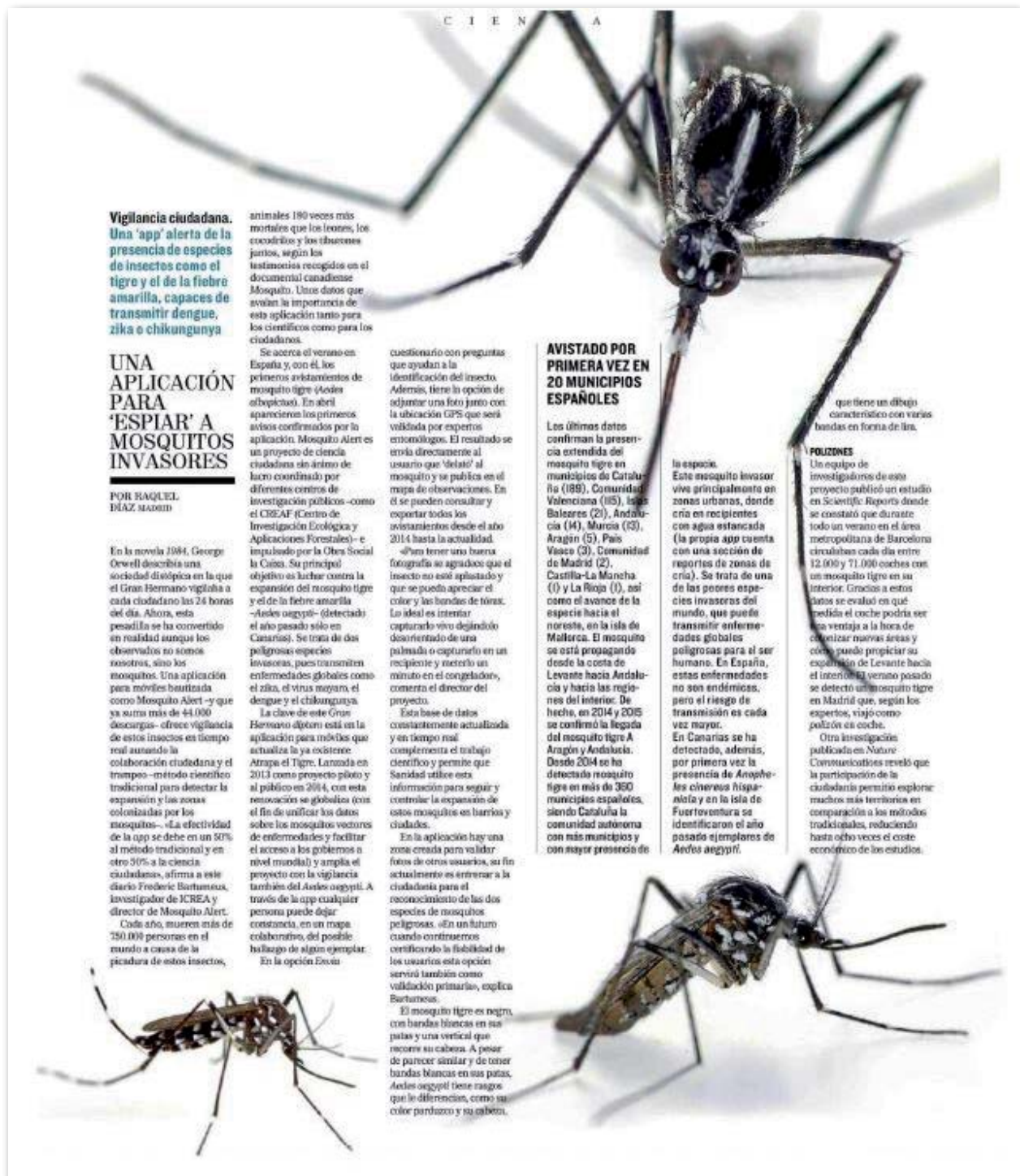


Betevé (febrero 2018)



