



# Pre(HLB)

## Preventing HLB epidemics for ensuring citrus survival in Europe

### [D2.5] FIRST REPORT OF PUBLISHED PRACTICE ABSTRACTS

Deliverable No.	2.5	Work Package No.	2	Task/s No.	2.2.
Work Package Title	DEVELOPMENT OF SHORT-TERM PREVENTIVE MEASURES				
Linked Task/s Title	Creation of an early warning system and improvement of the contingency plan at EU level				
Status	Final	(Draft/Draft Final/Final)			
Dissemination level	Public	(PU-Public, PP, RE-Restricted, CO-Confidential)			
Due date deliverable	31/12/2020	Submission date			31/12/2020
Deliverable version	V2				



Horizon 2020  
European Union Funding  
for Research & Innovation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817526

## Table of contents

Table of contents .....	2
1 EXECUTIVE SUMMARY .....	3
2 PRACTICE ABSTRACTS PREPARED .....	4
2.1 Linking the PRE-HLB with EIP-AGRI projects corner.....	4
2.2 Publishing practice abstracts .....	6
2.3 Linking the EIP to the PRE-HLB website.....	10



## 1 EXECUTIVE SUMMARY

The main objective derived from the creation of "Practice Abstracts" is to disseminate in the EU the best early detection and management practices.

To this end, there has been created a collective approach involving all EU stakeholders (industry, growers, society at large and plant protection agencies) to raise awareness of the importance of HLB and its potential impact on the citrus business.

In particular, through the Practice Abstracts created, it is intended to generate awareness about HLB, to train in HLB prevention/management and to share research results in an educational understandable form. For this reason, in addition to the relevant information included in each of the Practice Abstracts, recommendations related to the thematic area are provided.

Each of the practice abstracts is presented in both English and Spanish.



## 2 PRACTICE ABSTRACTS PREPARED

### 2.1 Linking the PRE-HLB with EIP-AGRI projects corner

Project coordinator has created an account in EIP-AGRI to harmonize all the publications and some of the partners (as AVA and AGROAMBIENT) has also joined to the group in order to publish practice abstract addressed to each client segment:

<https://ec.europa.eu/eip/agriculture/en/find-connect/projects/pre-hlb-prevenci%C3%B3n-de-la-epidemia-por-hlb-para>



Projects
ABOUT
EIP-AGRI PROJECTS
SHARE
FIND
EVENTS
NEWS
PUBLICATIONS
FOCUS GROUPS

**Pre-HLB: Prevención de la epidemia por HLB para asegurar la supervivencia de la citricultura en Europa**

Geographical location	Spain
Main geographical location (NUTS3)	Valencia / València
Keywords	Pest / disease control Agricultural production system Genetic resources Plant production and horticulture
Main funding source	Horizon 2020 (EU Research & Innovation programme)
Project identification	Multi-actor project
Project type	Research project
Starting date	2019
End date	2023
Project status	ongoing
Website	<a href="#">preHLB: Preventing HLB epidemics for ensuring citrus survival in Europe</a>

Title (in English): Pre-HLB: Preventing HLB epidemics for ensuring citrus survival in Europe

#### Objective of the project (native language):

El objetivo general es desarrollar un plan integral de contingencia para proteger en la UE el sector citrícola frente al HLB así como generar, a través de un enfoque multidisciplinar y en colaboración con socios experimentados de América y Asia, nuevas soluciones para controlar la enfermedad. Más específicamente pre-HLB tiene tres objetivos principales: (i) establecer, en el corto plazo, acciones preventivas para monitorear la propagación de vectores y el riesgo de invasión de HLB; (ii) establecer, a medio plazo, intervenciones rápidas para reducir la propagación de psílidos/HLB; (iii) a largo plazo implementar, mediante enfoques biotecnológicos, estrategias para evitar la infección por HLB.

