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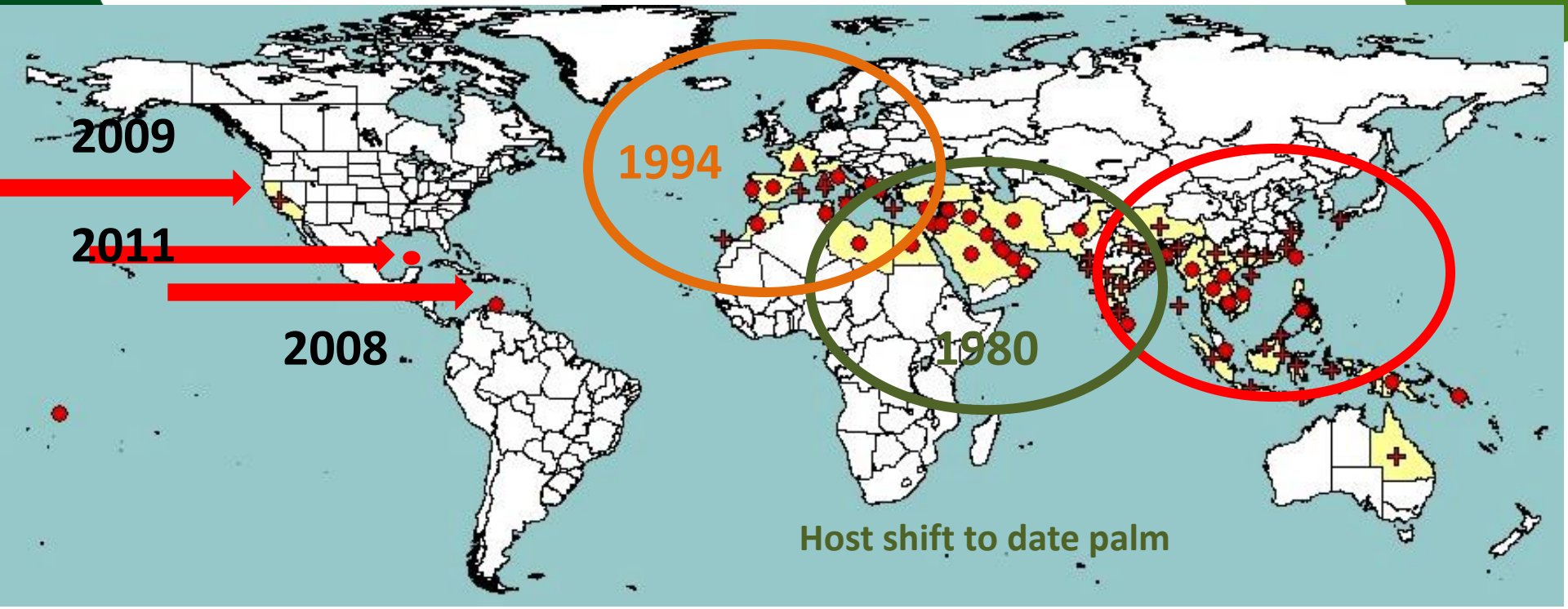
Corporación Colombiana de Investigación Agropecuaria

The red palm weevil, a major threat for commercial, ornamental and wild palm species in tropical America.

Bernhard Löhr, Centro de Investigación Palmira, Colombia

***Rhynchophorus ferrugineus*, the red or Asian palm weevil**

Foto: iberia-natur.



Distribution map and history of invasion of *Rhynchophorus ferrugineus (EPPO 2012, modified)*

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What is at stake in South and Central America?

Coconut and oil palm production statistics of selected South and Central American countries (1993)

Country	Coconut production (mt)	Palm oil production (mt)
Brazil	3,000,000	350,000
Colombia	100,000	1,000,000
Costa Rica	40,000	250,000
Ecuador	20,000	500,000
Mexico	1,050,000	-
Peru	35,000	50,000

Source: FAO world production statistics and Index Mundi

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What is at stake in South and Central America?

