Biological control as a Key tool for IPM in citrus
Virtual Training Session One

Status of the management of Citrus Greening Disease (Huanglongbing) in the Caribbean region

A Case study: Dominica

By: Nelson Laville
MSc. Crop Protection (Plant Pathology)

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Outline

- My Island - Dominica
- Brief Perspective on Citrus
- Plant health challenges for citrus
- HLB –Dominica's Experience
- Achievements
- IPM as a Component of ICM

DOMINICA (Waitukubuli)

- ✓ Is about 289.5 square miles (750 km^2) and it is about 29 miles (47 km) long and 16 miles (26 km) wide.
- ✓ The highest point is Morne Diablotin at 1,447 m (4,747 ft) in elevation.
- ✓ The population is about 70 000 as reported in the last population census.
- ✓ Dominica is the most heavily forested island of the Lesser Antilles

Brief perspective on Citrus in Dominica.

- A long (LIME) History since the 1900's
- Transition into other citrus varieties
  - Ruby Grapefruit
  - Navel oranges
  - West Indian Limes
- Dominican tradition and Culture

  - At least one tree per family home.

Plant health Challenges for Citrus:

- **Citrus Black Fly - 1994**

  - A biological control programme using two parasitic wasps, *Encarsia perplexa* and *Amitus hesperidum* were introduced. These became rapidly established and have brought the pest under control

- **Citrus Tristeza Virus – 1998**

  - Biological control- In this case the natural enemies already existed on island and it was our mission to encourage the proliferation of those species. parasitic wasps: *Lysiphlebus testaceipes* and Lady beetle: *Cycloneda sanguinea*

  - Commencement of a citrus certification program: switch from sour orange root stock to trifoliate root stock

- Still the battle had not been won!!!!

Huanglongbing (HLB/Citrus Greening Disease) - 2012

Citrus greening disease is a disease of citrus caused by a vector-transmitted pathogen. The causative agents is *Candidatus Liberibacter* spp. the pathogen is vectored by the Asian **citrus** psyllid (ACP) *Diaphorina citri Kuwayama*

- In 2012 three Cuban experts and plant protection staff members conducted a preliminary survey to evaluate the presence/absence of Citrus Greening disease Dominica.

- Citrus Greening disease was confirmed in Dominica in May 2012, the Ministry immediately embarked on an emergency action plan.

- In December 2012, the Ministry of Agriculture hosted two (2) experts of the Division of Plant Industry from Florida.
  - Capacity building (Diagnostics, Surveillance, Management, Etc)
  - Capacity evaluation
  - Recommendation

Highlights of Capacity evaluation of Dominica

- Propagation of Citrus Plant Material under protected covering – **already established**
- Molecular Lab for testing **– already functional**
- Well staff agricultural extension team
- Advance knowledge in mass rearing (experience from Pink Mealybug and Citrus Black Fly)
- Policy support
- Legislative framework- by then HLB was declared a notifiable pest.

