Mealybugs and Vine Leafroll Virus, a Dangerous Mix

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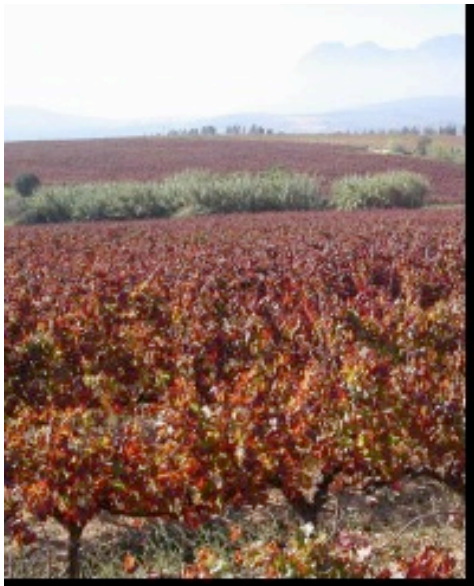
Grapevine leafroll disease:

Most important virus disease of grapevines in South Africa where it occurs at high incidences.

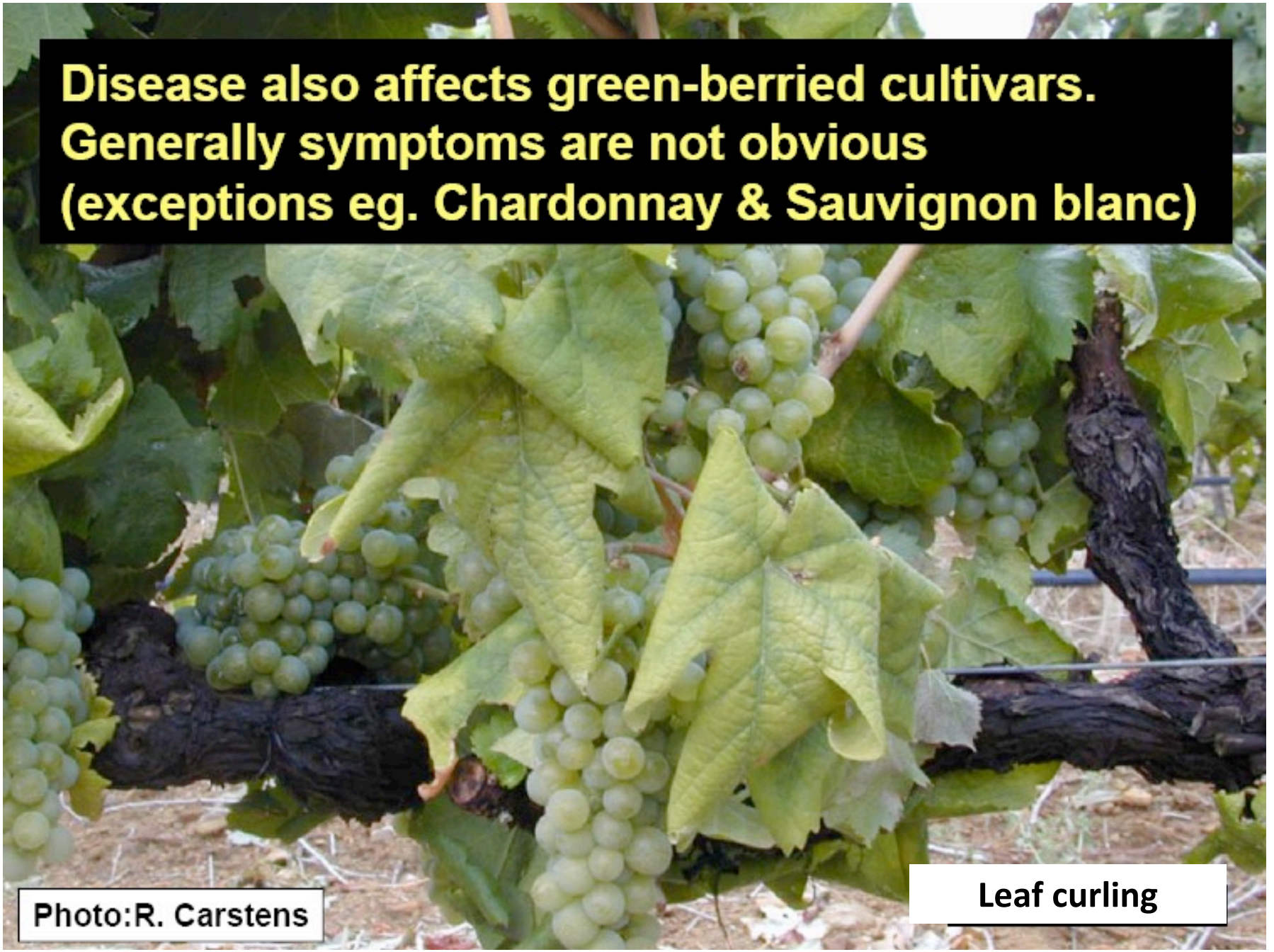
Oregon State University



***Vitis* free period: Remove infected vineyard thoroughly (all roots and root pieces), lay fallow, remove all volunteer *Vitis* plants.**


Photo G. Pietersen


✓ first symptoms may start on basal leaves in early summer (June)
✓ in late season, necrotic areas on leaves may occur
June
October