#### Objective of the project (in English):

The overarching objective is to develop and implement a holistic contingency plan to protect the citrus sector in the EU from HLB disease drivers and to co-create new solutions to manage the disease through a multidisciplinary approach and in collaboration with experienced partners from America and Asia. More specifically, there are three main operational objectives: (i) establish short-term preventive actions to monitor vector spread and risk of HLB invasion; (ii) setting up medium term mitigation actions to reduce the spread of psyllid/HLB via rapid interventions; and (iii) implementing long-term avoidance actions by biotechnological approaches

#### Description of activities (native language):

En primer lugar, Pre-HLB monitoreará la presencia de CLs/psílidos y realizará un análisis de riesgo porque, si el HLB se introduce, se prevé una rápida dispersión en el área mediterránea. El proyecto estudiará la ecobiología de *T. erytreae* en la UE y desarrollará modelos económicos/epidémicos y áreas de gestión para optimizar el control del HLB. En el medio plazo se implementará un diagnóstico precoz de las CLs y se investigarán nuevas estrategias de manejo sostenible. A más largo plazo, la mejor solución para lograr una citricultura económica y ambientalmente viable es a través de cultivares que sean resistentes a los psílidos y/o CLs, que comenzarán a desarrollarse

The contact data as well as all the practice abstracts published are available:



Pre-HLB will investigate new sustainable pest management strategies. For longer term, the best solution to support an economically and environmentally viable citricultures is through the development of cultivars that are resistant to the psyllid vectors and/or CLs, that will be explored in pre-HLB.

**Project coordinator**

Contact person:	Leandro Peña García
Address:	Avd. Ingeniero Fausto Elio s/n. CPI ed. 8 esc. G Lab 003
E-mail:	lpenya@ibmcv.upv.es
Phone:	34 963877865
Partner category:	Researcher

**Project partners**

Contact person:	Leandro Peña García
Address:	Avd. Ingeniero Fausto Elio s/n. CPI ed. 8 esc. G Lab 003
E-mail:	lpenya@ibmcv.upv.es
Phone:	34 963877865
Partner category:	Researcher

Contact person:	INSTITUTO POLITÉCNICO DE BRAGANÇA (IPB)
Address:	CAMPUS DE SANTA APOLONIA, BRAGANÇA 5301 253, PORTUGAL
E-mail:	jpereira@ipb.pt
Phone:	+351 273 303 818
Partner category:	Researcher

Contact person:	COUNCIL FOR AGRICULTURE RESEARCH AND ECONOMICS - RES. CENTRE FOR OLIVE, CITRUS AND TREE FRUIT (CREA)
Address:	VIA PO 14, ROMA 00198, ITALY
E-mail:	concella.llicciardello@crea.gov.it

- Practice summary
- • Practice abstract 1
- • Practice abstract 2
- • Practice abstract 3
- • Practice abstract 4
- • Practice abstract 5
- • Practice abstract 6
- • Practice abstract 7
- • Practice abstract 8
- • Practice abstract 9
- • Practice abstract 10
- • Practice abstract 11
- • Practice abstract 12
- • Practice abstract 13
- • Practice abstract 14
- • Practice abstract 15
- • Practice abstract 16
- • Practice abstract 17
- • Practice abstract 18
- • Practice abstract 19

**PA1.- PRE-HLB IS LAUNCHED TO FIGHT AGAINST HLB**  
**PA2.- WHAT IS HUANGLONGBING? A BIT OF HISTORY**  
**PA3.- HLB-ASSOCIATED BACTERIA AND THEIR SPREAD**

→ Pre-HLB, HLB AND CAUSAL AGENTS

**PA4.- HLB SYMPTOMS**  
**PA5.- HLB SYMPTOMS RECOGNITION**

2 PAs → HLB SYMPTOMS AND RECOGNITION

**PA6.- HLB TRANSMISSION**  
**PA7.- HLB TRANSMISSION VECTORS**

**PA8.- HUMAN-MEDIATED VECTORS MOVEMENT CAN SPREAD HLB ASSOCIATED BACTERIA**

**PA11.-THE AFRICAN CITRUS PSYLLID, *TRIOZA ERYTREA*: BRIEF DESCRIPTION**

**PA12.- *TRIOZA ERYTREA* MORPHOLOGY** 10 PAs → HLB TRANSMISSION VECTORS,

**PA13.- DESCRIPTION OF SYMPTOMS OF PLANTS DESCRIPTION, RECOGNITIONS AND THEIR SPREAD**

**PA14.-THE ASIAN CITRUS PSYLLID, *DIAPHORINA CITRI*: BRIEF DESCRIPTION**

**PA15.- *DIAPHORINA CITRI* MORPHOLOGY**

**PA16.- DESCRIPTION OF SYMPTOMS OF PLANTS INFESTED WITH *DIAPHORINA CITRI***

**PA17.- MAIN DIFFERENCES BETWEEN ASIAN (*DIAPHORINA CITRI*) AND AFRICAN (*TRIOZA ERYTREA*) CITRUS PSYLLIDS**

**PA9.- CITRUS AND RELATIVES AS HOSTS OF HLB-ASSOCIATED BACTERIA AND THEIR TRANSMISSION VECTORS** 2 PAs → HLB CAUSAL BACTERIA AND

