



Lethal Yellowing Disease of Coconut Palms

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Introduction

- *Cocos nucifera* (Coconut Palm)
 - Produced by 93 countries on 12.8 million hectare
 - Monocots
 - food security
 - Oil production
 - Tourism

New potential uses for palm oil

- As an agent for the treatment of HIV (antiviral properties).
- As a component for jet fuel.



A Virgin Atlantic Boeing 747 flew on February 2008, from London to Amsterdam, using a fuel containing 20% of a non-fossil mixture of oils from the coconut and babassu palms (Courtesy of Dr. Carlos Oropeza).

Introduction...

- ## Uses



Biodiesel



Water



Products for Horticulture

Diseases of coconut palms...

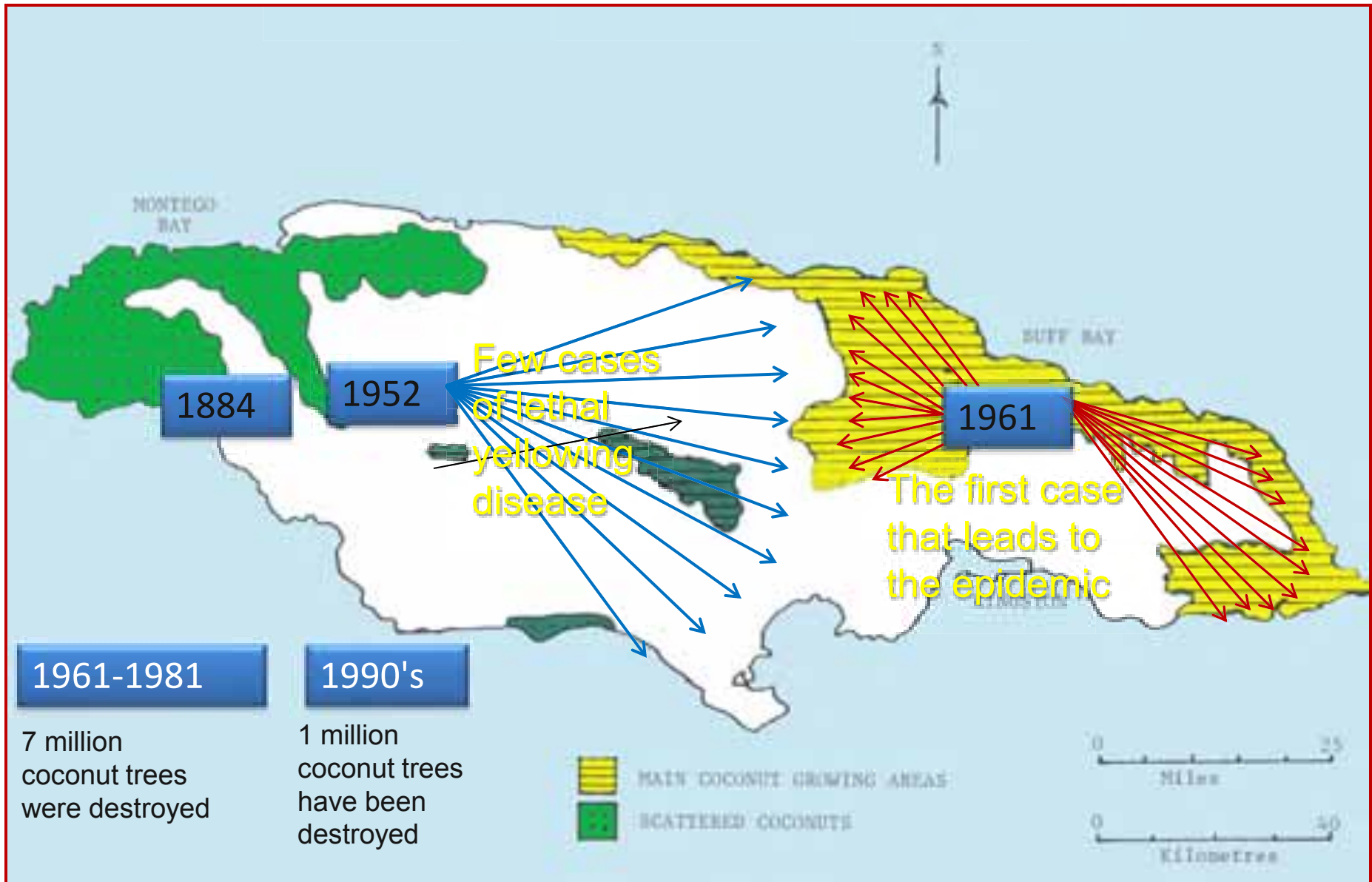
- Major Diseases
 - Lethal yellowing
 - Bud rot
 - Heart rot (Coryneum blight)
 - Red ring