Palm species diversity in selected South American countries

	Géneros	Especies
Brasil	36	276
Colombia	45	252
Perú	29	148
Ecuador	30	142
Venezuela	30	112
Panamá	31	106
Costa Rica	28	88
Bolivia	27	86
México	21	84

Source: Plan de conservación, manejo y uso sostenible de palmas en Colombia. Min. Ambiente y Desarrollo Sostenible, Colombia 2015

***Rhynchophorus palmarum,* the American palm weevil (APW)**

The American palm weevil (APW) is:

- **The most important palm pest in tropical America**

- **The principal vector of *Bursaphelenchus cocophilus*, the nematode that causes red ring disease of coconut and oil palm**

- **a serious pest of other economically important (oil palm, peach palm, Açaí), ornamental and wild palm species**

Coconut affected by Red Ring Disease at the Colombian Pacific coast

Coconut plantation at spring tide, devastated by red ring disease. Río Gualajo, Tumaco Bay, Pacific Coast of Colombia

Coconut plantation devastated by red ring disease. Río Rosario, Tumaco Bay, Pacific Coast of Colombia

Larva of *Rhynchophorus palmarum* in the base of a petiole of oil palm

Symptoms of Red Ring Disease in coconut var. “Típico”

Conventional control : pheromone trapping

More of the same?

Colombian Government, USAID and EU invested USD >5 million in Tumaco in mass trapping, eradication of diseased palms and replanting but …….

Trapping is disliked by the farmers

Eradication of diseased palms is very labour intensive and costly

……. and the weevil problem just continues as before

The only viable alternative:

increasing the natural mortality of the weevils in the environment

Biological Control

introducing new mortality factors into the general population

Options:

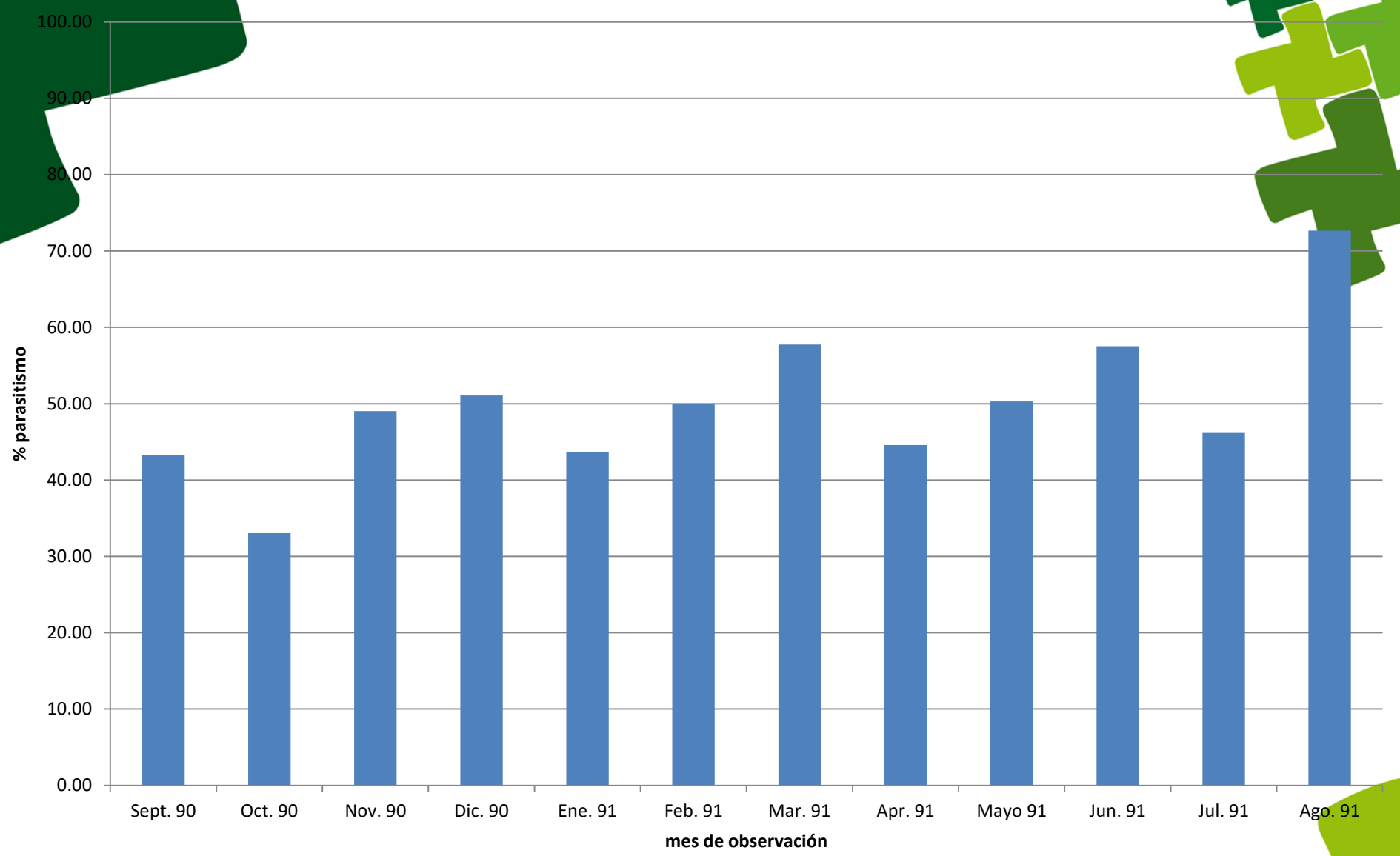
Two species of parasitic flies of palm weevils were detected >20 years ago in Brazil but have not been studied or deliberately used as biocontrol agent anywhere