Disease also affects green-berried cultivars.
Generally symptoms are not obvious
(exceptions eg. Chardonnay & Sauvignon blanc)
Photo:R. Carstens
Leaf curling

Grape Leafroll-associated Virus

LR strain	Vector
GLRaV-1	*Heliococcus adenostomae* *Parthenolecanium corni* *Phenacoccus aceris* *Planococcus ficus*
GLRaV-3	*H. adenostomae* *Pa. corni* *Ph. aceris* *Pl. citri* *Pl. ficus* *Pseudococcus calceolariae* *Ps. longispinus* *Ps. maritimus* *Ps. viburni*
GLRaV-4	*Pl. ficus*
GLRaV-5	*Pl. ficus* *Ps. longispinus*
GLRaV-9	*Pl. ficus* *Ps. longispinus*

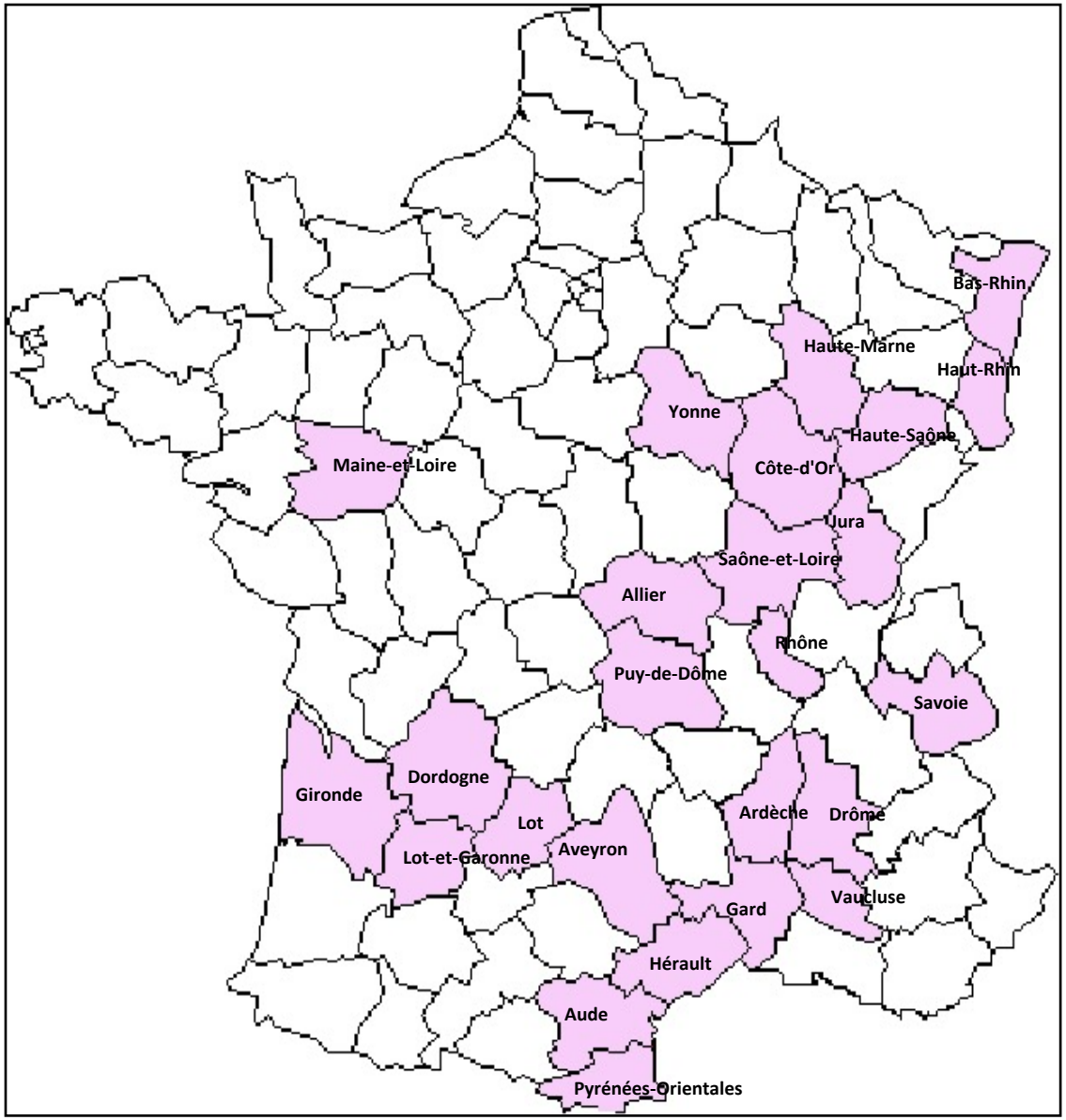
Table adapted from Tsai et al. 2010 and Rayapati et al. 2008