PRESS

El Mundo (May 2018)



Vigilancia ciudadana. Una 'app' alerta de la presencia de especies de insectos como el tigre y el de la fiebre amarilla, capaces de transmitir dengue, zika o chikungunya

UNA APLICACIÓN PARA 'ESPIAR' A MOSQUITOS INVASORES

POR RAQUEL DEAZ MADRIN

En la novela 1984, George Orwell describía una sociedad distópica en la que el Gran Hermano vigilaba a cada ciudadano las 24 horas del día. Ahora, esta pesadilla se ha convertido en realidad aunque los observados no somos nosotros, sino los mosquitos. Una aplicación para móviles bautizada como Mosquito Alert -y que ya suma más de 44.000 descargas- ofrece vigilancia de estos insectos en tiempo real aumentando la colaboración ciudadana y el tramping-método científico tradicional para detectar la expansión y las zonas colonizadas por los mosquitos-. «La efectividad de la app se debe en un 50% al método tradicional y en otro 50% a la ciencia ciudadana», afirma a este diario Frédéric Burtumeus, investigador de ICREA y director de Mosquito Alert. Cada año, mueren más de 750.000 personas en el mundo a causa de la picadura de estos insectos,

animales 180 veces más mortales que los leones, los cocodrilos y los tiburones juntos, según los testimonios recogidos en el documental canadiense Mosquito. Unos datos que avisan la importancia de esta aplicación tanto para los científicos como para los ciudadanos.

Se acerca el verano en España y, con él, los primeros avistamientos de mosquito tigre (*Aedes albopictus*). En abril aparecieron los primeros avisos confirmados por la aplicación. Mosquito Alert es un proyecto de ciencia ciudadana sin ánimo de lucro coordinado por diferentes centros de investigación públicos -como el CREAF (Centro de Investigación Ecológica y Aplicaciones Forestales)- e impulsado por la Obra Social la Caixa. Su principal objetivo es luchar contra la expansión del mosquito tigre y el de la fiebre amarilla (*Aedes aegypti*) -detectado el año pasado sólo en Canarias-. Se trata de dos peligrosas especies invasoras, pues transmiten enfermedades globales como el zika, el virus zika, el dengue y el chikungunya.

La clave de este Gran Hermano altoparlante está en la aplicación para móviles que actualiza la ya existente. Atrapa el Tigre. Lanzada en 2013 como proyecto piloto y al público en 2014, con esta renovación se globaliza (con el fin de unificar los datos sobre los mosquitos vectores de enfermedades y facilitar el acceso a los gobiernos a nivel mundial) y amplía el proyecto con la vigilancia también del *Aedes aegypti*. A través de la app cualquier persona puede dejar constancia, en un mapa colaborativo, del posible hallazgo de algún ejemplar. En la opción Escu

cuestionario con preguntas que ayudan a la identificación del insecto. Además, tiene la opción de adjuntar una foto junto con la ubicación GPS que será validada por expertos entomólogos. El resultado se envía directamente al usuario que 'delata' al mosquito y se publica en el mapa de observaciones. En él se pueden consultar y exportar todos los avistamientos desde el año 2014 hasta la actualidad.

«Para tener una buena fotografía se agradecen que el insecto no esté aplastado y que se pueda apreciar el color y las bandas de tigras. Lo ideal es intentar capturarlo vivo dejándolo desorientado de una palmada o capturarlo en un recipiente y meterlo en el congelador», comenta el director del proyecto.

Esta base de datos constantemente actualizada y en tiempo real complementa el trabajo científico y permite que Sanidad utilice esta información para seguir y controlar la expansión de estos mosquitos en barrios y ciudades.

En la aplicación hay una zona creada para validar fotos de otros usuarios, su fin actual es erradicar a la ciudadanía para el reconocimiento de las dos especies de mosquitos peligrosas. «En un futuro cuando continuemos certificando la fiabilidad de los usuarios esta opción servirá también como validación primaria», explica Burtumeus.

