

# **OVERVIEW OF UF, IFAS CITRUS GREENING RESEARCH PROGRAMS**

Harold Browning, UF, IFAS

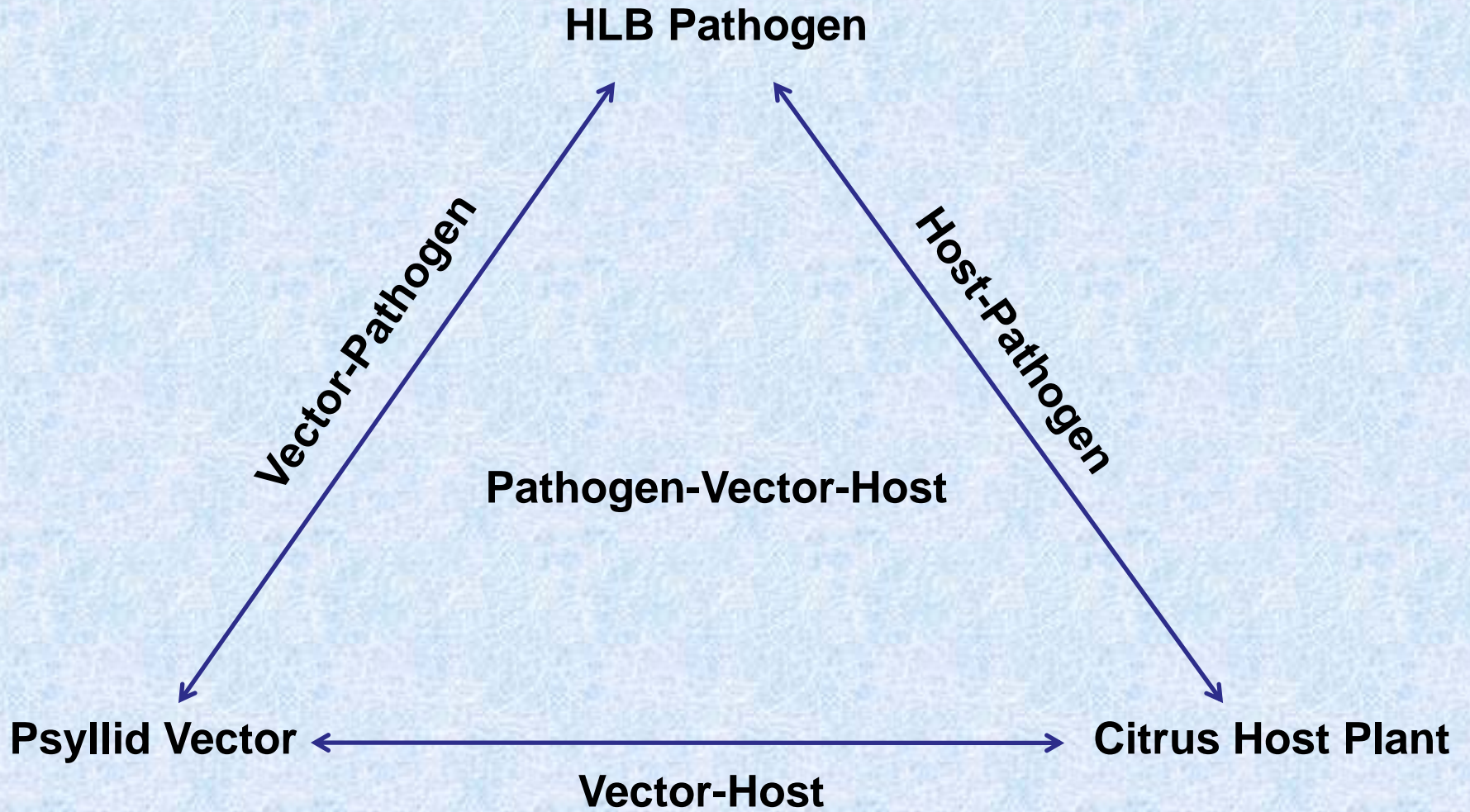
Presented to the Citrus Summit  
April 2008

# Approaches to Managing HLB

- **Cultural methods**
  - **Control psyllids**
  - **Remove inoculum sources**
  - **Change growth cycle**
  - **Change production methods to improve economics**
- **Develop resistant or tolerant trees**
- **Control the pathogen**

