DOI: 10.1111/epp.12892

ORIGINAL ARTICLE

Being prepared for huanglongbing disease of citrus: a simulation exercise workshop for contingency planning held in Valencia, Spain

Carola Aragón[1] | **Vicente Dalmau**[1] | **Carles Escrivà**[1] | **Amparo Ferrer**[1] | **Maria Ăngeles Forner-Giner**[2] | **Anaís Galvañ**[2] | **Sara García-Figuera**[3] | **Elena Lázaro**[2] | **Joséphine Meyer**[4] | **Rob Tanner**[4] | **Antonio Vicent**[2]

[1]Conselleria de Agricultura, Desarrollo Rural, Emergencia Climática y Transición Ecológica, Valencia, Spain

[2]Institut Valencià d'Investigacions Agràries (IVIA), Valencia, Spain

[3]Department of Plant Pathology, University of California-Davis, Davis, California, USA

[4]European and Mediterranean Plant Protection Organization, Paris, France

Correspondence
Rob Tanner, European and Mediterranean Plant Protection Organization, Paris, France.
Email: rt@eppo.int

Antonio Vicent, Institut Valencià d'Investigacions Agràries (IVIA), Valencia, Spain.
Email: vicent_antciv@gva.es

Funding information
PRE-HLB Preventing HLB epidemics for ensuring citrus survival in Europe, Grant/Award Number: 817526 and H2020-SFS-2018-2

Abstract

Contingency plans aim to ensure a rapid and effective response to an outbreak of a pest likely which is to have a major impact. Huanglongbing is a devastating disease of citrus not yet present in the European and Mediterranean Plant Protection Organization (EPPO) region. A simulation exercise workshop for contingency planning was held in Valencia, Spain over 3 days in October 2021 as part of the PRE-HLB project funded by the European Union Horizon 2020 programme. In total, 49 experts from the EPPO region attended the workshop. Participants represented a range of stakeholders from citrus cooperatives, grower associations, nursery workers, citrus exporters, landscapers and gardeners, scientists, Regional Plant Health Authorities, National Plant Protection Organizations and the European Commission. Participants were split into five groups and each group acted as an outbreak management team for a scenario based on a finding of a quarantine pest. The scenario followed the first (fictitious) finding of *Diaphorina citri* (the insect vector of '*Candidatus* Liberibacter asiaticus', a causal agent of huanglongbing) at a citrus orchard in Spain. As the scenario developed over a month time scale, each team had to organize themselves to manage a number of issues designed to mimic the development of an outbreak of huanglongbing of citrus over the course of the exercise. The groups acknowledged the usefulness of the Spanish contingency plans for huanglongbing and its vectors, the EPPO Standards, and the risk-based surveillance design tool RiBESS+.

Se préparer à la maladie du huanglongbing des agrumes : un atelier sous forme de simulation pour s'exercer à la planification d'urgence qui s'est tenu à Valence (Espagne)

Les plans d'urgence visent à garantir une réponse rapide et efficace en cas d'apparition d'un foyer d'un organisme nuisible susceptible d'avoir un impact majeur. La maladie du huanglongbing est une maladie dévastatrice des agrumes qui n'est pas encore présente dans la région OEPP. Un atelier sous forme d'exercice de simulation pour la planification des mesures d'urgence s'est tenu à Valence, en Espagne, pendant 3 jours en octobre 2021 dans le cadre du projet Pre-HLB

financé par le programme Horizon 2020 de l'Union européenne. Au total, 49 experts de la région OEPP ont participé à l'atelier. Les participants représentaient un éventail d'acteurs, issus de coopératives produisant des agrumes, d'associations de producteurs, de pépiniéristes, d'exportateurs d'agrumes, de paysagistes et de jardiniers, de scientifiques, d'autorités phytosanitaires régionales, d'organisations nationales de protection des végétaux (ONPV) et de représentants de la Commission européenne. Les participants ont été répartis en cinq groupes et chaque groupe a joué le rôle d'une 'équipe de gestion du foyer' sur un scénario basé sur la découverte d'un organisme de quarantaine. Le scénario suivait la première découverte (fictive) de *Diaphorina citri* (l'insecte vecteur de '*Candidatus* Liberibacter asiaticus', un agent causal de la maladie du huanglongbing) dans un verger d'agrumes en Espagne. Le scénario se déroulait sur un mois, et chaque équipe a dû s'organiser pour gérer un certain nombre de problèmes destinés à imiter le développement d'un foyer de huanglongbing au cours de l'exercice. Les groupes ont reconnu l'utilité des plans d'urgence espagnols pour le huanglongbing et ses vecteurs, ainsi que l'utilité des Normes OEPP et l'outil RiBESS+ permettant de concevoir de la prospections basée sur le risque.