El mosquito tigre es negro, con bandas blancas en sus patas y una vertical que recorre su cabeza. A pesar de parecer similar y de tener bandas blancas en sus patas, *Aedes aegypti* tiene rasgos que le diferencian, como su color parduzco y su cabeza,

AVISTADO POR PRIMERA VEZ EN 20 MUNICIPIOS ESPAÑOLES

Los últimos datos confirman la presencia extendida del mosquito tigre en municipios de Cataluña (189), Comunidad Valenciana (115), Islas Baleares (21), Andalucía (14), Murcia (13), Aragón (5), País Vasco (3), Comunidad de Madrid (2), Castilla-La Mancha (1) y La Rioja (1), así como el avance de la especie hacia el noroeste, en la isla de Mallorca. El mosquito se está propagando desde la costa de Levante hacia Andalucía y hacia las regiones del interior. De hecho, en 2014 y 2015 se confirmó la llegada del mosquito tigre a Aragón y Andalucía. Desde 2014 se ha detectado mosquito tigre en más de 350 municipios españoles, siendo Cataluña la comunidad autónoma con más municipios y con mayor presencia de

la especie. Este mosquito invasor vive principalmente en zonas urbanas, donde cría en recipientes con agua estancada (la propia app cuenta con una sección de reportes de zonas de cría). Se trata de una de las peores especies invasoras del mundo, que puede transmitir enfermedades globales peligrosas para el ser humano. En España, estas enfermedades no son endémicas, pero el riesgo de transmisión es cada vez mayor.

En Canarias se ha detectado, además, por primera vez la presencia de *Anopheles cinereus hispaniola* y en la isla de Fuerteventura se identificaron el año pasado ejemplares de *Aedes aegypti*, que tiene un dibujo característico con varias bandas en forma de lira.

POLIZONES

Un equipo de investigadores de este proyecto publicó un estudio en Scientific Reports donde se constató que durante todo un verano en el área metropolitana de Barcelona circulaban cada día entre 12.000 y 71.000 coches con un mosquito tigre en su interior. Gracias a estos datos se evaluó en qué medida el coche podría ser una ventaja a la hora de colonizar nuevas áreas y cómo puede propiciar su expansión de Levante hacia el interior. El verano pasado se detectó un mosquito tigre en Madrid que, según los expertos, viajó como polizón en coche.

Otra investigación publicada en Nature Communications reveló que la participación de la ciudadanía permitió explorar muchos más territorios en comparación a los métodos tradicionales, reduciendo hasta ocho veces el coste económico de los estudios.

El mosquito asiático, cerca de Galicia

El «*Aedes japonicus*», localizado en Asturias por primera vez en España, pone sobre aviso a las comunidades vecinas del norte. Se asienta en zonas húmedas

MATEO CASAL, R.R.
REDACCIÓN / LA VOZ

Austria, Bélgica, Francia, Suiza, Países Bajos, Alemania... Y ahora también España. Y quizás Galicia. El mosquito *Aedes japonicus*, una especie invasora de origen asiático, fundamentalmente de Japón y Corea, y con capacidad de transmitir enfermedades como el virus del Nilo Occidental, se ha identificado por primera vez en la Península. Su presencia se localizó en Asturias gracias al proyecto de ciencia ciudadana Mosquito Alert. Una plataforma impulsada por la Obra Social 'la Caixa' y coordinada por investigadores del Creaf, el CEAB-CSIC e Icrea que incluye una aplicación móvil. A través de ella se pueden remitir fotografías de las especies de mosquito sospechosas para que sean analizadas por los entomólogos.