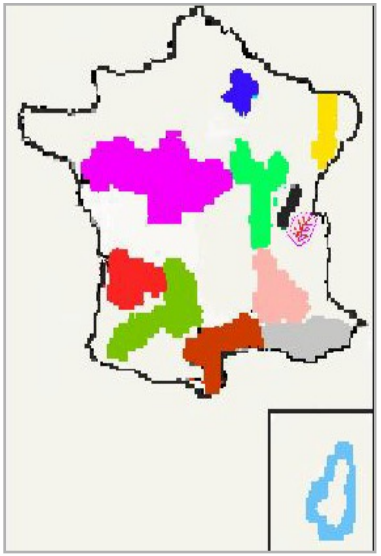
Transmission:
- Infected propagation material
- Wind transfer of vectors
- Migration of vectors
- Mixed infection synergism

Symptoms:
- Reduced leaf area
- Decreased yield
- Delayed maturity
- Compromised berry quality

Vines showing symptoms of GLRaV, Willamette Valley, Oregon

Distribution of Leafroll in France





Sforza 2001

GLAV- 3 on Pinotage on mother blocks in Stellenbosch, South Africa

Hand-lens Comparison

Grape Mealybug "Complex"

- long "tail" or caudal wax filament
- 1-3 generations per year (Oregon)
- development stages are synchronized
- moderate honeydew production (except for obscure mealybug)