Готовность к болезни Хуанглонгбинг цитрусовых: семинар по моделированию планирования действий в чрезвычайных ситуациях, проведенный в Валенсии, Испания

Планы действий в чрезвычайных ситуациях направлены на обеспечение быстрого и эффективного реагирования на вспышку массового размножения вредного организма, который может иметь серьезные последствия. Хуанглонгбинг (HLB) - это опасное заболевание цитрусовых, пока не зарегистрированное в регионе ЕОКЗР. В октябре 2021 года в Валенсии, Испания, в течение 3 дней проводился семинар по моделированию планирования действий в чрезвычайных ситуациях в рамках проекта Pre-HLB, финансируемого программой Европейского Союза «Horizon 2020». Всего в семинаре приняли участие 49 экспертов из региона ЕОКЗР. Участники представляли целый ряд заинтересованных сторон из кооперативов по выращиванию цитрусовых, ассоциаций производителей, работников питомников, экспортеров по цитрусовым, озеленителей и садоводов, ученых, региональных органов по охране здоровья растений, национальных организаций по карантину и защите растений (НОКЗР) и представителей Европейской комиссии. Участники были разделены на пять групп, и каждая группа выступила в роли 'Группы управления вспышкой массового размножения' для сценария, основанного на обнаружении карантинного вредного организма. Сценарий был основан на первом (гипотетическом) обнаружении *Diaphorina citri* (насекомого-переносчика '*Candidatus* Liberibacter asiaticus', возбудителя болезни Хуанглонгбинга) в цитрусовом саду в Испании. Поскольку сценарий развивался в течение месяца, каждая группа в ходе учений должна была организовать свою работу по решению ряда проблем, связанных с развитием вспышки хуанглонгбинга цитрусовых. Группы признали полезность испанских планов действий в чрезвычайных ситуациях при вспышке болезни Хуанглонгбинг, стандартов ЕОКЗР и инструмента разработки надзора на основе рисков RiBESS+.

1 | OVERVIEW

1.1 | The Pre-HLB project

A simulation exercise workshop for contingency planning was organized by the Institut Valencià d'Investigacions Agràries (IVIA) and the Plant Health Service in Valencia, Spain between the 19th and 21st of October, 2021, as part of the Pre-HLB project (https://www.prehlb.eu/) funded by the European Union (EU) Horizon 2020 programme. The workshop was organized in collaboration with the project partners and the European and Mediterranean Plant Protection Organization (EPPO) and was based on the experience of a previous simulation exercise for a forestry pest held in Serbia in 2018 (Tanner et al., 2019).

Among other objectives, the Pre-HLB project aims to build up competencies and assist to improve contingency plans to prevent huanglongbing introduction in the EU and associated countries. The activities of Pre-huanglongbing aim to create collective awareness about huanglongbing response plans. Stakeholders including citrus growers, packinghouse managers, citrus nursery workers, consultants, input suppliers and the general public should be aware of the risks posed by huanglongbing, as well as the scientific basis for the control measures foreseen in the contingency plans.

1.2 | The importance of simulation exercises

Technical workshops and other knowledge transfer activities are key to raise awareness among stakeholders and the general public about responses to plant health threats. In this line, the new EU Plant Health Law (Regulation EU 2016/2031, European Union, 2016) establishes that EU Member States shall carry out simulation exercises concerning the implementation of the contingency plans for all priority quarantine pests, defined as those with the most potentially severe economic, environmental or social impact. The bacteria '*Candidatus* Liberibacter spp.', associated with huanglongbing, are included in this list of priority quarantine pests (Regulation EU 2019/1702, European Union, 2019).