CITRUS GREENING DISEASE SYMPTOM IN DOMINICA

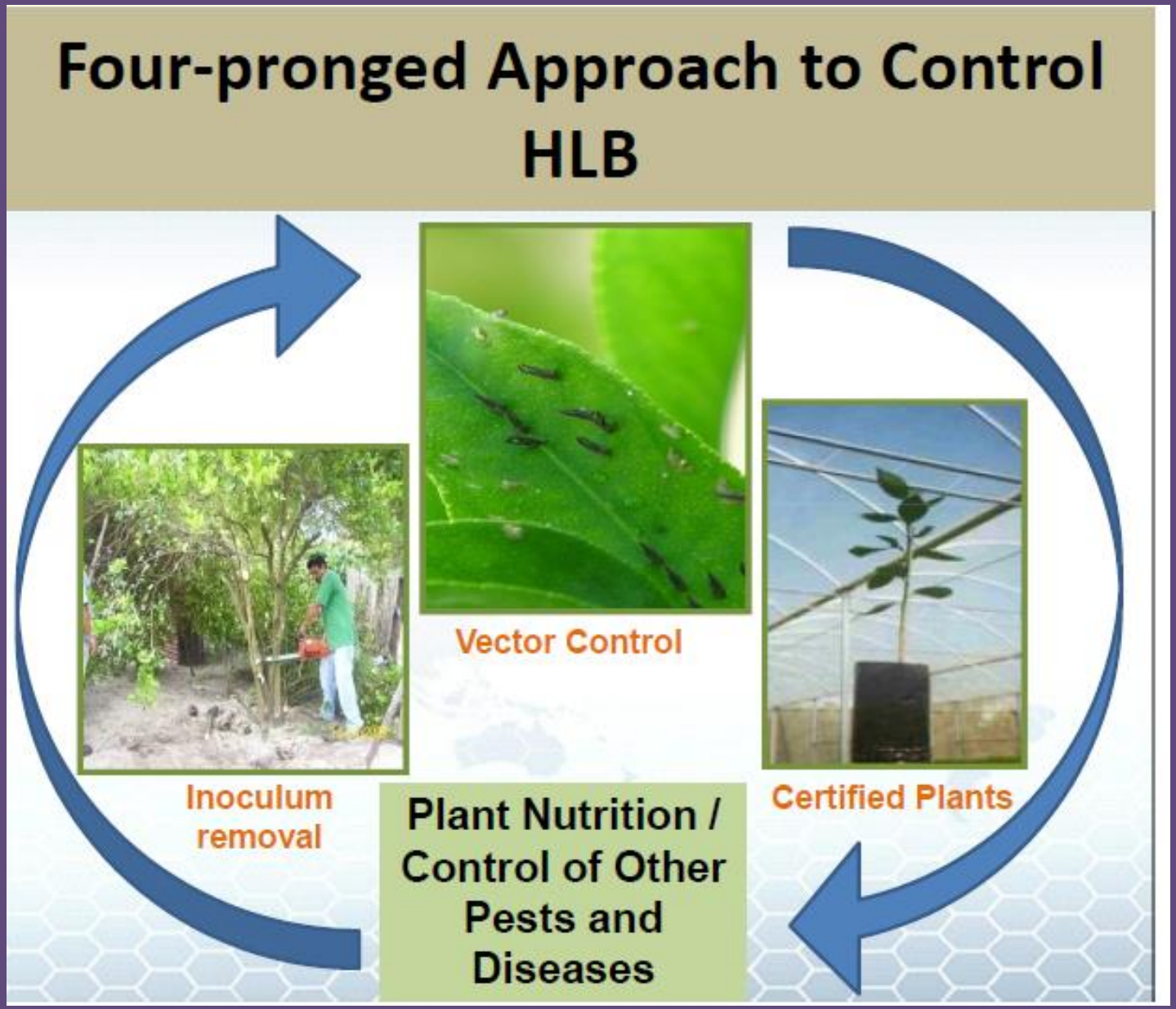
- Blotchy mottle is the most prominent diagnostic symptom of citrus greening disease in the field.

Tahiti Lime in Calibishie

Mexican Lime in Portsmouth

Distribution of HLB

MANAGEMENT STRATEGY



MANAGEMENT STRATEGY

IPM – Integrated Pest Management strategies are **: the Four Pronged approach**

- **Containment and Quarantine –** Restrict the movement of plants from the positive to negative areas.
- **Eradication of Infected trees** - Eliminate ONLY affected trees in the commercial groves and backyard farms.
- **Management of Vector**
  - Release of Parasitoids to control population of Asian citrus psyllids.
  - Begin small scale rearing of *Tamarixia radiata*
  - Application of systemic insecticides as a last resort where parasitoids were ineffective
- **Plant Nutrition and Provision of Clean Planting material.**

- **Communication and Training**

Distribution of public awareness materials and conduct training for farmers and extension officers in various Agricultural Regions.

This component was very important as it served as advocacy as well. The actions being taken required clear communication with all stake holders.

MANAGEMENT OF THE VECTOR

In 2012 -2013, a total of **67,900** *Tamarixia* sp. were released on island.

http://cisr.ucr.edu

Adult Tamarixia sp. parasitizing nymphs

http://ucanr.edu

TAMARIXIA RADIATA RELEASE

Impact and Establishment assessment

MUMMIFIED ACP NYMPHS IN GOODWILL

Evidence of *T. radiata effectiveness in Goodwill*

Before release

Two month After

POSSIBLITY OF TWO PARASITOIDS

Exit wound of T. radiata

Exit wound of *Diaphorencyrtus aligarhensis*

Entomopathogens

Hirsutella citriformis

Isaria fumosoroseus

In 2015 we discover these species in Dominica. Plans we in place to explore its potential when we got hit by tropical storm erika and our national focus had to change for a little while. Subsequently Hurricane Maria

ACHIEVEMENTS

- Successful eradication of citrus greening disease in the community of Pointe Michel.
- The Ministry of Agriculture (MOA) issued an order for the closure of all private nurseries on island to reduce the spread of infected planting materials.
- Release of Tamarixia on island for the control of ACP. A total of **67,900** Tamarixia were released on island
- Train extension officers and farmers during survey in the identification of both HLB and its vector.
- Increased public awareness by radio programs, talk shows and distribution of posters and flyers.
- Citrus Certification Program is the only certified nursery that can provide true to type clean planting materials to the farmer.
- Molecular testing capacity exist for conducting PCR for HLB
- The Ministry produced over 18 000 healthy plants - HLB and CTV free - in 2014-2015

WAY FORWARD-

A holistic approach to plant health can significantly reduce the socio-economic impact on an agricultural sector.

We must adopt the concepts of Integrated Crop Management (ICM) of which IPM is a component.