Fue lo que hizo un ciudadano de Siero (Asturias). Mandó una imagen y tras ser estudiada, se le notificó que enviara por correo ejemplares de adulto y larvas, sobre los cuales se confirmó la sospecha. Era el mosquito *Aedes japonicus*, una especie invasora capaz de adaptarse a nuevos ambientes y con una distribución natural en el norte de España. «Galicia, Asturias, País Vasco, Cantabria son las zonas propensas. Les gustan las temperaturas frías y zonas boscosas de árboles caducifolios», explica Frederic Bartumeus, director de Mosquito Alert. Desde Asturias ya les enviaron dos o tres fotografías sospechosas de pertenecer a esta especie. Por ello, animan a los norteños a descargarse la aplica-



Las tres especies más peligrosas localizadas en España. De izquierda a derecha: el mosquito asiático (*Aedes japonicus*), el tigre (*Aedes albopictus*) y el de la fiebre amarilla (*Aedes aegypti*). Los tres fueron descubiertos en España. El último, el mosquito asiático, en Siero (Asturias). CREAF



Búsqueda del mosquito asiático en Asturias. CREAF

«Galicia, Asturias, País Vasco y Cantabria son zonas propensas. Les gustan las temperaturas frías»

Frederic Bartumeus
Director de Mosquito Alert

El mosquito de la fiebre amarilla, localizado el pasado año en Canarias, es un transmisor potente del dengue. No obstante, el asiático, a priori, no es problemático. Lo mismo que el mosquito tigre.

ción y enviar imágenes de mosquitos sospechosos. Podrían estar en Galicia y no saberlo.

Esta especie puede transmitir el virus del Nilo Occidental. Sin embargo, no es alarmante, ya que suele transferirse entre aves y mosquitos. «Se da en zonas de paso de aves migratorias, como Gibraltar o Andalucía. A veces pasa a caballos, pero muy rara

vez a humanos. La jirafa al norte maticos a ofrece un lluvia, es prevenir puntos de mular agros de aniseja Bartumeus.

Detecten un nou mosquit invasor gràcies a una app

■ L'«*Aedes japonicus*» trobat a Astúries pot transmetre diverses malalties

Xavi Aguilar
BARCELONA

Entomòlegs del programa Mosquito Alert, una aplicació que permet als ciutadans avisar la comunitat científica de la presència de mosquits, han detectat per primera vegada a l'Estat i al sud d'Europa la presència del mosquit d'origen asiàtic *Aedes japonicus*, que és capaç de transmetre diverses malalties, entre elles el virus del Nilo Occidental.

El mosquit va ser localitzat a partir d'una fotografia que un ciutadà d'Astúries va penjar a l'app de ciència ciutadana impulsada per la Fundació Bancària La Caixa. La troballa va ser avaluada i confirmada per entomòlegs de Mosquito Alert, projecte en el qual participa el Centre de



Un exemplar del mosquit 'Aedes japonicus' ■ MARK YOKOYAMA

Recerca Ecològica i Aplicacions Forestals (Creaf) de la Universitat de Barcelona, i també per responsables del projecte de vigilància entomològica del Ministeri de Sanitat, Consum i Benestar Social. El responsable dels entomòlegs de Mosquito Alert, Roger Eritja, explica que el mosquit es va trobar en tots els estadis de l'evolució i en diferents localitzacions properes. De fet,

Eritja no descarta que l'*Aedes japonicus* estigui establert "en una àrea molt més àmplia", motiu pel qual anima els ciutadans a usar l'aplicació.

Aparentment, el mosquit invasor pot recordar el mosquit tigre, però és bastant més gran, de color marró i amb diverses línies de color daurat al tòrax. Pot volar llargues distàncies i és molt resistent al fred. ■

El Punt Avui (August 2018)

La Voz de Galicia
(August 2018)

ONLINE PRESS

La Razón (October 2018)

Dengue: Las lluvias favorecerán la expansión del mosquito tigre

El descenso de las temperaturas hace presagiar que no habrá más casos autóctonos de dengue, enfermedad que transmite este mosquito, pero la «tropicalización» del clima supone que este insecto seguirá colonizando la Península