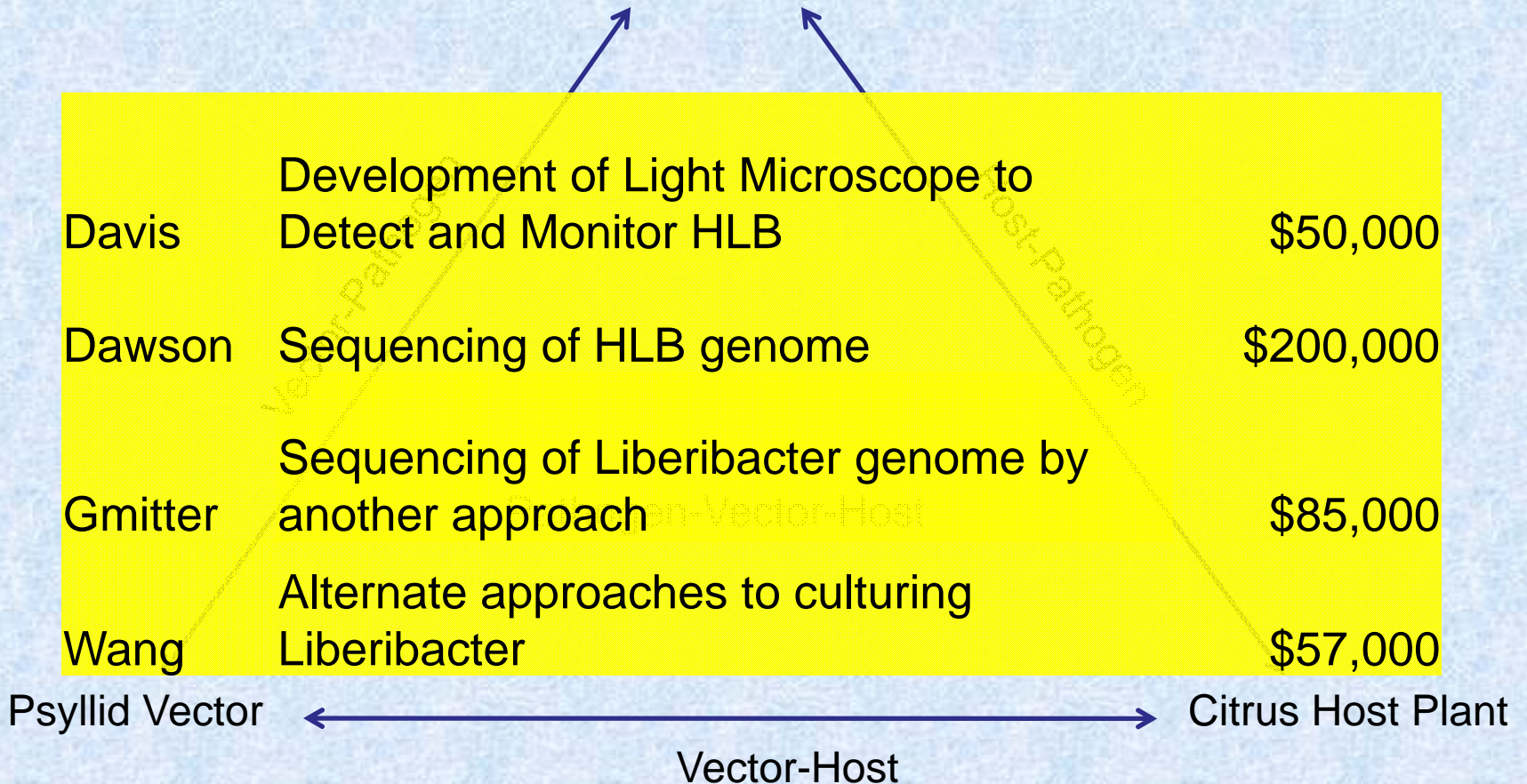
# Tools Needed

- Better detection methods
- Sequence of the bacterial genome
- Culturing of the bacterium
- Basic understanding of the bacterium to find a weak link
- Basic understanding of the plant response to the pathogen
- Citrus genome sequence to facilitate above



**Vectored Disease Triangle**

# HLB Pathogen



HLB Pathogen

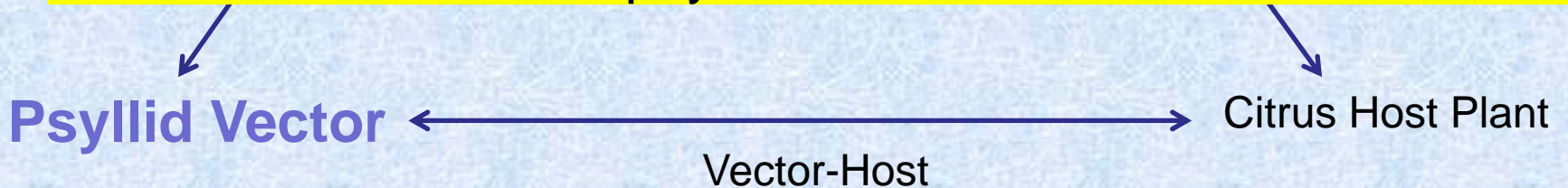
Vector-Pathogen

Host-Pathogen

Brlansky	Pathogen acquisition and transmission by psyllids from symptomatic and asymptomatic trees in the field.	\$100,000
Psyllid Rogers Brlansky	Investigation of Psyllid Transmission of the Citrus Greening Pathogen and Methods for Preventing Disease Transmission	\$95,000

## HLB Pathogen

Keyhani	Development of a citrus psyllid tissue culture cell line	\$62,860
Rogers	Citrus Psyllid Population Dynamics	\$60,000
Stansly	Enhanced Biological Control of ACP in Florida	\$54,000
Stelinski	Development of attractants for Asian citrus psyllid	\$95,000