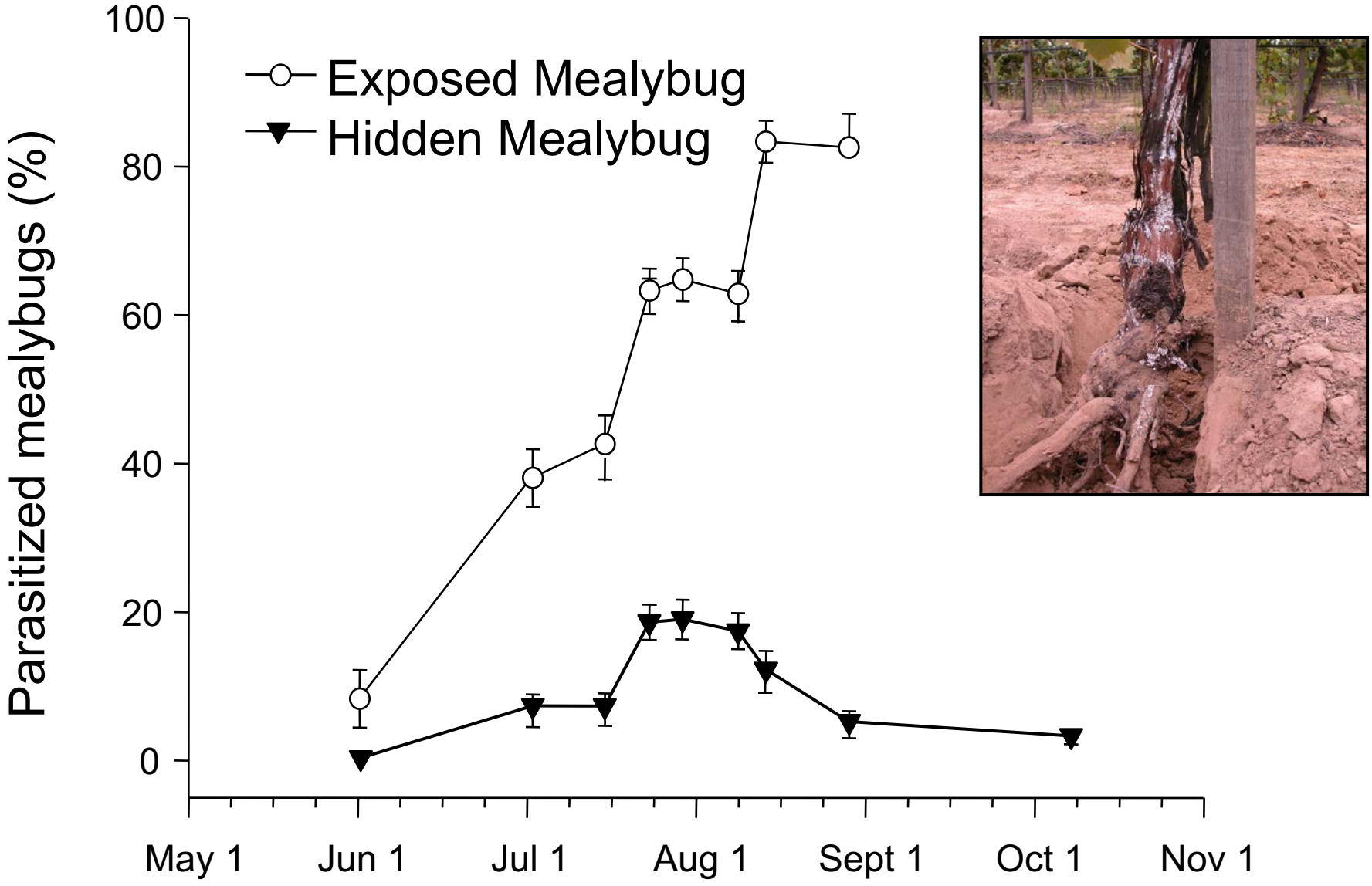
P. ficus:

- waxy filaments same length (no "tail")
- 2-5 generations per year (Oregon)
- stages overlap throughout year
- excessive honeydew production
- feeds on roots and outside of canes

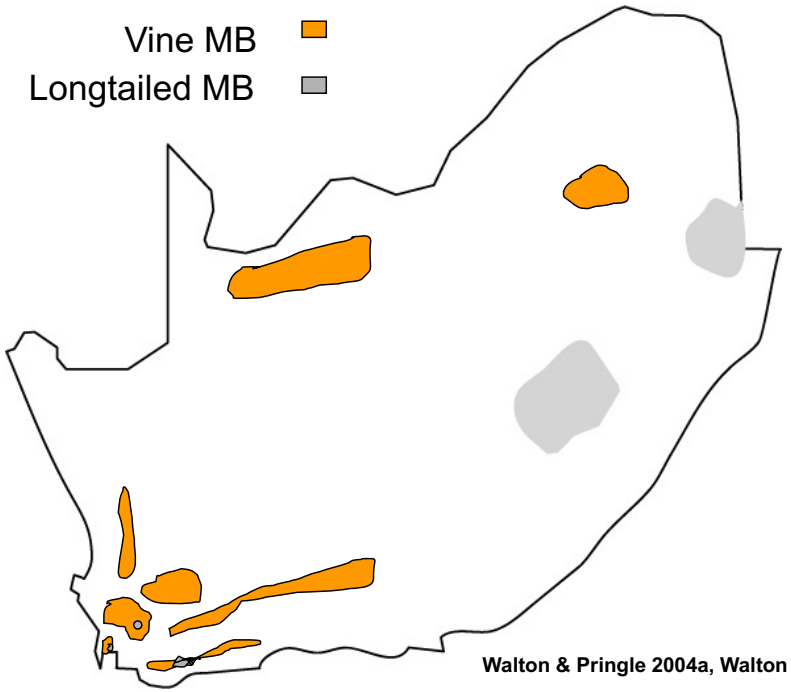
Vine mealybug
a) native to the Mediterranean region
b) spread throughout CA vineyards, now in S. Oregon