***Billaea menezesi* (Guimarães)**

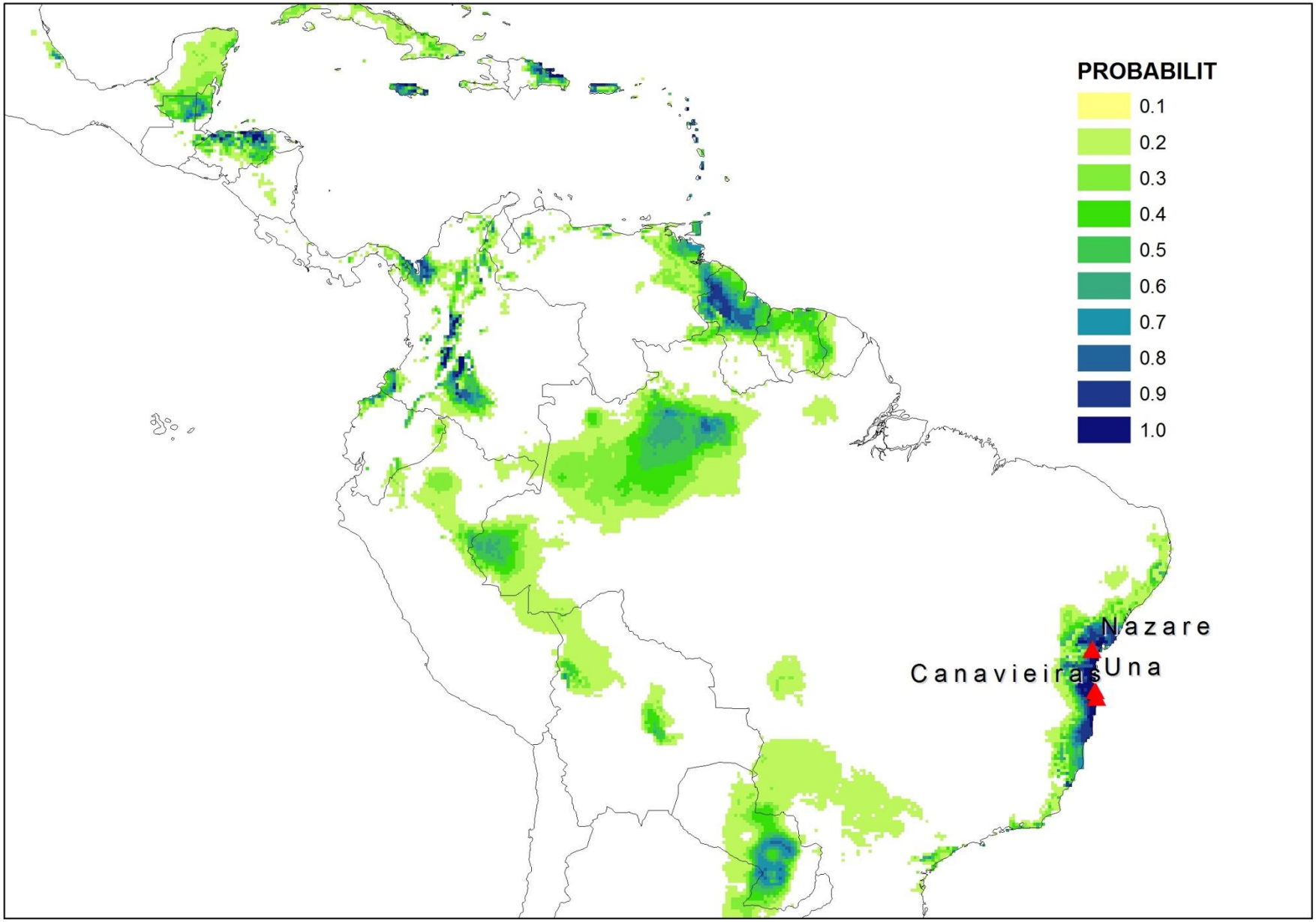
***Billaea rhynchphorae* (Blanchard)**

***Billaea rhynchophorae*, parasitoid of *Rhynchophorus palmarum* larvae and pupae**

***Billaea rhynchophorae*, parasitoid of *Rhynchophorus palmarum* larvae and pupae**

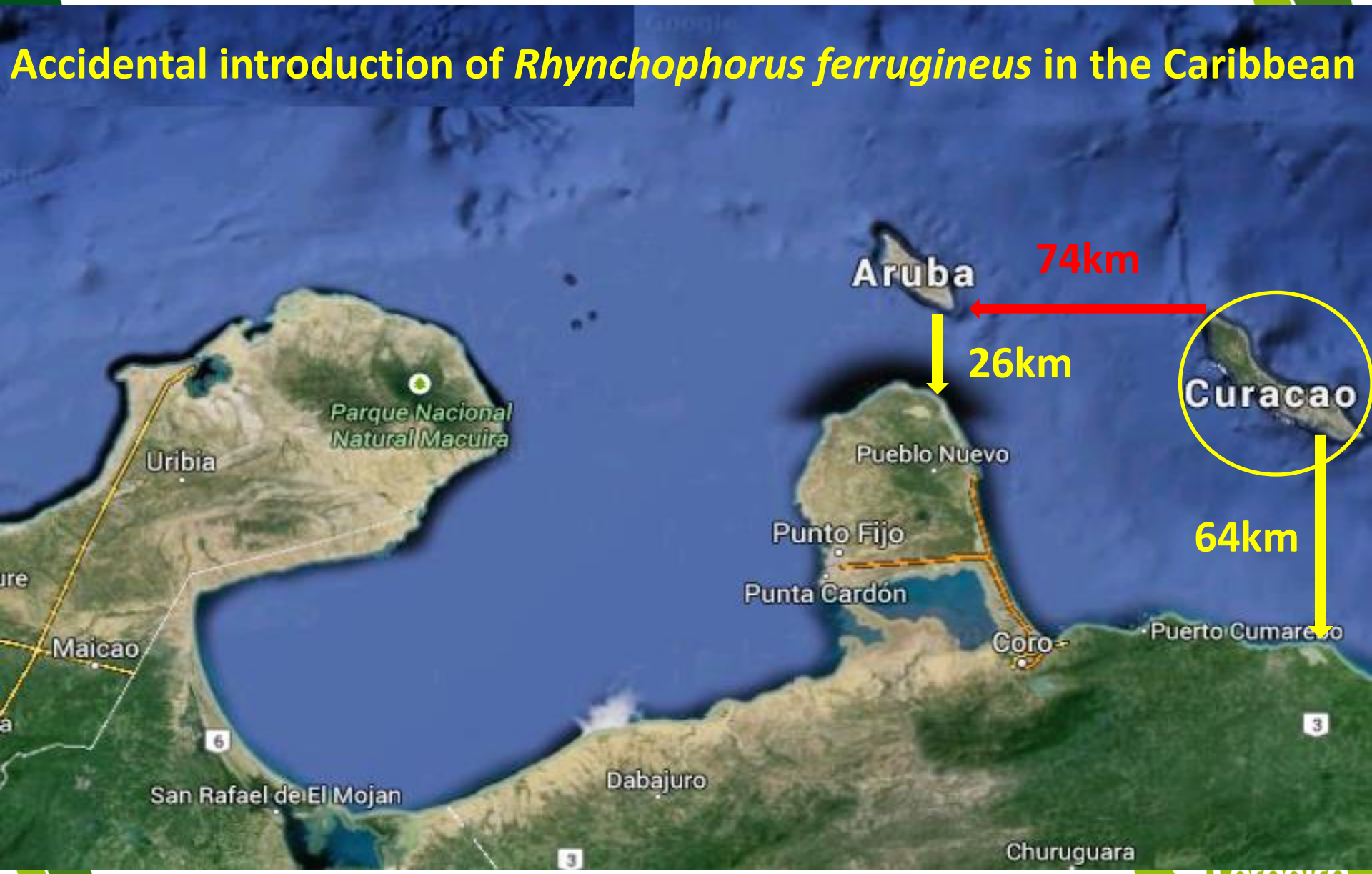


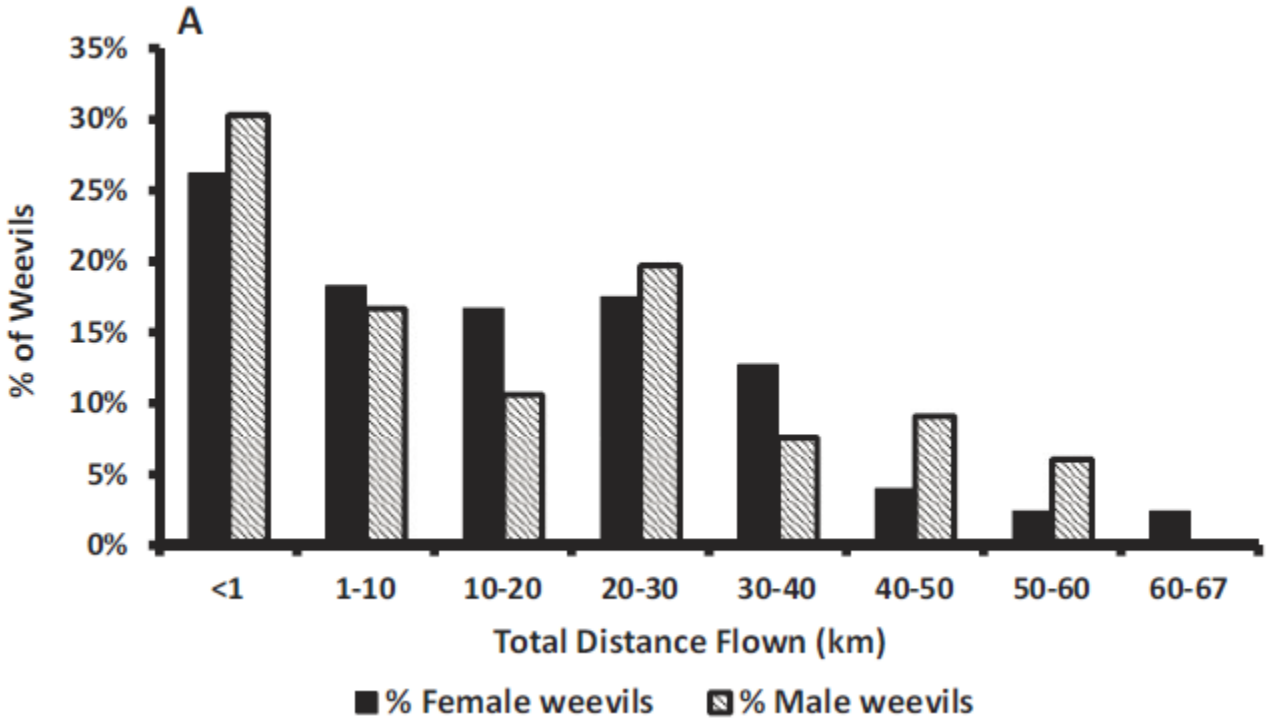
Parasitism of *Rhynchophorus palmarum* by *Billaea rhynchophorae* in oil palm, Nazaré, Bahia, Brasil (Moura et al., 1993)



Climate matching chart between area of endemism and possible introduction of *Billaea rhynchophorae*

Accidental introduction of *Rhynchophorus ferrugineus* in the Caribbean





HODDLE et al. 2015, J. Econ. Entomol. 108(6): 2599–2609 How Far Can the Red Palm Weevil (Coleoptera: Curculionidae) Fly?: Computerized Flight Mill Studies With Field-Captured Weevils.

