LIFE Vida for citrus

Development of sustainable control strategies for citric under threat of climate change & preventing entry of HLB in EU

-Members
-Targets
-Accions
-Expected results
-How
-Biodiversity
-Impact

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ASAJA

Members

13 beneficiaries

4 countries

ivia
instituto valenciano
de investigaciones agrarias

Valenciagro

agrimarba

cirad

iFAPA
ASAJA
JUNTA DE ANDALUCIA

UAlg
UNIVERSIDADE DO ALGARVE

ICIA

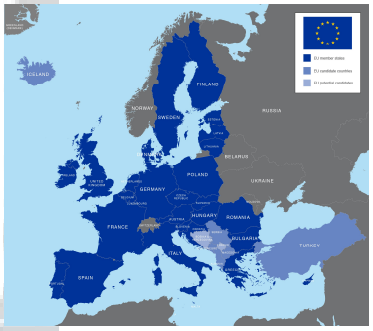
AVA
ASAJA

INRA
SCIENCE & IMPACT

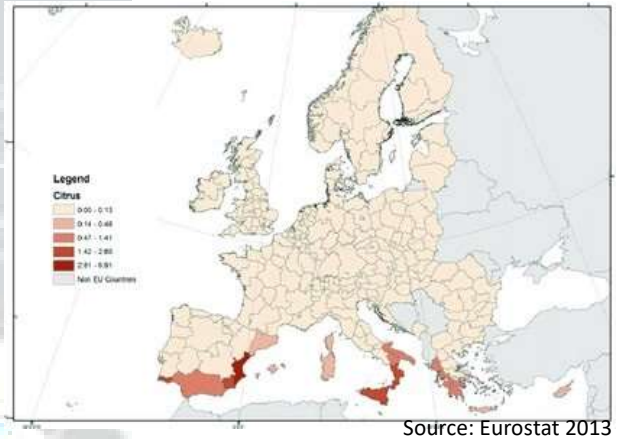
NOSDO
AYUNTAMIENTO
DE SEVILLA

ASAJA
MÁLAGA

UNIVERSITÀ
degli STUDI
di CATANIA



Citrus area in Europe



Source: Eurostat 2013

TARGETS

Contribute to the early diagnosis of HLB by developing a commercializable early detection kit

Test new pathogen and heat-tolerant rootstocks that can be adapted to Mediterranean citrus production and increase plant resiliencet

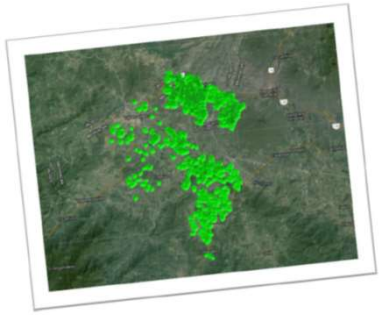
Demonstrate techniques to effectively control vector spread and increase defence in the entire ecosystem with sustainable agricultural practices, while providing other environmental cobenefits

Promote international cooperation and involve EU's Outermost Regions in strategies to avoid HLB entry and contain potential spread

Create a replicable model of agricultural practices for vector/disease prevention for citrus growers in EU, while increasing their capacity to adapt to CC.

ACTIONS

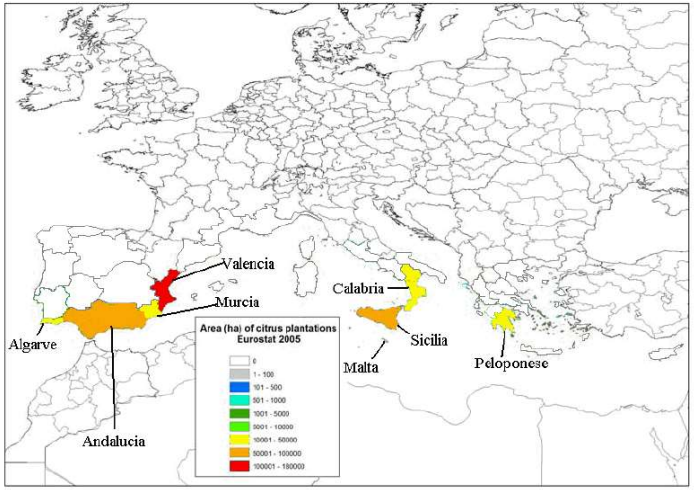
1.- Contribute to the early diagnosis of HLB by developing a commercializable early detection kit