**PA10.- ORNAMENTAL AND WILD CITRUS RELATIVES RELATED TRANSMISSION VECTORS HOSTS**

**PA18.- HUANGLONGBING (HLB) CONTROL**

**PA19.-HLB ECONOMIC IMPACT** 3 PAs → HLB CONTROL AND ECONOMIC IMPACT

**PA20.- VECTOR AND HLB-FREE NURSERIES, THEIR IMPORTANCE IN PREVENTION OF HLB SPREAD**



## 2.2 Publishing practice abstracts

This is the list of the practice abstracts elaborated so far, detailing the member who prepared them, and the title of each one:

MEMBER	Nº	TOPIC
Spanish National Research Council (CSIC)	1	Pre-HLB IS LAUNCHED TO FIGHT AGAINST HLB IN EUROPE
Spanish National Research Council (CSIC)	2	WHAT IS HUANGLONGBING? A BIT OF HISTORY
Spanish National Research Council (CSIC)	3	HLB-ASSOCIATED BACTERIA AND THEIR DISTRIBUTION
Spanish National Research Council (CSIC)	4	HLB SYMPTOMPS
Spanish National Research Council (CSIC)	5	HLB SYMPTOMS RECOGNITION
Spanish National Research Council (CSIC)	6	HLB TRANSMISSION
Spanish National Research Council (CSIC)	7	HLB TRANSMISSION VECTORS
Spanish National Research Council (CSIC)	8	HUMAN-MEDIATED VECTOR MOVEMENT CAN SPREAD HLB ASSOCIATED BACTERIA
Spanish National Research Council (CSIC)	9	CITRUS AND RELATIVES AS HOSTS OF HLB-ASSOCIATED BACTERIA AND THEIR TRANSMISSION VECTORS
Spanish National Research Council (CSIC)	10	ORNAMENTAL AND WILD CITRUS RELATIVES RELEVANT HOSTS OF HLB-ASSOCIATED BACTERIA AND/OR THEIR TRANSMISSION VECTORS
Spanish National Research Council (CSIC)	11	THE AFRICAN CITRUS PSYLLID, <i>TRIOZA ERYTREAE</i> : BRIEF DESCRIPTION
Spanish National Research Council (CSIC)	12	<i>TRIOZA ERYTREAE</i> MORPHOLOGY
Spanish National Research Council (CSIC)	13	DESCRIPTION OF SYMPTOMS OF PLANTS INFESTED WITH <i>TRIOZA ERYTREAE</i>
Spanish National Research Council (CSIC)	14	THE ASIAN CITRUS PSYLLID, <i>DIAPHORINA CITRI</i> : BRIEF DESCRIPTION
Spanish National Research Council (CSIC)	15	<i>DIAPHORINA CITRI</i> MORPHOLOGY
Spanish National Research Council (CSIC)	16	DESCRIPTION OF SYMPTOMS OF PLANTS INFESTED WITH <i>DIAPHORINA CITRI</i>
Spanish National Research Council (CSIC)	17	MAIN DIFFERENCES BETWEEN ASIAN ( <i>DIAPHORINA CITRI</i> ) AND AFRICAN ( <i>TRIOZA ERYTREAE</i> ) CITRUS PSYLLIDS
Spanish National Research Council (CSIC)	18	HUANGLONGBING (HLB) CONTROL
Spanish National Research Council (CSIC)	19	HLB ECONOMIC IMPACT
Spanish National Research Council (CSIC)	20	VECTOR AND HLB-FREE NURSERIES, THEIR IMPORTANCE IN PREVENTION OF HLB SPREAD
Counseling of Agriculture, Environment, Climate Change and Rural Development (AGROAMBIENT)	21	LIST OF REGULATIONS RELATED TO HLB
Counseling of Agriculture, Environment, Climate Change and Rural Development (AGROAMBIENT)	22	REGULATORY FRAMEWORK OF PLANT HEALTH
Counseling of Agriculture, Environment, Climate Change and Rural Development (AGROAMBIENT)	23	THE ROLE OF PROFESSIONAL OPERATORS IN PLANT HEALTH
Counseling of Agriculture, Environment, Climate Change and Rural Development (AGROAMBIENT)	24	CONTINGENCY PLANS BEFORE HLB
Counseling of Agriculture, Environment, Climate Change and Rural Development (AGROAMBIENT)	25	PRIORITY PESTS
Counseling of Agriculture, Environment, Climate Change and Rural Development (AGROAMBIENT)	26	PHYTOSANITARY DOCUMENTATION NEEDED FOR THE INTRODUCTION AND TRANSFER OF PLANT MATERIAL
Counseling of Agriculture, Environment, Climate Change and Rural Development (AGROAMBIENT)	27	CLASSIFICATION OF PESTS
Counseling of Agriculture, Environment, Climate Change and Rural Development (AGROAMBIENT)	28	CONTINGENCY PLAN FOR <i>Candidatus Lliberibacter</i> spp., BACTERIUM ASSOCIATED WITH THE DISEASE KNOWN AS HUANGLONGBING (HLB)
Valencian Association of Farmers (AVA-ASAJA)	29	WHAT IS HLB?
Valencian Association of Farmers (AVA-ASAJA)	30	AVOID TRANSMISSION OF HLB
Valencian Association of Farmers (AVA-ASAJA)	31	<i>CANDIDATUS LIBERIBACTER</i>
Valencian Association of Farmers (AVA-ASAJA)	32	CLASSIC BIOLOGICAL CONTROL TRIOZA ERYTREAE - STUDY PHASE