1.3 | The importance of huanglongbing disease to the EPPO region

Huanglongbing disease of citrus is associated with three bacterial species: '*Candidatus* Liberibacter asiaticus', which is vectored by the psyllid *Diaphorina citri* and was first described in Asia; '*Candidatus* Liberibacter africanus', which is vectored by *Trioza erytreae* and was first described in Africa (Bové, 2006); and '*Candidatus* Liberibacter americanus', found in Brazil, which is also vectored by *D. citri* (Teixeira et al., 2005, cited in EPPO, 2022a). The huanglongbing bacteria have been not reported in the EPPO region, although *T. erytreae* is present in the Iberian Peninsula, the Canary Islands and Maderia. *D. citri* has recently been reported in Israel (EPPO, 2022a, 2022b, 2022c, 2022d). Huanglongbing is a major threat to citrus production in the EPPO region because infected trees suffer from phloem disruption, fruits are mishappen, taste bitter and fall prematurely, and trees eventually die (McCollum & Baldwin, 2016). The species '*Ca*. L. asiaticus' is particularly aggressive and has had a significant impact on citrus production in the major citrus-growing states in Brazil, where it was first reported in 2004 (Bassanezi et al., 2020), and in the state of Florida in the United States, where it was first reported in 2005 (Graham et al., 2020). In the absence of citrus varieties that were resistant to the disease, early experiences trying to manage huanglongbing in these areas suggested that the best approach was to prevent trees from getting infected by detecting and removing infected trees as soon as possible, replacing them with certified pathogen-tested plant material and applying coordinated insecticide treatments against the insect vector to limit disease spread (Gottwald, 2010). This was the approach followed as huanglongbing spread to other citrus-growing areas in Mexico, the United States and Argentina (Garcia-Figuera et al., 2021). However, as citrus stakeholders, plant health regulators and researchers have improved their understanding of the epidemiology of huanglongbing, management approaches have evolved and there are many potential solutions being investigated. In the meantime, citrus-growing areas such as the state of California in the United States have limited the expansion of the initial huanglongbing quarantine area and avoided the spread of the disease to commercial citrus. This has been achieved through a tightly coordinated response that involves risk-based surveys, massive testing and removal of citrus trees, restrictions in the movement of citrus fruits and plants, coordinated insecticide treatments to control *D. citri* in commercial citrus production areas, and a biological control program in residential areas (McRoberts et al., 2019).

1.4 | Contingency plan for huanglongbing and its insect vectors

Following the provisions of Regulation EU 2016/2031, the National Plant Protection Organization (NPPO) in Spain, the Ministry of Agriculture, Fisheries and Food, and the Regional Plant Health Authority in Comunitat Valenciana developed a contingency plan for huanglongbing and its vectors (GVA-Agroambient, 2016; MAPA, 2021a, 2021b, 2021c). This contingency plan provides specific guidelines on the organization and responsibilities of the stakeholders involved, the background, symptoms and legal provisions of the pest, relevant factors in the prevention, detection, damage and control of the pest, and containment procedures. The plan details

FIGURE 1 Setting of the simulation exercise for huanglongbing at the facilities of the Institut Valencià d'Investigacions Agràries (IVIA), Valencia, Spain

the agencies involved and their main responsibilities, including the NPPO, the plant health authorities of the autonomous communities, the national reference laboratories and the emergency management team, which deals, in particular, with the tactical and operational aspects of the plan.

If an outbreak is confirmed, specific action plans will be derived from the execution of the contingency plan. The plan also includes a surveillance program detailing how official inspections should be carried out, how samples should be taken, diagnostic tests that could be used in the field, the psyllids sampling procedure to be followed, the necessary material and equipment to be used, and the most appropriate time to carry out the work.

In case of suspicion of the presence of the harmful organisms, precautionary measures should be adopted to confirm their presence in an area, and to prevent their spread out of this area while the pest situation is defined. The plant health authority will carry out official surveys in the outbreak area. Surveys will include the inspection and sampling of the host plants and on-site verification of the presence of potential vectors. Relevant information will be gathered, such as the location of the citrus production plots and nurseries that produce and/or market plants of the Rutaceae family. Precautionary marking and immobilization of the sampled plants will be performed. In addition, precautionary measures will be taken to restrict the access of people to the affected area and to destroy the diseased plant materials.

If the presence of the harmful organisms is confirmed, the autonomous community must immediately inform the NPPO and apply the specifically defined eradication program, which consists of three basic activities: demarcation, eradication and prevention of spread. Demarcation of a regulated area is based on carrying out delimiting surveys to identify and mark all infected/infested plants and delimit the infested zone. Then a buffer zone is established around this infested zone, where intensive detection surveys of host plants, nurseries and garden centres should be established. Actions for eradication will differ depending on whether (i) only vectors, (ii) only huanglongbing or (iii) both vectors and huanglongbing are detected. When the vector is present, psyllid control is the immediate priority. In case of huanglongbing detection, it is essential to detect all infected trees and proceed immediately to their on-site elimination. The eradication program also has a management plan to prevent the spread of the organisms from the regulated area. This includes activities to engage with stakeholders and the lay public as well as conducting outreach and awareness campaigns.