Lethal yellowing disease



Lethal yellowing disease...



Lethal yellowing disease

• Phytoplasma (MLO)

Causal agent : phytoplasmas

- Electron microscopy (Beackbane *et al.*, 1972; Heinze *et al.*, 1972; Plavsic-Banjac *et al.*, 1972).
- Differential response to antibiotics (McCoy, 1972).

- No reports of *in vitro* culture
- Closely resembles the true mycoplasma
- No mechanical transmission reported.

Vector: *Myndus crudus*

- Not cultured to date.
- Cage transmission trials (Howard, 1995)
- PCR detection (Harrison and Oropeza, 1997).

- Has no cell wall
- Genome size (530-1350 kbp)

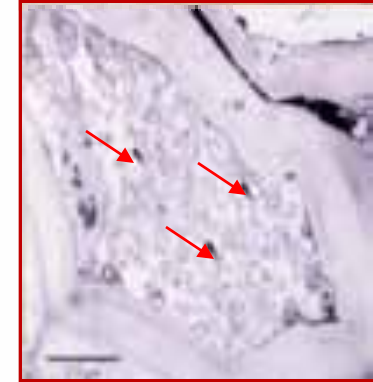


Figure 1. Electron micrograph of a sieve tube element (SE) infected with phytoplasma (Arrows). CW = host cell wall. Line = 2.0 μm (McCoy *et al.*, 1983).
Causal agent : phytoplasmas



Vector: *Myndus crudus*

- Cage transmission trials (Howard, 1995).
- PCR detection (Harrison and Oropeza, 1997).

Lethal yellowing disease...



- One million coconut trees were destroyed in 13 years.
- Impact of LY
 - 8000 coconut growers and their dependents
 - Low production
 - Loss of revenue





How can you recognize the lethal yellowing disease





How can you recognize the lethal yellowing disease...





How can you recognize the lethal yellowing disease...



How can you recognize the lethal yellowing disease...