2.- Test new pathogen and heat-tolerant rootstocks that can be adapted to Mediterranean citrus production and increase plant resiliencet

1 Will characterize the demonstration areas and develop a sustainable field management plan.

2 Will design the training materials focusing on preventative control strategies and execute the training sessions.



ACTIONS

Demonstrate techniques to effectively control vector spread and increase defence in the entire ecosystem with sustainable agricultural practices, while providing other environmental cobenefits

Partners will select the citrus rootstocks (genetic material) with desirable agronomical characteristics and evaluate tolerance to MED conditions as well as test them in infected areas of Guadeloupe where infection is present.

Partners will develop & test an HLB early detection kit and manual.

The sustainable field management methods for vector control will be implemented on 4 citrus varieties in 8 trial sites, including summer pruning, optimized irrigation techniques, pheromones, and adapted green covers, resulting in a Handbook of Best Practices.

Partners will demonstrate prevention strategies for vector/disease control in cities and suburban areas, responsible for large part of the unchecked spread of the vector.

Replication of best practices in at least 20 areas (e.g. cities and citrus plantations) across 4 MED countries will take place given the high rate of interest received already during the preparation of this proposal.

The city of Seville has more than 40.000 orange trees in its streets and courtyards.

ACTIONS

Promote international cooperation and involve EU's Outermost Regions in strategies to avoid HLB entry and contain potential spread

Define the protocols for measurements on site and control the activities for the entire duration. This will ensure that impact and outputs contribute to the key KPI Key Performance Indicators.

Will gather the conclusion and recommendations including a socio-economic impact study for all 4 countries as well as a replicability study and business case.

ACTIONS

Create a replicable model of agricultural practices for vector/disease prevention for citrus growers in EU, while increasing their capacity to adapt to CC.

Two actions will focus on communication and dissemination of results, as well as awareness raising. A strategy for getting the attention of a wider, general audience is proposed, including creating a project website, social media and preparing dissemination material.

Targeted information campaigns specifically directed at citizens and urban/garden profesionals will raise huge awareness for both HLB prevention and the LIFE program.

Specialized and technical dissemination is expected through conferences, publications of scientific papers, organizing events and networking with other LIFE projects.

RESULTS

1. Select and test at least 3-4 new citrus rootstocks, with potential tolerance to HLB and more extreme climate patterns in the Mediterranean region, on different demonstration trials for orange, lemon, and mandarin

2. Demonstrate sustainable practices over 45 ha in 9 productive citrus orchards (SP, IT, FR, PT) & at least 1,000 trees in an urban setting (Sevilla)

3. Contribute to a reduction in GHG emissions of approx. 1,000 tons of CO_2 after three years (reduce phytosanitary applications, increase carbon fixation)

4. Prepare a Handbook of Best Practices including a proposal for HLB prevention and management and natural vector control measures for both citrus production and citrus trees in green urban spaces

5. Develop an early HLB detection kit and a manual on how to use

6. Increase awareness among approx. 450,000 people in the EU, including farmers and citizens, plant nurseries, extension and plant protection services, urban gardening departments and the overall citrus sector (including trade of ornamental citrus)

7. Market-based replication effort in at least 20 areas, including cities and plantations across all 4 countries involved

8. Increase local biodiversity by at least 10% (by introducing auxiliary flora and fauna to citrus orchards)

How? HLB- and heat-tolerant citrus rootstocks

This intervention focuses on testing new rootstocks (orange, lemon, mandarin) that are tolerant against HLB and hotter temperatures, while relying on a complex strategy of international cooperation to do so.

Since HLB has had detrimental effects on the industry in the US and Brazil, most breeding for plant resistance/tolerance and hybrids to this pathogen has been done by research institutes in those locations. Commercially available tolerant rootstocks are not expected for at least 3-6 years.

This is why it is crucial to begin similar processes with other important commercial goods that are under threat of wide-spread infection in Europe.

Partners will test the new plant rootstocks assessing their agronomic performance and tolerance to abiotic factors in environmental chambers and under MED growing condition in field.

IFAPA, IVIA, UNICT and CIRAD will deliver the new rootstocks to 6 locations among SP, IT, PT & FR where they will evaluate them with the cooperation of UALG and INRA.