Valencian Association of Farmers (AVA-ASAJA)	33	CLEANING PRUNING TOOLS
Valencian Association of Farmers (AVA-ASAJA)	34	BACTERIA INFECTION PROCESS

Consortium is internally working with a collaborative excel file were all the partners can edit the open access publications:

A	B	C	D	E	G	H	I	J	K	L	M	N	O						
1 Project information																			
2																			
3 Project identifier (see INSTRUCTIONS)	2018H2020_817526_Pre-HLB		Mandatory																
4 Title of the project in native language (can be the language of the coordinator / one of the partners - otherwise repeat the title in English)	Pre-HLB Prevención de la epidemia por HLB para asegurar la supervivencia de la cítricatura en Europa		Mandatory	87 character(s) / 150															
5																			
6 Title of the project in English (provide the project ACRONYM + short title within the characters limit)	Pre-HLB Preventing HLB epidemics for ensuring citrus survival in Europe		Mandatory	63 character(s) / 150															
7																			
8 Geographical location	Country (of the coordinator) Spain		Mandatory																
9																			
10 Main geographical location (NUTS3) (of coordinator - for geolocation on map)	523		Mandatory																
11																			
12 Editor of the text person/organisation responsible for delivering the text	Leandro Peña / IBMC (CSIC)		Mandatory	23 character(s) / 150															
13																			
14																			
15																			
16																			
17 Project coordinator (lead-partner) according to the cooperation/consortium agreement	Name Leandro Peña García Address Avd Ingenieros Fausto Elío s/n. CPI ed. 8 esc. G Lab 003 E-mail lepeny@ibmc.upv.es Telephone 34 963877865		Mandatory	17 character(s) / 150															
18																			
19																			
20																			
21																			
22																			
23																			
24 Project period:	start year (YYYY) end year (YYYY)	2019 2023	Mandatory																
25																			
26																			
27																			
28 Project status ongoing (after selection of the project) or completed (after final payment)	ongoing		Mandatory																
29																			
30 Main funding source (Rural development programme, H2020, or other EU, national/regional or private funds)	H2020		Mandatory																
31																			
32 Total budget of the project (total costs - in euros)	6.639.762,50		Mandatory																
33																			
	EC guidelines	INSTRUCTIONS	PRIVACY	IDENTIFICATION	PROJECT INFORMATION	PARTNERS	KEYWORDS	AUDIOVISUAL MATERIAL	WEBSITES	PA1	PA2	PA3	PA4	PA5	PA6	PA7	PA8	PA9	PA10
A	B	C	D	E															
Short summary for practitioners in english on the final or expected outcomes (1000-1500 characters, word count - no spaces). Do not complete if the summary below is completed in English	Many Aurantioidae plants able to host HLB-associated bacteria (CLas, CLaf) and their vectors are widely spread as ornamentals outside the EU. For example, citrus relatives from Clymenia, Feroniella, Microcitrus, Atalantia, Limonia and Citropsis genera can host CLas and Diaphorina citri, while Swinglea, Murraya and Bergera are transient hosts showing low or null bacterial titers and generally a lack of symptoms. However, species from these last two genera are excellent hosts for D. citri. From a quarantine point of view, all these