***Phoenix dactylifera* in a resort in Aruba.**

Palms in Aruba killed by the red palm weevil: *Washingtonia* sp. (arriba izq. y abajo) y *Phoenix canariensis* (arriba der.) y *Cocos nucifera* (abajo der.).

Experiences of Aruba and Curação

- the weevil was introduced because there is no phytosanitary legislation
- in spite of an effort with mass trapping, it could not be eliminated
- difficulties with access to private gardens of only seasonally used houses
- hotels and resorts use calendar (biweekly) applications of insecticides
- no control or monitoring activities by the authorities
- authorities recommend replacement of susceptible species with resistant ones

The European experience with *Rhynchophorus ferrugineus*

Phoenix canariensis **(1 male, 2 female),** ***Phoenix dactylifera*** **(3) and** ***Washingtonia filifera*** **(4), the land-scape dominating palms of the Mediterranean**

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Avenue lined with *Phoenix canariensis* in Granada/España in 2003

…… and in 2007

Elche Town Hall tackles red palm weevil plague in the Palmeral

The strategy in Elche shifts from the destruction of affected palms to treatment

As the red palm weevil continues to devastate date palms throughout the Mediterranean regions of Spain it has been reported that in the municipality of Elche, which is home to the largest palm grove in Europe, a total of 33,007 trees were lost in the first eight months of this year.