The HLB-tolerance level of these new rootstocks will be verified in the already infected island of Guadeloupe (CIRAD).

The consortium will also provide the entire ‘package’ for building resilience in MED citrus production (stronger rootstocks for orchards and gardens) in the After-LIFE period.

How? Natural vector control methods

The project will provide proof of concept for low-emission, vector control measures via semi-open greenhouse sub-trials (led by ICIA). This strategy targets the prevention (increased resilience) and mitigation (vector control) of spread, addressing multiple sides of this complex issue. Conventional vector control methods including commercialization restrictions and elimination of infected plants are proving to be unsuccessful.

The application of systemic insecticides has not been able to control the spread, emitting dangerous GHG emissions in the process. Attempts to eradicate HLB in infected areas have been made worldwide but are clearly ineffective in containing the spread.

The project will focus on prevention and early diagnosis methods and increasing plant defence.

Activities for identification of auxiliary agents to prevent entry of alien species will be carried out including mapping vector behaviour and distribution through the demo sites.

How? Disease detection

Current on-site detection methods are available and provide relatively high accuracy, although they only can provide qualitative testing (presence/absence) and must be further quantified in the laboratory by real-time PCR techniques.

IVIA will develop an innovative, on site Early Detection Kit for farm managers, and gardening departments of cities to access information on the detection of DNA regions specific to a given organism.

These kits will be demonstrated and their market viability assess in two actions.

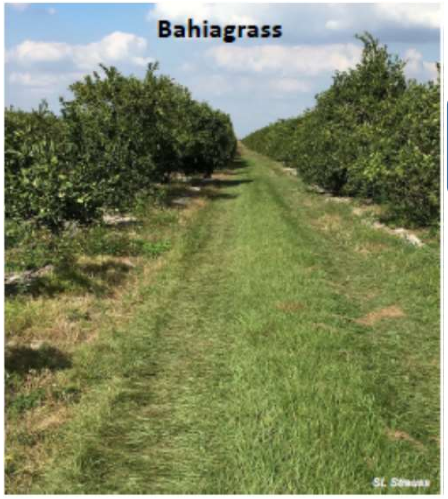
How? Best management practices in citrus production systems and in cities

The project will target the ecosystem around the citrus tree, by demonstrating an integral method of best practices to reduce the future impact of potential vectors, increase biodiversity and soil health while emitting a lower carbon footprint.

Measures to increase the system's resilience that will be applied on citrus farms and experimental plots with two challenges:

1.- Firstly it will experiment with finding a balance between increase in biodiversity/sustainability of the system and control of potential HLB-carrying insects. On-field testing (all partners) of the interactions between biodiversity measures and natural vector control will give relevant results to further develop effective strategies

Strategies that prevent disease outbreak without relying on chemical pesticides. To do so, the project will use beneficial organisms, novel bio-insecticides, pheromones and phytosanitary products.



2.- The second challenge will be to demonstrate the role that microorganisms and other organic products for soil improvement can have on plant health and their immune systems against bacterial diseases.

In this case, the role of innovative bio stimulants, elicitors, green covers, mulching and microorganisms to increase soil quality and their effects on plant health and immune systems will be important.

Partners are aware that citrus productive systems are input-dependant, making them more vulnerable to pest and pathogen outbreaks and considered 'less sustainable'. This project will apply and demonstrate techniques that do not hinder production capacity but optimize inputs and lower chemical exposure, thereby minimizing these system's environmental footprints and mitigating future CC impact.

The best management techniques will not only be circumscribed to citrus production orchards, but also demonstrated and targeted to a broader audience of city planners, managers and citizens in urban areas (led by Ay Sevilla) and other actors in the citrus supply chain ensuring that awareness of the spread and impact of the disease is well-understood.