1.5 | Logistics of the workshop

In total, 49 experts from the EPPO region attended the workshop, which was mainly held outdoors due to the Covid-19 situation (Figure 1). Participants represented a range of stakeholders from citrus cooperatives, grower associations, nursery workers, citrus exporters, residential plants services, scientists, Regional Plant Health Authorities, NPPOs and representatives from the European Commission Directorate-General for Health and Food Safety (DG SANTE). Most of the stakeholders were from Spain, but some came from Portugal and Italy. Participants were split into five groups for the exercise and each group acted as an outbreak management team for the same scenario, based on a fictitious finding of one of the vectors of huanglongbing and the disease itself in a major citrus production region of Spain.

Groups were formed considering the different types of stakeholders. Some stakeholder types, such as members of cooperatives and scientists, were represented in all five groups (Table 1). However, others, such as nursery workers and landscapers/gardeners, were under-represented and participated only in one or two groups. This heterogeneity in the group composition was expected to influence the outcomes of the simulation exercise, as the different sensitivities were not equally represented in all the groups. Different perceptions and compliance with the contingency plan for huanglongbing by the different stakeholder groups were captured in the feedback session at the end of the exercise.

The aims of the workshop were to:

TABLE 1 Number of participants in each group according to stakeholder type.

Stakeholder type	Group 1	Group 2	Group 3	Group 4	Group 5
Cooperatives	1	1	1	1	1
Grower associations	1	2	1	1	0
Nursery workers	0	0	2	0	0
Citrus exporters	1	2	0	2	2
Landscapers and gardeners	0	1	0	0	2
Scientists	3	1	1	2	3
Regional Plant Health Authorities	0	2	4	3	1
National Plant Protection Organizations	2	1	1	0	1
European Commission	2	0	0	0	0

a. Simulate the experience of a phytosanitary emergency
b. Experiment with responses to an emergency
c. Test whether relevant contingency plans are available and fit for purpose
d. Test the availability and relevance of other resources, e.g. EPPO guidance
e. Provide experience in communicating key messages during an emergency
f. Learn why and how to develop contingency plans
g. Learn how to communicate with different stakeholders in case of a phytosanitary emergency
h. Learn how to carry out an emergency response exercise.

To make the exercise realistic, details of the outbreak scenario were not shared with participants in advance, but the necessary information (e.g., reference materials) was provided during the workshop.

2 | THE SCENARIO

The scenario developed over the course of a month following the first (fictitious) finding of *D. citri* (the vector of '*Ca*. L. asiaticus') at a citrus orchard in Comunitat Valenciana, Spain. With more than 150 000 ha (MAPA, 2021d), this is the largest citrus-growing region in Europe, and so it was considered a proper case to test the contingency plan. Note, this was only a scenario for the workshop, as the vector (*D. citri*) and the disease are not recorded from Spain. The main purpose was not to learn specifically about the biology and ecology of the vector and the epidemiology of the disease, but to recreate the confusion and stress of a real emergency and learn from that experience how to pull together an effective team to manage the response to an outbreak.

The scenario began on a Friday morning in May where each outbreak team received a report from a local inspector of some 'worrying' symptoms on sweet orange (*Citrus sinensis*) trees at a fictitious citrus orchard close to Valencia, in a region where citrus trees are commonly found in commercial orchards and in gardens and parks. Over the course of the next 2 days (1 month in the scenario time), the scenario developed where more citrus trees were reported showing symptoms, the laboratory confirmed the identification of *D. citri* and later confirmed the presence of '*Ca*. L. asiaticus' in nymphs. Requests were made for information (and reassurance that everything was under control) from the NPPO, the general public and neighbouring countries.

The inputs came in rapidly to the teams, just as in a real-life situation, and they were varied. Inputs could be classified as problems or issues each group had to deal with as the scenario unfolded. For example, one input was about car problems the inspectors were having and another was about selecting volunteer staff, with varying levels of expertise, to work during the weekend. The teams had to deal with these staff issues as well as managing the outbreak itself.