According to the Town Hall councillor responsible for the Palmeral, Antonio García, 643 of the trees destroyed

J. M. Cobos, 2010 Red palm weevil Control Strategy for Europe, Intl. Confer. Valencia, Spain 5-6 May 2010

Imported palms in a port in the south of Spain

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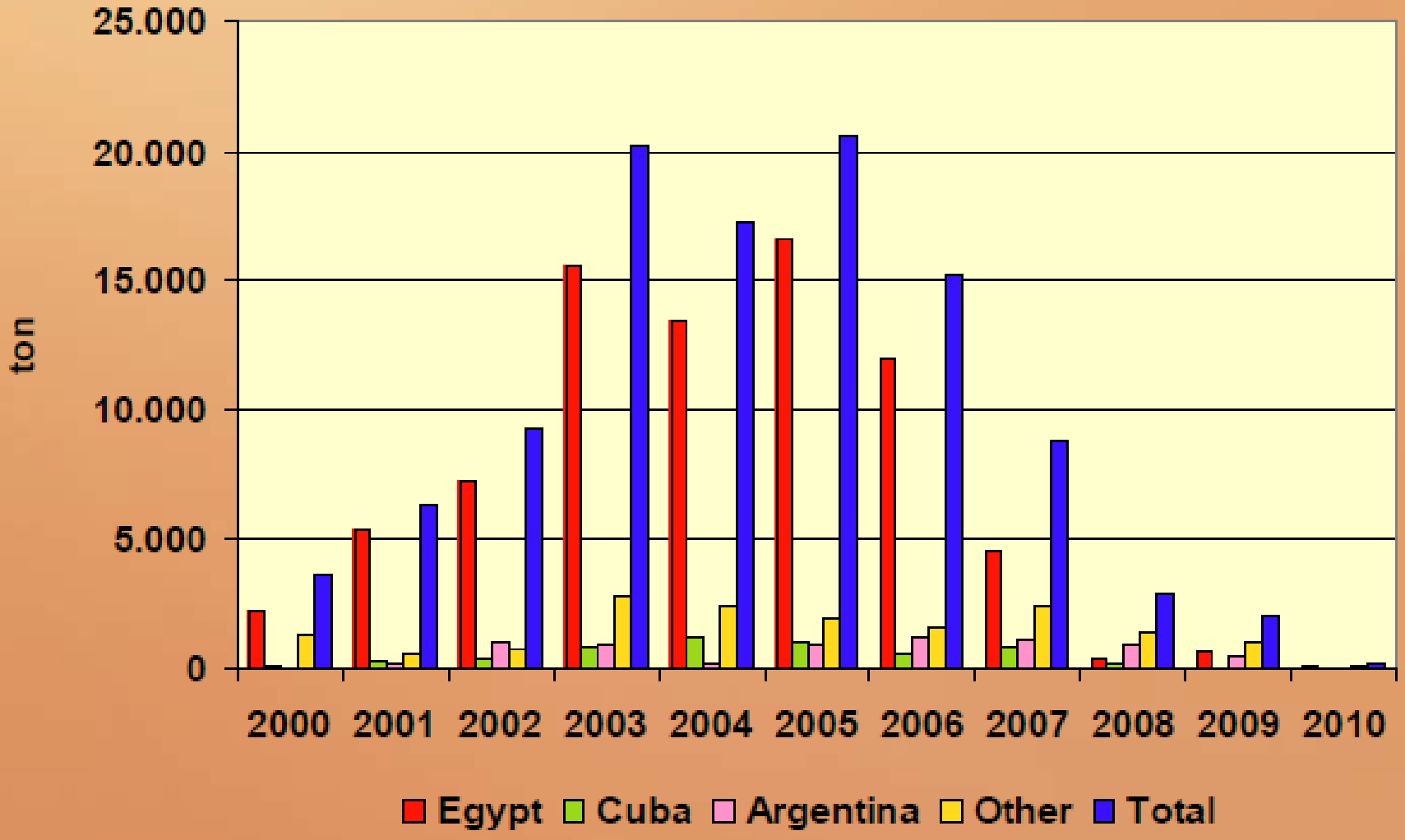
Origin of imported palm trees