BIODIVERSITY

LIFE Vida for Citrus contributes to the enhancement, preservation and protection of biodiversity as defined in the EU Biodiversity Strategy to 2020. Five targets:

Protect species and habitats	• Follow the lines of the Birds and Habitats Directive by promoting bird and insect presence in citrus growing areas. The measures will include planting auxiliary flora and creating nest boxes as well as insect hotels to create new beneficial habitats for birds, bats and insects.
Maintain and restore ecosystems	• By strengthening citrus groves we are simultaneously defending entire ecosystems. We are also enhancing the ecosystem services these groves can provide (especially with regards to carbon storage, fruit production, pollination, healthier soils, among others) and thus contributing to the objectives set out for 2020.
Achieve more sustainable agriculture	• Our strategy of implementing better practices in citrus systems intends to have a long-term effect on improving the balance between biodiversity and agricultural production. The project delivers a multipurpose objective of increasing the ecosystems´ immune system, increasing biodiversity and ensuring food security of valuable market commodities.
Combat invasive alien species	• Although T. erytreae is not on any EU list of invasive alien species, it is almost certain to be on the unpublished European Invasive Alien Species of Union Concern. The project will fight against the spread of T. erytreae by enhancing biodiversity below and above the ground- fostering more insects, birds and mammals which through their natural habits will provide biological control against pests.
Help avert global biodiversity loss	• Our project will contribute evidence showing that best practices can also help increase the ecosystem's defence against a global pathogen such as HLB.

CURRENT SITUATION IN THE EU

CLIMATE CHANGE

Exacerbates the threat of diseases brought about the pest and pathogens

High risk of HLB entry in EU (mainly Mediterránean región)

No CURE, No effective treatments

Significant economic losses for producers…

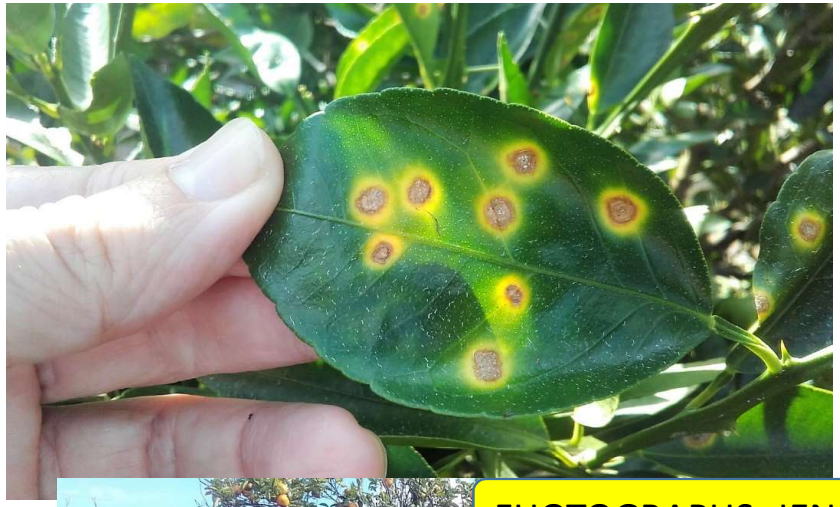
Current methods

-Restriction in commercialization of potential carrier species

-Chemical phytosanitary/insecticide treatments

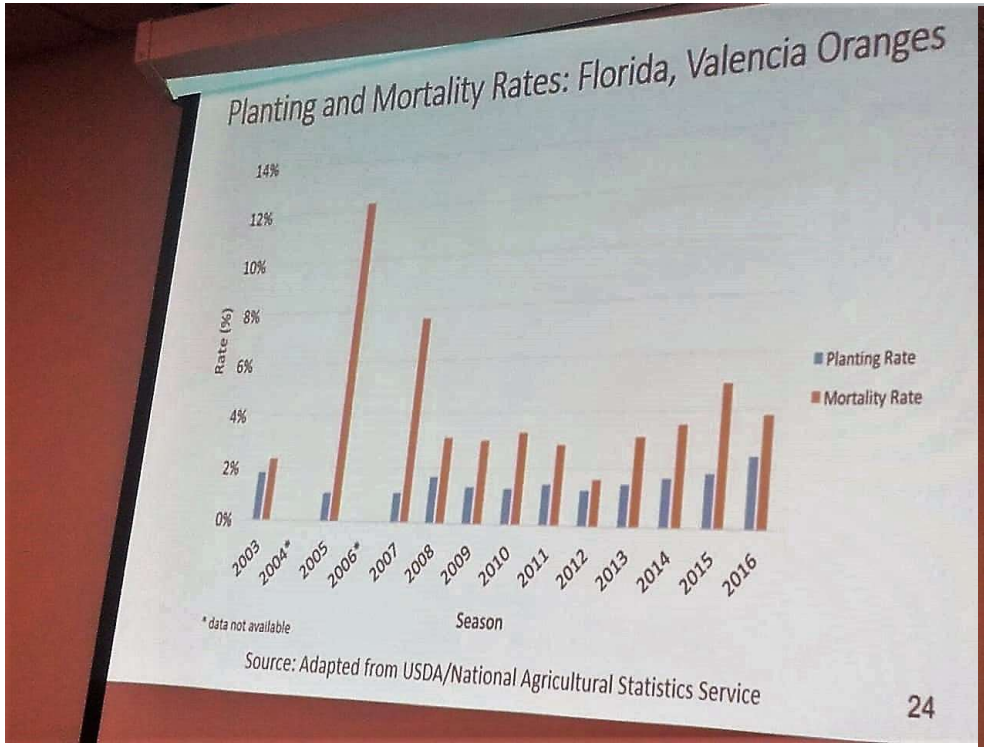
-elimination of infected and nearby vegetation