There were logistical and financial issues to deal with as well. The leaders of the outbreak teams were concerned with the costs and needed to reallocate financial resources to deal with the outbreak. Each team was asked to prepare resource forecasts for the short, medium and long term. One input concerned one landowner refusing to allow inspectors access to his land.

Some inputs were collaboration offers from modellers to predict the rate of spread linked to research in remote sensing. Others were from worried members of the public. For example, one school was concerned with news that insecticides were to be sprayed on citrus trees in the neighbouring area and wanted reassurance that it would be safe for students in the school. This led on to a number of other inputs that focused on communication with different stakeholders. Each outbreak team had to produce a press release and compile a list of frequently asked questions and answers that could be used when communicating with the media.

On top of all this, the outbreak team had to decide how to manage the outbreak. Each team had to organize surveys to evaluate the area affected, assess inspectors' and laboratory reports, and decide on the extension of

the regulated area and what measures should be taken within it. Each team had extensive discussions on how to demarcate the regulated area and how to design surveys within it. Following the confirmation of the pest from the laboratory reports, they also had to discuss the area required for clear-cut, i.e. an area where all host plants would have to be cut down and destroyed.

Although at the beginning of the scenario each group had to select a leader who acted as the head of the plant quarantine unit, the groups were deliberately not given any guidance on how they should structure themselves internally. As the scenario developed, it became clear that dealing with a high influx of inputs was better managed if the groups divided into smaller teams. In addition, each team already had key skills where some team members had more experience in management or public communications, for example, compared to others.

3 | GUIDANCE

Each outbreak management team had a facilitator from the planning group whose role was to ensure that every participant was aware of the purpose and rules of the exercise, to make sure that everyone got involved and benefitted from the exercise, and to provide guidance to the team if they were going off track or falling behind, when needed.

Information available included maps of the region along with overlay maps of citrus production areas. These maps were a central part of the information provided to each team. Additionally, relevant EPPO Standards, such as the recently published National Regulatory Control System Standard PM 9/27 '*Candidatus Liberibacter' species that are casual agents of Huanglongbing disease of citrus and their vectors: procedures for official control* (EPPO, 2020), as well as PM 9/10 *Generic elements for contingency plans* (EPPO, 2009) and PM 9/18 *Decision support scheme for prioritizing action during outbreaks* (EPPO, 2014). Furthermore, Spanish and regional contingency plans for both the vector and the disease were also available (GVA-Agroambient, 2016; MAPA, 2021a, 2021b, 2021c), as well as the EFSA Pest survey card on Huanglongbing and its vectors (ESFA et al., 2019).

Additionally, a collective activity was addressed during the exercise with the aim of introducing participants to the EFSA Plant Pest Survey Toolkit (EFSA, 2022). This toolkit has been developed by EFSA to assist EU Member States in using a statistically sound and risk-based approach to plan surveillance activities for quarantine organisms, in line with current international standards. The toolkit consists of pest-specific documents, such as pest survey cards, for addressing the preparation of surveys, and general and specific guidelines, plus the statistical tool RiBESS+ for the design of statistically sound and risk-based surveys.

The collective activity started with a brief presentation of the most important aspects of surveillance under the EU Plant Health Law (Regulation EU 2016/2031, European Union, 2016). Next, the EFSA toolkit was presented with special emphasis on explaining the phases of survey preparation and design, the specific objectives of each phase, how they are connected and the EFSA reference documents that address each of these phases. Then, the statistical RiBESS+ software was introduced together with the definition and interpretation of the survey parameters that have to be quantified and fulfilled in the software to estimate the survey efforts.

After the presentation of the EFSA toolkit, the audience took part in a practical simulation of a survey design, framed in the epidemiological context of the exercise. The proposed design scenarios involved a buffer zone survey for huanglongbing surveillance. Buffer zone intensive detection surveys are intended to ensure pest freedom around an infested zone. The design scenarios differed in the quantification of the survey parameters (e.g. method sensitivity, design prevalence), and they were discussed and compared in terms of survey efforts and the conclusions about the pest status that could be derived after their implementation.

4 | FEEDBACK

At the end of the exercise, all groups came together and presented their experience of the simulation exercise. Each group summarized the main approach that they had followed based on the inputs provided, and also gave feedback on the exercise. Each group indicated that they had learned significant lessons about dealing with an outbreak. The groups highlighted the advantage of having stakeholders from several sectors present at the workshop. In fact, they noted that sharing their experience at the end of the workshop improved their understanding of the point of view of each type of stakeholder.