citrus relatives are and should remain as genotypes able to bring the vector and/or the HLB-associated bacteria to the EU. CLaf and Triozar erytreae host ranges are much wider than those of D. citri and CLas. Within the Rutaceae family, T. erytreae has been found besides Aurantioidae in hosts from the Rutidoideae and Toddalioidae subfamilies. As many plant species from these subfamilies grow naturally in the Mediterranean wild, it should be studied whether any of them may be host and serve as reservoir for T. erytreae.	Recommended 30 character(s) / 1500																	
This summary should at least contain the following information: - Main results/outcomes of the activity (expected or final) - The main practical recommendation(s): what would be the main added value/benefit/opportunities to the end-user if the generated knowledge is implemented? How can the practitioner make use of the results?	Recommendation: It is illegal in the EU to introduce Rutaceae plant material recognized as host for the insect vector and/or HLB-associated bacteria. Be aware of possible alternative hosts for T. erytreae in wild Rutaceae plants growing in the Mediterranean areas where the insect is already present. Complete list of quarantine plant material is available in Annex VII of Directive 2000/29/EC.																		
This summary should be as interesting as possible for farmers/end-users, using a direct and easy understandable language and pointing out entrepreneurial elements which are particularly relevant for practitioners (e.g. related to cost, productivity etc). Research oriented aspects which do not help the understanding of the practice																			
Short title in native language	CITRICOS AFINES ORNAMENTALES Y SILVESTRES COMO		Mandatory	102 character(s) / 150															
Short summary for practitioners in native language (can be the language of the coordinator / one of the partners - otherwise in English) (1000-1500 characters, word count - no spaces).	Muchas plantas Aurantioidae, huéspedes de las bacterias asociadas al HLB (CLas, CLaf) y de sus vectores, son habitualmente usadas como ornamentales fuera de la UE. Por ejemplo, plantas de los géneros Clymenia, Feroniella, Microcitrus, Atalantia, Limonia y Citropsis son huéspedes de CLas y Diaphorina citri. Especies de Swinglea, Muraya y Bergera son huéspedes transitorios de CLas, con muy bajas o nulas concentraciones de la bacteria y ausencia de síntomas. Por el contrario, Muraya y Bergera son huéspedes excelentes de D. citri. Desde un punto de vista sanitario todos estos géneros afines a los cítricos deben clasificarse como potenciales portadores a la UE de los vectores y bacterias asociados al HLB. La gama de huéspedes de CLaf y Triozar erytreae es aún más amplia que la de D. citri y CLas. Dentro de la familia Rutaceae T. erytreae ha sido detectado, además de en Aurantioidae en plantas de las subfamilias Rutidoideae y Toddalioidae. Dado que muchas plantas de estas	Mandatory	10 character(s) / 1500																
This summary should at least contain the following information: - Main results/outcomes of the activity (expected or final) - The main practical recommendation(s): what would be the main added value/benefit/opportunities to the end-user if the generated knowledge is implemented? How can the practitioner make use of the results?																			



This is an example of some practice abstracts:

▼ Practice abstract 13

**Short title (in English):**

DESCRIPTION OF SYMPTOMS OF PLANTS INFESTED WITH TRIOZA ERYTREAE

**Short summary for practitioners (in English):**

The symptoms induced by the African citrus psyllid, *T. erytreae* are highly characteristic and can help to detect the pest in citrus trees, so it is convenient to check the young leaves (preferred by this insect) in order to determine its possible presence. The adult females deposit in tender shoots the eggs, which present orange coloration. Few days after the emergence of nymphs (immature larval stage), typical galls are formed in the lower side of leaves. The feeding activity of each nymph promotes the formation of a typical nest identified by a globular distortion on the upper side of the leaf corresponding to a concave hollow on the lower side, where the nymph inhabits until its development is completed. Until this moment, on the lower side of the leaf the bodies of the nymphs are surrounded by white waxy filaments, which number increases during their development. Bold or other fungi may develop on this waxy stuff. The gall remains empty in the lower side of the leaf after the adults emerge and move out. When there is a heavy infestation of *T. erytreae*, the galls produce a typical distortion and rolling of leaves that can be easily identified. Sometimes leaf chlorosis can also be observed following the distortion and rolling up of leaves. Citrus leaves remain in the tree after heavy infestations of *T. erytreae* as opposed to what is observed after heavy infestations of the Asian citrus psyllid, *Diaphorina citri*. Photographs showing typical symptoms of *T. erytreae* infestation are available at <https://www.prehlb.eu/wp-content/uploads/2020/07/PA13.jpg>. Recommendation: Look for galls formed by nymphs in leaves that are characteristic of *T. erytreae* infestation. Alert phytosanitary authorities if the vector has not been reported previously in your area

**Short title (native language):**

DESCRIPCIÓN DE SÍNTOMAS DE PLANTAS INFESTADAS CON TRIOZA ERYTREAE

**Short summary for practitioners (native language):**

Los síntomas de infestación por *T. erytreae*, el psílido africano de los cítricos, son muy característicos y pueden ayudar a detectar su presencia, por lo que es conveniente revisar las hojas jóvenes (las preferidas por este insecto) para detectarlo. Las hembras adultas depositan huevos naranjas en los brotes tiernos, donde pocos días después de la aparición de las ninfas (estado inmaduro del insecto), se forman agallas típicas en la parte inferior de la hoja. La alimentación de las ninfas promueve la formación de agallas que parecen globos en el haz de la hoja, y huecos cóncavos en el envés, donde se encuentra la ninfa hasta que completa su desarrollo. Hasta ese momento, en el envés de la hoja se aprecian los cuerpos de las ninfas rodeadas por filamentos céreos blancos, cuya cantidad aumenta durante su desarrollo. Sobre esta especie de cera puede desarrollarse negrilla u otros hongos. Después de que emergen los adultos, la agalla permanece vacía en el lado inferior de la hoja. Cuando hay una fuerte infestación de *T. erytreae*, las agallas producen una distorsión y un enrollamiento típico de las hojas que se puede identificar fácilmente, algunas veces acompañado de clorosis. Las hojas de cítricos permanecen en el árbol después de infestaciones masivas por *T. erytreae*, contrariamente a lo que sucede después de las infestaciones por *Diaphorina citri*. En <https://www.prehlb.eu/wp-content/uploads/2020/07/PA13.jpg> hay fotografías de los síntomas típicos asociados a la infestación por *T. erytreae*. Recomendación: Observe la posible presencia de agallas formadas en las hojas tras la infestación por *T. erytreae* ya que ayudan a detectar esta plaga. Avise a las autoridades fitosanitarias si el vector aún no se ha detectado en el área



## ▼ Practice abstract 20

### **Short title (in English):**

VECTOR AND HLB-FREE NURSERIES, THEIR IMPORTANCE IN PREVENTION OF HLB SPREAD

### **Short summary for practitioners (in English):**

The rapid elimination of infected plants and their replacement by healthy certified ones is one of the basic actions to control HLB. If this procedure is not followed, HLB associated bacteria are quickly spread from the infected trees by Diaphorina citri and Trioza erytreae. Considering both the need for unambiguously healthy plants for replanting, and the vectors' predilection to feed on young plants versus adult trees, it is essential to protect citrus nurseries from HLB and its vectors. Moreover, young plants are much more susceptible to severe damage from infestation by these insects and from infection by associated bacteria, which may compromise their growth and production. For example, it has been reported that in the absence of insecticidal treatments, *T. erytreae* can cause the death of up to 90 % of the plantlets in a nursery. The best way to prevent infestation of nursery plantlets is by cultivating them on greenhouses covered with a screen or plastic that prevents the entry of HLB vectors. This would also prevent HLB infection in regions where vectors may be infected. This measure was implemented by law in São Paulo (Brazil), so that the production of millions of plants was saved, in opposite to what happened in Florida (USA) where nurseries remained uncovered during years after HLB was first detected, causing huge losses despite plantlets were being periodically treated with insecticides. Mesh diameter of the screens is legislated by each region or country. For example, in California and Portugal a maximum of 0.3 mm<sup>2</sup> mesh is mandatory while in São Paulo is 0.87 x 0.30 mm mesh. Recommendation: In nurseries, cultivating in screenhouses or greenhouses can prevent vector infestation as well as HLB spread