Este año se ha detectado la presencia de este mosquito en Madrid y Extremadura y ya está instalado en 122 municipios de España / Efc

EL MOSQUITO TIGRE, BAJO LA LUPA

CÓMO SE TRANSMITE

Otros mosquitos se infectan al picar al humano

El virus se multiplica en el intestino del insecto antes de pasar a la saliva

El mosquito infectado pica al humano y le transmite el virus a través de su saliva

Mosquito Aedes aegypti

No se transmite de persona a persona

El virus se multiplica en el tejido corporal antes de extenderse a la sangre para infectar los glóbulos blancos

SÍNTOMAS

- Fiebre alta
- Fuertes dolores de cabeza
- Dolor muscular
- Náuseas
- Picore

Dos semanas de incubación. No hay vacuna.

Una ligera infección provoca fiebre duradera.

El dengue hemorrágico fuerte provoca desangramiento generalizado.

El Centro Nacional de Microbiología del Instituto de Salud Carlos III confirmó el día 4 de octubre dos casos en España y otro pendiente de confirmación

Las tres personas iniciaron síntomas durante la **segunda quincena de agosto**. Actualmente presentan buen estado de salud

En países de nuestro entorno, como Francia o Italia, también se han detectado en los últimos años casos de dengue de forma esporádica

Infografía LA RAZÓN

La Nueva España (September 2018)

Los investigadores piden ayuda para acotar la presencia del mosquito asiático

Aitana Oltra, coordinadora científica de la plataforma Mosquito Alert, advierte al Principado de la necesidad de vigilar la expansión de la especie invasora

Marián Martínez | Oviedo | 26.09.2018 | 01:22

El descubrimiento del "Aedes japonicus", o mosquito asiático, el pasado mes de agosto en una finca de La Figarona, en la parroquia sienes de Anes, hizo saltar las alarmas sanitarias, al ser la primera vez que se encontraba esta especie en todo el país. Lo más urgente es vigilar su expansión, al tener el norte un clima muy propicio para su reproducción y desarrollo. La plataforma Mosquito Alert, que fue la primera en alertar de su presencia, pidió ayer colaboración al Principado y a los asturianos en la tarea de vigilancia que ha



Jorge Chachero, en el bebedero de su finca de La Figarona en el

El Periódico Extremadura (June 2018)

el Periódico Extremadura

EXTREMADURA

EXTREMADURA SE PREPARA ANTE LA POSIBLE APARICIÓN DEL INSECTO

A la 'caza' del mosquito tigre

Una aplicación móvil permitirá alertar de su presencia con una fotografía

Mosquito Alert

MIS PUNTOS: 72

NIVEL CONSEGUIDO: Oro

ENVÍA LUGAR DE CRÍA

ENVÍA MOSQUITO

MI MAPA

VALIDA FOTOS

NOTIFICACIONES

Coordination and acknowledgements

4

The project is coordinated by the CREA, CEAB-CSIC and ICREA institutions, with the support of the Obra Social “la Caixa”, the co-financing of Dipsalut (Autonomous Body of Public Health of the Diputació de Girona) and the sponsorship of Lokímica SA. The PICAT platform is led by the Vall d’Hebrón Research Institute (VHIR), with funding from the Department of Health of the Generalitat de Catalunya. They are also members of the PICAT ISGlobal, the ASPB, Dipsalut and the Servei de Control de Mosquits del Baix Llobregat.

Special thanks to all the people who participate anonymously, collecting and sending data with the Mosquito Alert app and disseminating the project. Also the involvement of many public and private entities and the support of many professionals and collaborators.

Finally, thanks to the entire team of Mosquito Alert for the dedicated effort and constant work in all areas of the project, making it grow day after day.



MOSQUITO



ALERT



info@mosquitoalert.com
www.mosquitoalert.com
Twitter: @Mosquito_Alert
[Facebook.com/mosquitoalert](https://www.facebook.com/mosquitoalert)