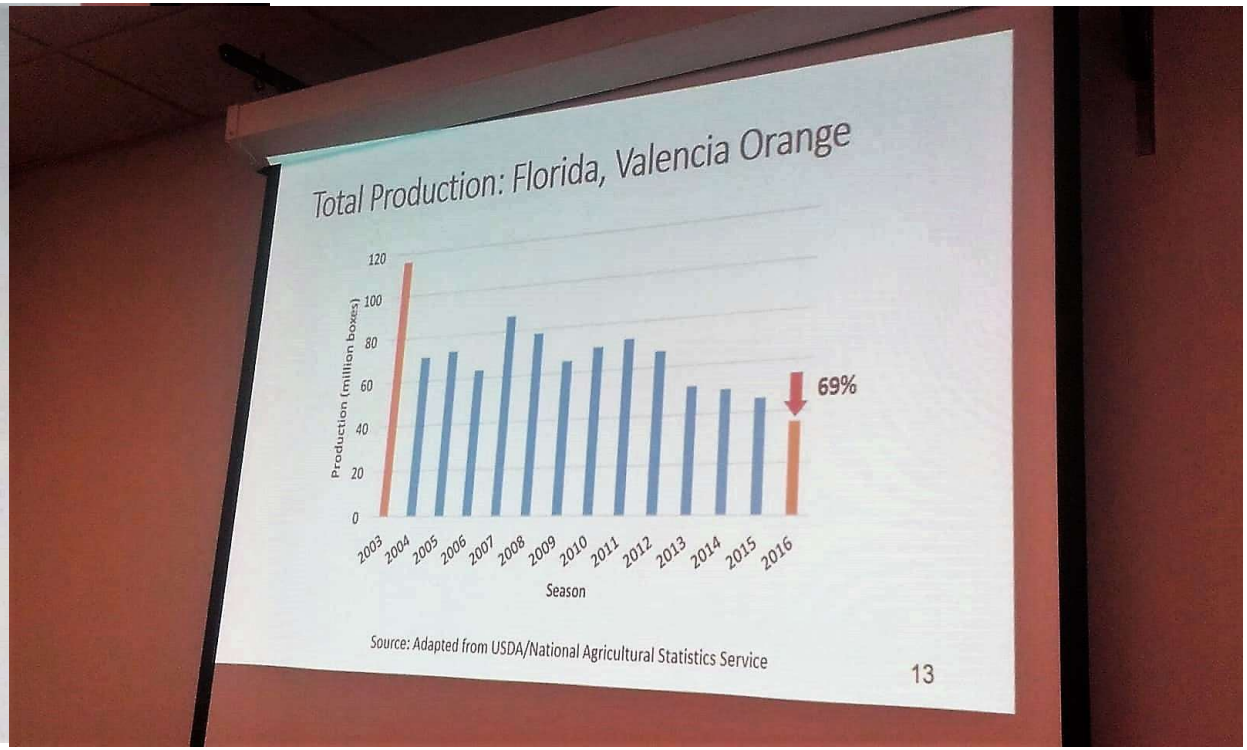
CURRENT SITUATION IN FLORIDA



FHOTOGRAPHS: JENARO AVIÑÓ. OCTOBER 2018. FLORIDA

CURRENT SITUATION IN FLORIDA

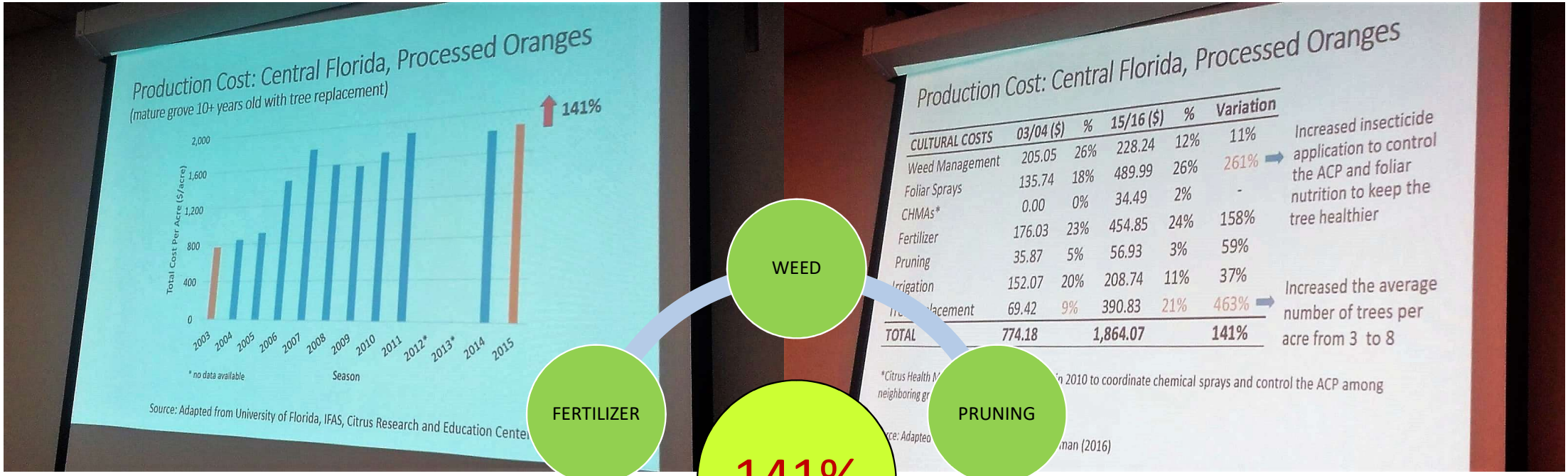




MORTALITY OF PLANTS

BRUTAL FALL OF PRODUCTION

CURRENT SITUATION IN FLORIDA



GRAN INCREMENTO DE COSTOS

CURRENT SITUATION IN FLORIDA

NON-COMMERCIAL FRUIT

FINAL CONSEQUENCE FOR FLORIDA CITRUS. 2005:12 MILLION TON. 2018: 3,6 MILLION TON

PROPOSED MEASURES

LIFE Vida for citrus puts the focus on PREVENTION and the increase of DEFENSES of plants and ecosystems against HLB

PREVENTATIVE

TESTING OF NEW ROOTSTOCKS

- Selection and evaluation of new tolerant rootstocks
- Combination of tolerant + productive rootstocks
- Potential for replication of the process with other species

DEVELOPMENT OF BETTER AGRICULTURAL PRACTICES IN SYSTEMS OF PRODUCTION AND CITIES

- Limit transmission through vectors
  - Increase in biodiversity
  - BC with auxiliary flora and fauna
  - Set traps for vectors to decrease the general population
  - Summer pruning of young shoots
- Increase in plant and soil health
  - Application ofmicroorganisms/ biostimulating
  - Vegetable covers
- Production and efficiency
  - Mulching and soil management
  - Optimization of irrigation and fertilization
  - More efficient use of insecticides, pheromones and phytosanitary products

ACTIVE CONTROL

CONSOLIDATE NATURAL VECTOR CONTROL METHODS

- Identification of auxiliary agents to prevent the entry of alien pests
- Test bioinsecticides for large-scale implementation in the production systems of cities
- Implement idela cover crop mix for beneficial insects
- Map vector behaviour and distribution & share knowledge vía technology

+ DEVELOPMENT OF EARLY DETECTION KIT

IMPACT

Increased resilience. Stronger plant rootstocks and ecosystems to combat pests and pathogens & climate change

Food security: New plants type compatible with sustainable production systems

Increased sustainability: Lower carbon footprint, soil improvement, increase of biodiversity

Increased defenses against the vectors that can carry the greening disease (HLB)


Thanks!
Let´s save the EU citrus industry!