Some groups suggested improvements that will be taken into consideration when preparing future simulation exercises. Participants noted the usefulness of the RiBESS+ tool, and suggested that this tool could be incorporated into simulation exercises in the future. The groups acknowledged the usefulness of the EPPO Standards and emphasized the importance of the Spanish contingency plans. These documents contain all the relevant information required for dealing with an outbreak of huanglongbing and its vectors. Participants suggested that in the future the following actions could be considered as possible improvements/additions to the contingency plan:

- To combine the contingency plans (of the NPPO and the Regional Plant Health Authority) into a single document to facilitate access to information and

implementation of control measures
- To estimate the necessary resources for the implementation of the contingency and action plans
- To present the criteria for the development of emergency response groups in the event of a possible outbreak: availability of field inspectors, number of members in each team, availability of laboratory staff to process samples in good conditions
- To detail a protocol to make official notifications of pest findings to avoid wrong information leaking to the media, since this may generate alarm among local citizens
- To include a procedure to notify affected citrus owners: appropriate time, precautionary measures, means of communication, justification of the measures to be taken, etc.
- To specify the procedure to be followed to access private properties for plant inspection and eradication measures
- To specify the physical protection requirements that screen houses must have in nurseries (biosecurity plan)
- To define the phytosanitary criteria for the movement and commercialization of citrus plants and fruits in regulated areas, for instance whether fruits with or without leaves can be moved to be handled in packing houses outside the regulated area.

FUNDING INFORMATION

Financial support through the project PRE-HLB Preventing HLB epidemics for ensuring citrus survival in Europe (H2020-SFS-2018-2 Topic SFS-05-2018-2019-2020, proj. no. 817526; https://www.prehlb.eu/).

REFERENCES

Bassanezi RB, Lopes SA, de Miranda MP, Wulff NA, Volpe HXL, Ayres AJ (2020) Overview of citrus huanglongbing spread and management strategies in Brazil. *Tropical Plant Pathology*, 45, 251–264. https://doi.org/10.1007/s40858-020-00343-y

Bové JM (2006) Huanglongbing: a destructive, newly-emerging, century-old disease of citrus. *Journal of Plant Pathology*, 88, 7–37. https://doi.org/10.4454/jpp.v88i1.828

EFSA (2022) Toolkit for plant pest surveillance in the EU. *EFSA Journal*, virtual issue. Available online: https://efsa.onlinelibrary.wiley.com/doi/toc/10.1002/(ISSN)1831-4732.toolkit-plant-pest-surveillance

EPPO (2022a) '*Candidatus Liberibacter americanus*'. EPPO datasheets on pests recommended for regulation. Available online: https://gd.eppo.int/taxon/LIBEAM/datasheet

EPPO (2022b) *Trioza erytreae*. EPPO datasheets on pests recommended for regulation. Available online: https://gd.eppo.int

EPPO (2022c) *Diaphorina citri*. EPPO datasheets on pests recommended for regulation. Available online: https://gd.eppo.int

EPPO (2022d) EPPO Reporting Service (2022/032) First report of *Diaphorina citri* in Israel. Available online: https://gd.eppo.int/taxon/DIAACI/distribution/IL

EPPO (2020) PM 9/27 '*Candidatus* Liberibacter' species that are casual agents of Huanglongbing disease of citrus and their vectors: procedures for official control. *EPPO Bulletin*, 50, 122–141.

EPPO (2014) PM 9/18 Decision support scheme for prioritizing action during outbreaks. *EPPO Bulletin*, 44, 443–456.

EPPO (2009) PM 9/10 Generic elements for contingency plans. *EPPO Bulletin*, 39, 471–474.

EFSA (European Food Safety Authority), Parnell S., Camilleri M., Diakaki M., Schrader G. & Vos S. (2019). Pest survey card on Huanglongbing and its vectors. *EFSA supporting publication 2019*, EN-1574. 23pp. https://doi.org/10.2903/sp.efsa.2019.EN-1574

European Union (2016) Regulation (EU) 2016/2031 on protective measures against pests of plants, amending Regulations (EU) No 228/2013, (EU) No 652/2014 and (EU) No 1143/2014 of the European Parliament and of the Council and repealing Council Directives 69/464/EEC, 74/647/EEC, 93/85/EEC, 98/57/EC, 2000/29/EC, 2006/91/EC and 2007/33/EC. *Official Journal of the European Union*. Available online: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016R2031&from=EN