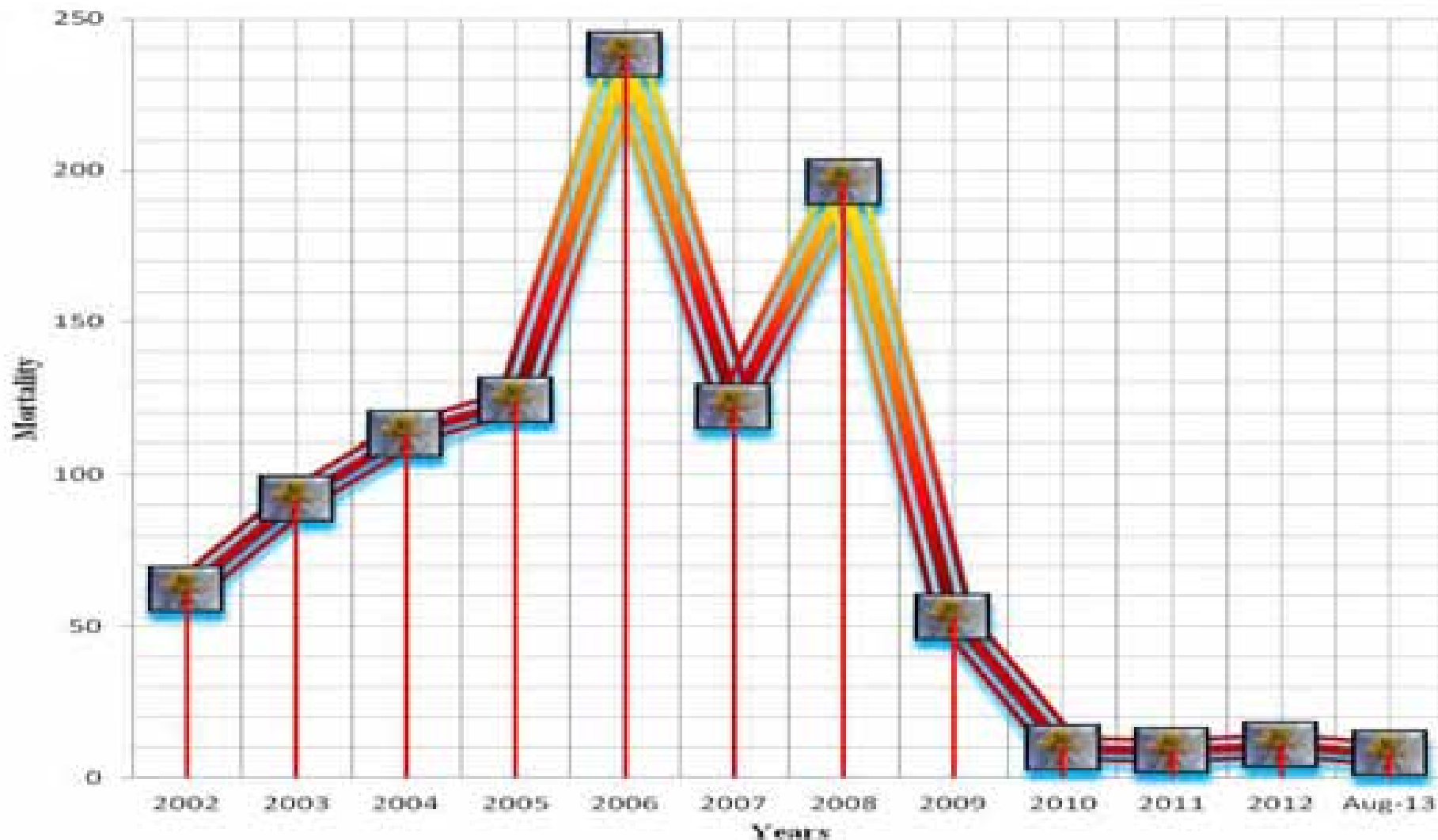


Jamaica's approach to lethal yellowing

- Island wide diseased operation
- Making hybrids
- Molecular Lab work
- Black's Approach
 - Monitoring
 - Removal of infected trees
 - Replacement of infected trees
 - Weed control
 - Proper plant nutrition
- The grower diligently monitors weekly the farm and removed immediately the infected coconut trees. Effective weed control to removed the alternate and alternative host plants.



Reduction of lethal yellowing disease



LY mortality at Nutts River Farm



Table 3 Monthly deaths of coconut trees by lethal yellowing disease at Nutts River Farm

Years	Months												Total
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	
2007	19	9	7	9	16	8	13	9	15	4	9	4	122
2008	26	12	18	15	29	26	26	11	11	7	9	6	196
2009	4	4	5	4	5	4	5	4	3	1	5	9	53
2010	2	0	2	1	0	2	0	1	0	0	0	2	10
2011	2	0	2	1	0	0	2	1	0	0	0	1	9
2012	1	1	2	0	0	4	1	0	1	0	1	1	12
Total	54	26	36	30	50	44	47	26	30	12	24	23	402



How can I help to reduce lethal
yellowing on my farm





I did nothing and now I am sorry





Acknowledgement

- CFC
- FAO
- CIB
- CICY
- UWI
- CIRAD
- UOF

Thank you !



Courtesy of Mr. B. O. Been