HLB Pathogen

Hoy	Improved Control of Psyllid, with Silwet L-77 and Reduced Rates of Insecticides	\$52,000
Rogers	Development of Psyllid baseline toxicology information	\$65,000
Rogers	Development and Evaluation of Citrus Grower Psyllid Management Programs approved	\$134,000.00 \$168,041
Rogers & Brlansky	Effects of Insecticides on Pathogen Transmission By the Asian Citrus Psyllid	\$55,000

Psyllid Vector

Citrus Host Plant

**Vector-Host**



## HLB Pathogen

Salyani	Spot-treatment of young leaf flushes for chemical control of psyllid	\$75,000
Salyani	Optimizing spray parameters for psyllid pesticide applications	\$83,500
Stansly	Development and Extension of Comprehensive Asian Psyllid Management in Commercial Citrus	\$139,729
Stelinski	Determine the movement patterns of Asian citrus psyllid within and between groves	\$75,000

Psyllid Vector

Citrus Host Plant

**Vector-Host**

HLB Pathogen

Brlansky	Distribution and Symptom Induction in Citrus Hosts	\$55,000
Dawson	Increase capacity of citrus transformation laboratory	\$99,805
Gmitter	The International Citrus Genome Consortium (ICGC) Sequencing Project	\$250,000
Gmitter	Development of transformation techniques for <i>Murraya</i> , to engineer a deadly trap plant	\$25,000
Gurley	Develop promoters that will prevent expression of foreign genes in fruit	\$50,000
Spann	Improving micro-element management for easier detection of HLB symptoms	\$26,310

Pathogen

→ Citrus Host Plant

Brlansky	Research on Improved Diagnostics for Citrus Greening for Use in Florida	\$105,000
Brlansky	Evaluate Potential for Alternate Hosts for HLB	\$25,000
Chung	Evaluation of Compounds to Suppress HLB	\$100,000

Vector-Pathogen

Host-Pathogen

Pathogen-Vector-Host

P Dawson	Examination of Multiplication, Movement, Distribution, and Pathogenicity of HLB and Its Interaction with CTV in Different Citrus Varieties and Relatives	\$75,000 <sup>ant</sup>
Dawson	Develop non-transgenic resistance to HLB	\$70,000
Dawson	Engineering Antibacterial Compounds into Citrus	\$200,000

Gmitter	Identification and Characterization of HLB Survivors	\$70,000
	Assessment of Genetic Transmission of HLB	
Gmitter	Tolerance from Citrus Species	\$15,000

Vector-Pathogen

Host-Pathogen

Ehsani	Early Detection and Mapping of (HLB) Using Ground-Based and /or Aerial Hyperspectral or Other Imaging	\$100,000
Etxeberr ia	Development of Detection Methods for Greening in Citrus	\$40,000
Gabriel	Development of High Throughput Technologies for Rapid Detection of Citrus Huanglongbing (Greening) in Florida	\$59,952

Gmitter	Surviving HLB and Canker: Genetic strategies for improved scion and rootstock varieties	\$500,000
Graham	Does induced systemic resistance control greening disease development?	\$49,784
Moore	Gene expression in HLB Infected citrus trees	\$60,000

Vector-Pathogen

Host-Pathogen

Pathogen-Vector-Host

Moore	Evaluate differences in response to HLB by scions on different rootstocks	\$55,000
pmou	Transferring disease resistance technology from a model system to citrus	\$50,000
Powell	Develop a rapid screening process for chemical control of HLB	\$55,000
Reyes	Identification of metabolite changes in citrus leaves induced by citrus Huanglongbing	\$33,150

Rouseff	Characterization & Identification of HLB Off-Flavor	\$25,000
Schumann	Determine if HLB symptoms can be distinguished from other leaf symptoms to be used in early detection studies	\$50,000
Tatineni	Development of Simple, Sensitive and Rapid Diagnostic Methods for Large Scale Detection of the Citrus Greening Pathogen	\$20,000

Vector-Pathogen

Host-Pathogen

Pathogen-Vector-Host

Tatineni	Exploration for Natural Resistance for HLB and Mild HLB Isolates for Control of Greening Disease in Florida	\$75,221 <sub>nt</sub>
Triplett	Reducing HLB in the plant by inoculation with an antibiotic-inducing Rhizobium strain	\$35,000
Wang	Characterization of effects of HLB on phloem and phloem transport	\$82,000

# Pathogen/Vector/Host Interactions



Browning	Development of collaboration with National, International scientists in HLB	\$75,000
Futch	HLB Extension program for Florida citrus growers and workers	\$44,038
Muraro	Economic Assessment of Impacts of New Diseases on Florida Citrus	\$210,000

Vector

Agent

### Pathogen-Vector-Host

Ps Spann	Timing of hedging to reduce susceptibility to HLB infection and improve psyllid management	\$15,048	ant
Stansly	Proposed Integrated Project To Investigate Management of HLB in SWFREC Foundation Grove	\$307,157	



**Thanks to the Florida Citrus Industry  
for your support in this partnership**