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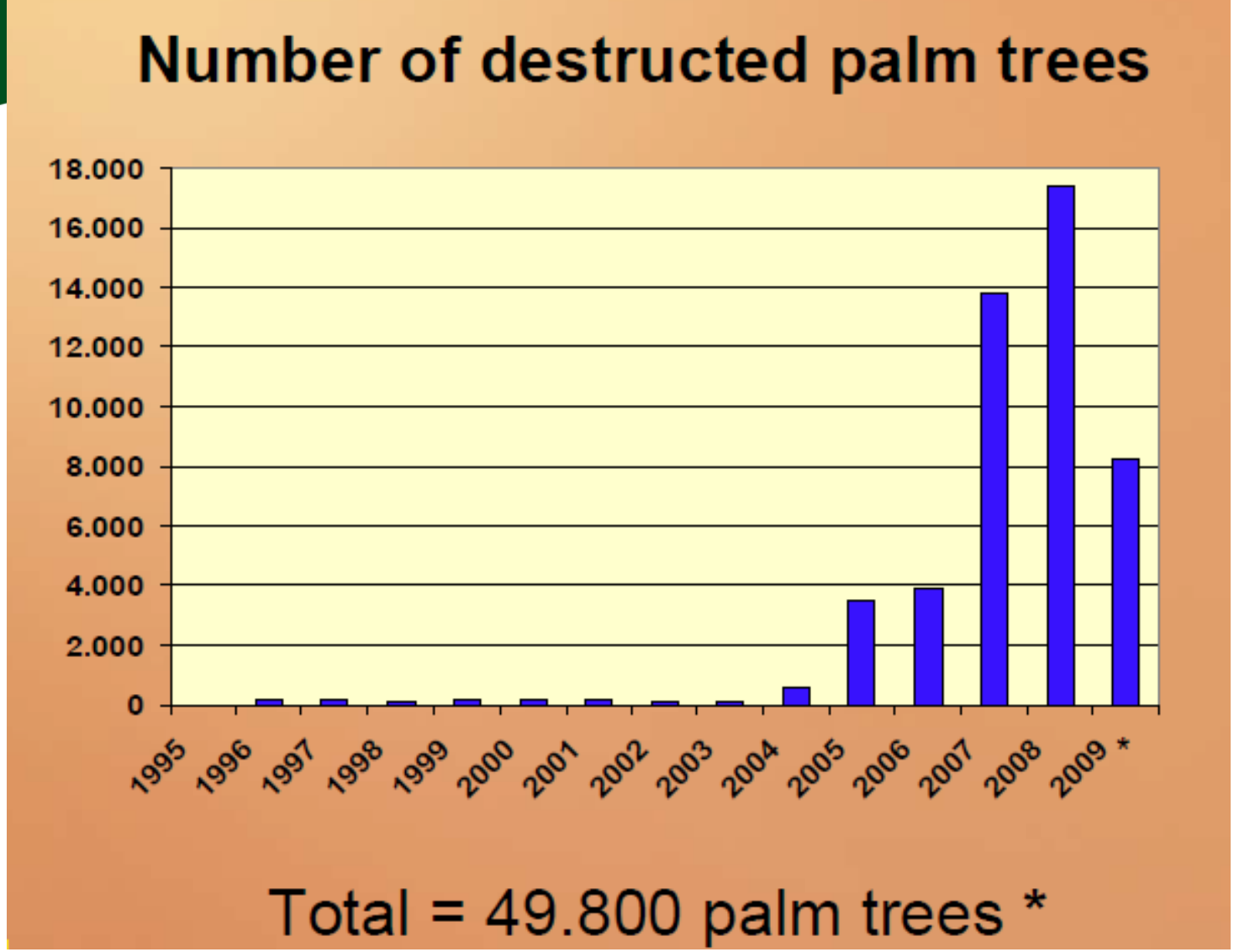