European Union (2019) Commission Delegated Regulation (EU) 2019/1702 supplementing Regulation (EU) 2016/2031 of the European Parliament and of the Council by establishing the list of priority pests. *Official Journal of the European Union*, 260, 8–10. Available online: https://eur-lex.europa.eu/eli/reg_del/2019/1702/oj

Garcia-Figuera S, Grafton-Cardwell EE, Babcock BA, Lubell MN, McRoberts N (2021) Institutional approaches for plant health provision as a collective action problem. *Food Security*, 13, 273–290. https://doi.org/10.1007/s12571-020-01133-9

Gottwald TR (2010) Current Epidemiological Understanding of Citrus Huanglongbing. *Annual Review of Phytopathology*, 48, 119–139. https://doi.org/10.1146/annurev-phyto-073009-114418

Graham JH, Gottwald TR, Sétamou M (2020) Status of Huanglongbing (HLB) outbreaks in Florida, California and Texas. *Tropical Plant Pathology*, 45, 265–278. https://doi.org/10.1007/s40858-020-00335-y

MAPA (Ministerio de Agricultura, Pesca y Alimentación). (2021a). Plan de Contingencia de *Candidatus* Liberibacter spp. Bacterias asociadas a la enfermedad del huanglongbing o greening de los cítricos. Available online: https://www.mapa.gob.es/es/agricultura/temas/sanidad-vegetal/pnchlbdiciembre2021sinamarillo_tcm30-583787.pdf [Accessed: 20/06/2022].

MAPA (Ministerio de Agricultura, Pesca y Alimentación). (2021b). Plan de Contingencia de *Diaphorina citri* Kuwayana. Available online: https://www.mapa.gob.es/es/agricultura/temas/sanidad-vegetal/190612pncdiaphodic2021sinamarillo_tcm30-136071.pdf [Accessed: 20/06/2022].

MAPA (Ministerio de Agricultura, Pesca y Alimentación). (2021c). Plan de Contingencia de T*rioza erytreae* (Del Guercio). Available online: https://www.mapa.gob.es/es/agricultura/temas/sanidad-vegetal/plannacionaldecontingenciatriozaerytreaediciembre2021sinamarillo_tcm30-136114.pdf [Accessed: 20/06/2022].

MAPA (Ministerio de Agricultura, Pesca y Alimentación). (2021d). Anuario de Estadística 2020. Available online: https://www.mapa.gob.es/estadistica/pags/anuario/2020/ANUARIO/AE20.pdf [Accessed: 22/08/2022].

GVA-Agroambient (Generalitat Valenciana, Conselleria Agricultura, Desenvolupament Rural, Emergència Climàtica i Transició Ecológica). (2016). Plan de Contingencia de la Comunitat Valenciana '*Candidatus* Liberibacter spp.' bacterias asociadas a la enfermedad del huanglongbing o greening de los cítricos y sus insectos vectores. Available online: https://agroambient.gva.es/documents/163214705/163408114/PC+CV+HLB+y+vectores+-junio+16.pdf/fad50a95-3326-42dc-8613-3983ca117e50 [Accesed: 20/06/2022].

McCollum G, Baldwin E (2016) Huanglongbing: Devastating Disease of Citrus. In: Janick, J. (Ed.) *Horticultural Reviews Volume 44*. Hoboken, NJ: John Wiley & Sons, Ltd, pp. 315–361.

McRoberts N, Garcia Figuera S, Olkowski S, McGuire B, Luo W, Posny D (2019) Using models to provide rapid programme support for California's efforts to suppress Huanglongbing disease of citrus. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 374, 20180281. https://doi.org/10.1098/rstb.2018.0281

Tanner R, Orlinski A, Meyer J, Ward M, Lukić S, Glavendekić M, McCann D (2019). EPPO contingency exercise workshop for a forestry pest, Zlatibor, Serbia, 2018-11-27/29. *EPPO Bulletin*, 49: 298–300.

How to cite this article: Aragón, C., Dalmau, V., Escrivà, C., Ferrer, A., Forner-Giner, M.A. & Galvañ, A. et al. (2022) Being prepared for huanglongbing disease of citrus: a simulation exercise workshop for contingency planning held in Valencia, Spain. *EPPO Bulletin*, 52, 704–711. Available from: https://doi.org/10.1111/epp.12892