### **Short title (native language):**

VIVEROS LIBRES DE VECTORES Y HLB, SU IMPORTANCIA EN PREVENCION DE LA DISPERSIÓN DEL HLB

### **Short summary for practitioners (native language):**

La rápida eliminación de plantas infectadas y su sustitución por plantas sanas certificadas es una medida básica de control del HLB. De no seguirse, el HLB puede ser rápidamente dispersado por *Diaphorina citri* y *Trioza erytreae*. Dadas la necesidad de disponer de plantas inequívocamente sanas para la replantación, y la predilección de los vectores por alimentarse de plantas jóvenes frente a árboles adultos, es esencial proteger del HLB a los viveros de propagación comercial. Además, las plantas jóvenes son mucho más susceptibles de sufrir daños graves derivados de la infestación por estos insectos y de la infección por las bacterias asociadas, pudiendo afectar a su crecimiento y producción. Por ejemplo, en ausencia de tratamientos insecticidas, *T. erytreae* puede ocasionar la muerte de hasta el 90 % de las plántulas de un vivero. La mejor forma de prevenir la infestación de plantas de vivero es cultivándolas en invernaderos cerrados o recintos de malla que eviten la entrada de los vectores. Esto además evitaría su infección por las bacterias asociadas al HLB en regiones donde los insectos estuviesen infectados. Esta medida salvó la producción de millones de plantas en São Paulo (Brasil), a diferencia de lo que sucedió en los viveros de Florida (EE.UU.), que permanecieron descubiertos tras la detección del HLB en la región, causando enormes pérdidas de producción pese a tratar las plantas periódicamente con insecticidas. El tamaño de poro de la malla se legisla por cada país o región. Por ejemplo, en California y Portugal se obliga a un tamaño de poro máximo de 0.3 mm<sup>2</sup> mientras que en São Paulo es de 0.87 x 0.30 mm. Recomendación: En los viveros el cultivo en invernaderos cerrados o recintos de malla previene la infestación por los vectores y la infección por HLB

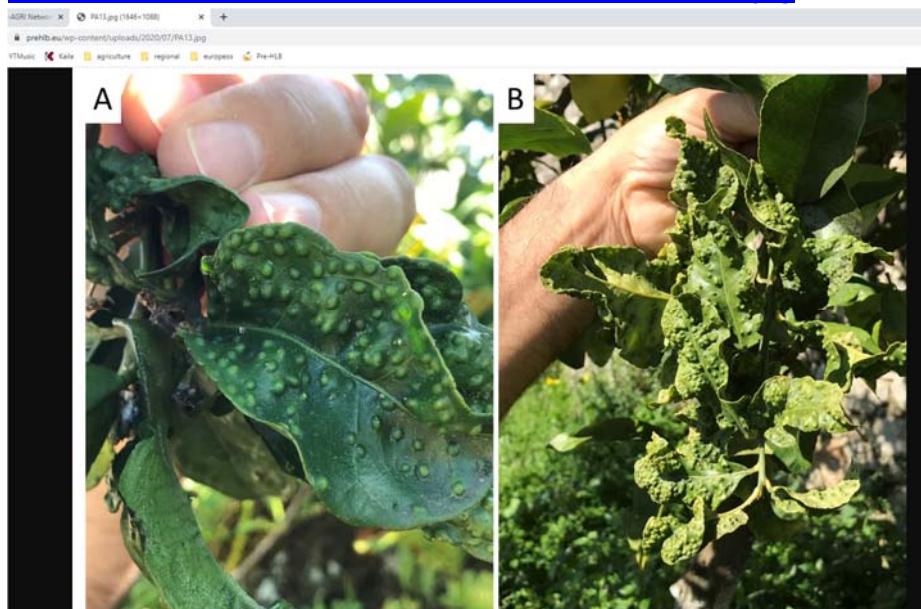


### 2.3 Linking the EIP to the PRE-HLB website

The EIP-AGRI platform does not allow to publish images or videos and for this reason we have linked the PA with specific sections of the project website where additional content is available:

High quality images:

<https://www.prehlb.eu/wp-content/uploads/2020/07/PA13.jpg>



Pre-HLB media corner

<https://www.prehlb.eu/eip-agri-h2020/>