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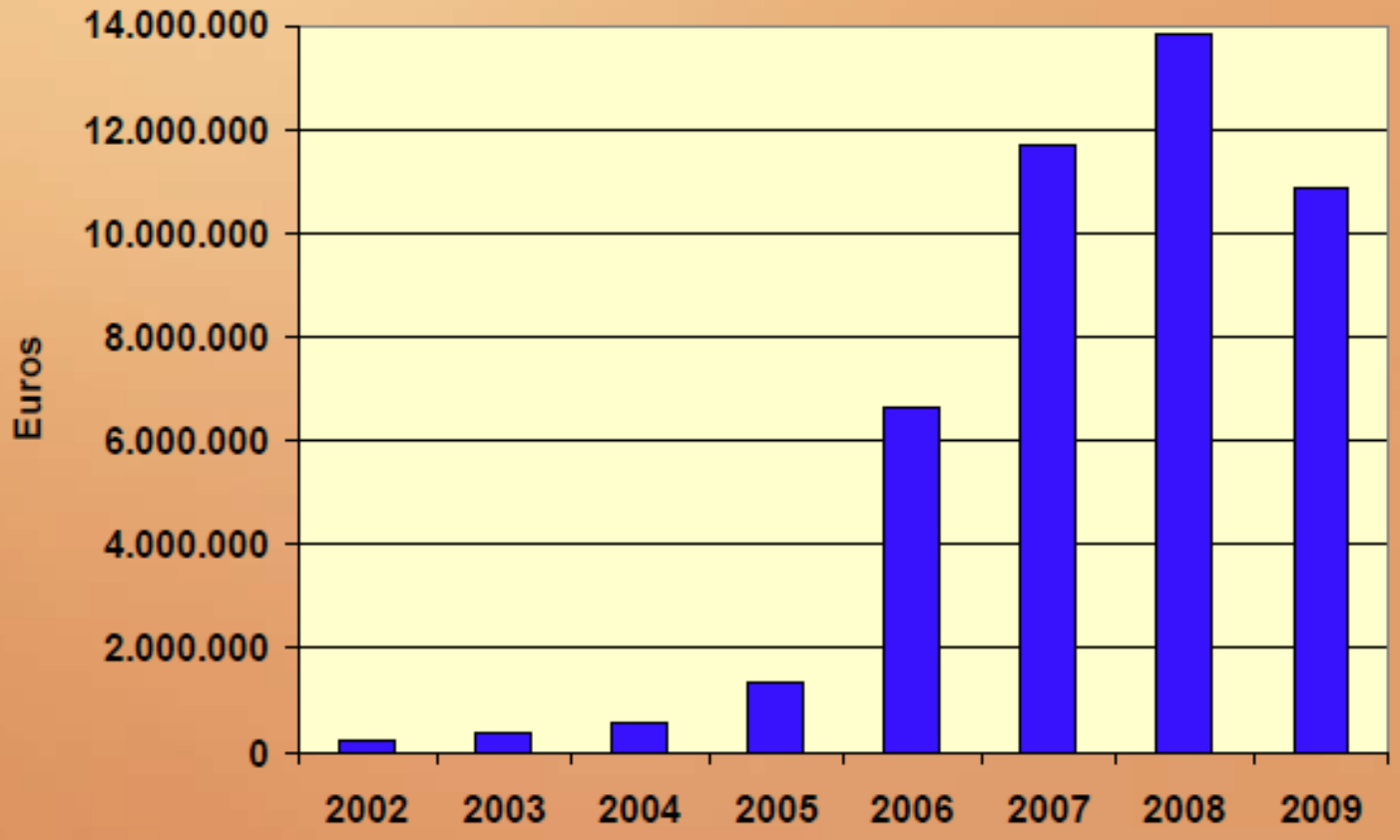
Estimated value of destroyed palms: € 275,000,000

Expense on control and preventive programmes



J. M. Cobos, 2010 Red palm weevil Control Strategy for Europe, Intl. Confer. Valencia, Spain 5-6 May 2010

Total = 45.500.000 €

This does not include the value of the palms (€ 5,500 – 10,000/palm)

Spherical pruning/Dendrochirurgy

S. Nardi, R. Griffo, M. De Santis y B. Faraglia 2010 Control of *Rhynchophorus ferrugineus* in Italy. Red palm weevil Control Strategy for Europe, Intl. Confer. Valencia, Spain 5-6 May 2010

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Microwave treatments

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Experiences and results in Spain

•The weevil was eradicated in the Canary Islands

- Good level of control of the problem in nurseries
- Huge problems in private gardens
- Astronomic costs for prevention and eradication
- Urgent need for new technologies
  - ➢ Early detection
  - ➢ Control options

Management practices currently in use

Insecticides Entomopathogenic fungi Entomopathogenic nematodes	Repeated application required, control effect unsatisfactory, costly
Trapping	Permanent activity, needs regular service, pheromone required, does not work in urban environment
Dendrosurgery Microwave treatment	High cost, unsuitable for use in plantations

At present, no efficient predators or parasitoids of *R. ferrugineus* are available worldwide

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Billaea rhynchophorae and *Billaea menezesi*,
New tools in weevil management

Why are we convinced the Brazilian flies will also attack *Rhynchoph*

The f

Dyna

Amer

R. pa

Rhino

Homa

Esteban-Durán et al, 19

All known as palm bore

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Expected biological traits of *Billaea spp.*

short generation time (2-3 weeks)

high reproductive rate (>500/female)

very active flier

narrow ecological adaptability

host (weevil) and habitat specific

naturally gregarious

probably easily reared, one host produces up to 20 fly progeny

releases easy, good dispersal from release sites

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EMBRAPA of Brazil and Corpoica of Colombia

have agreed to join efforts and try to erradicate *Rhynchophorus ferrugineus*

in cooperation with the Governments of the Netherlands Antilles

before it spreads to the South American continent with possibly disastrous consequences


What about this solution?

Or better raw?

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