Ants tending

Problem: mealybug location

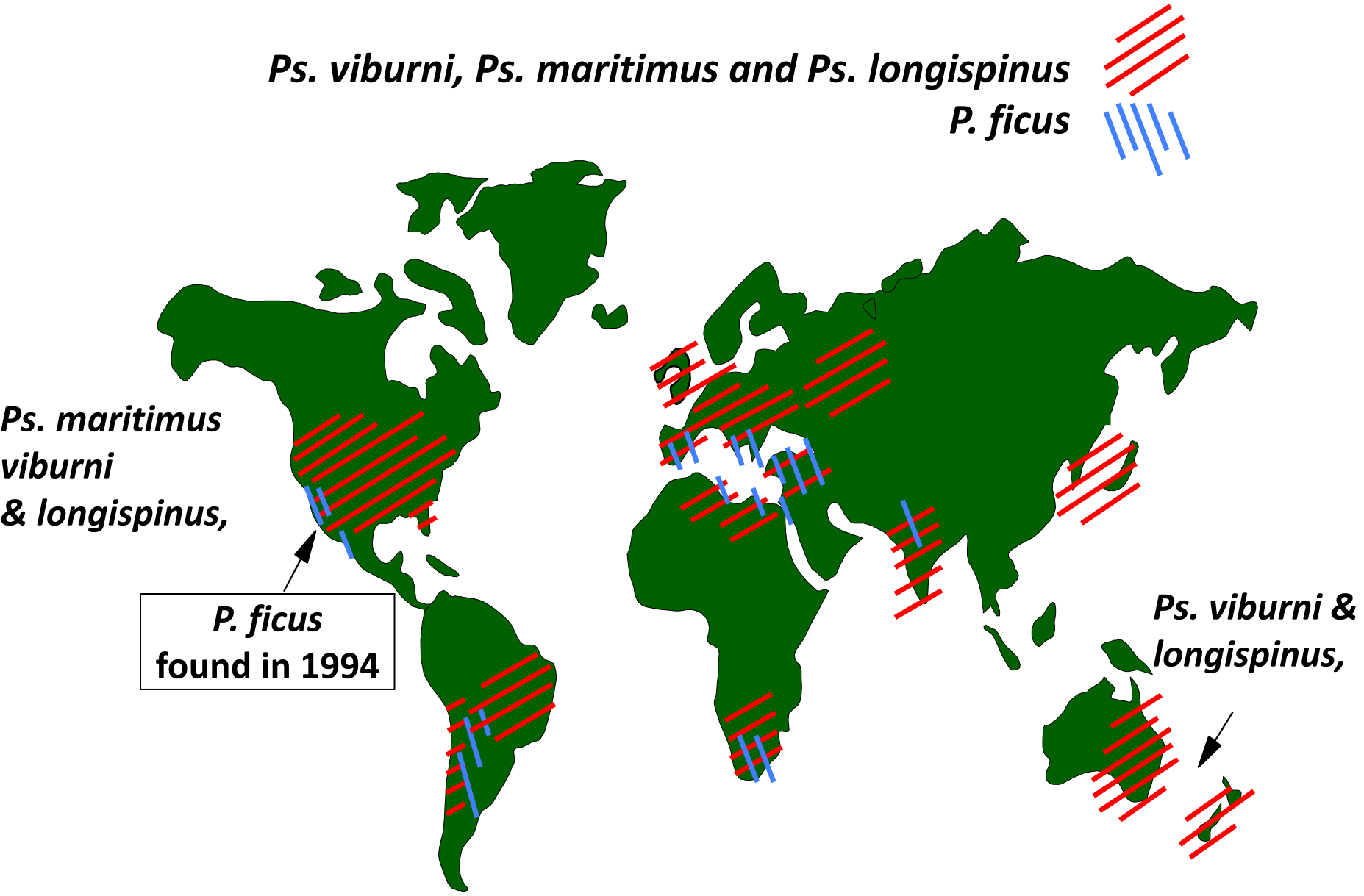


Daane et al, unpublished data



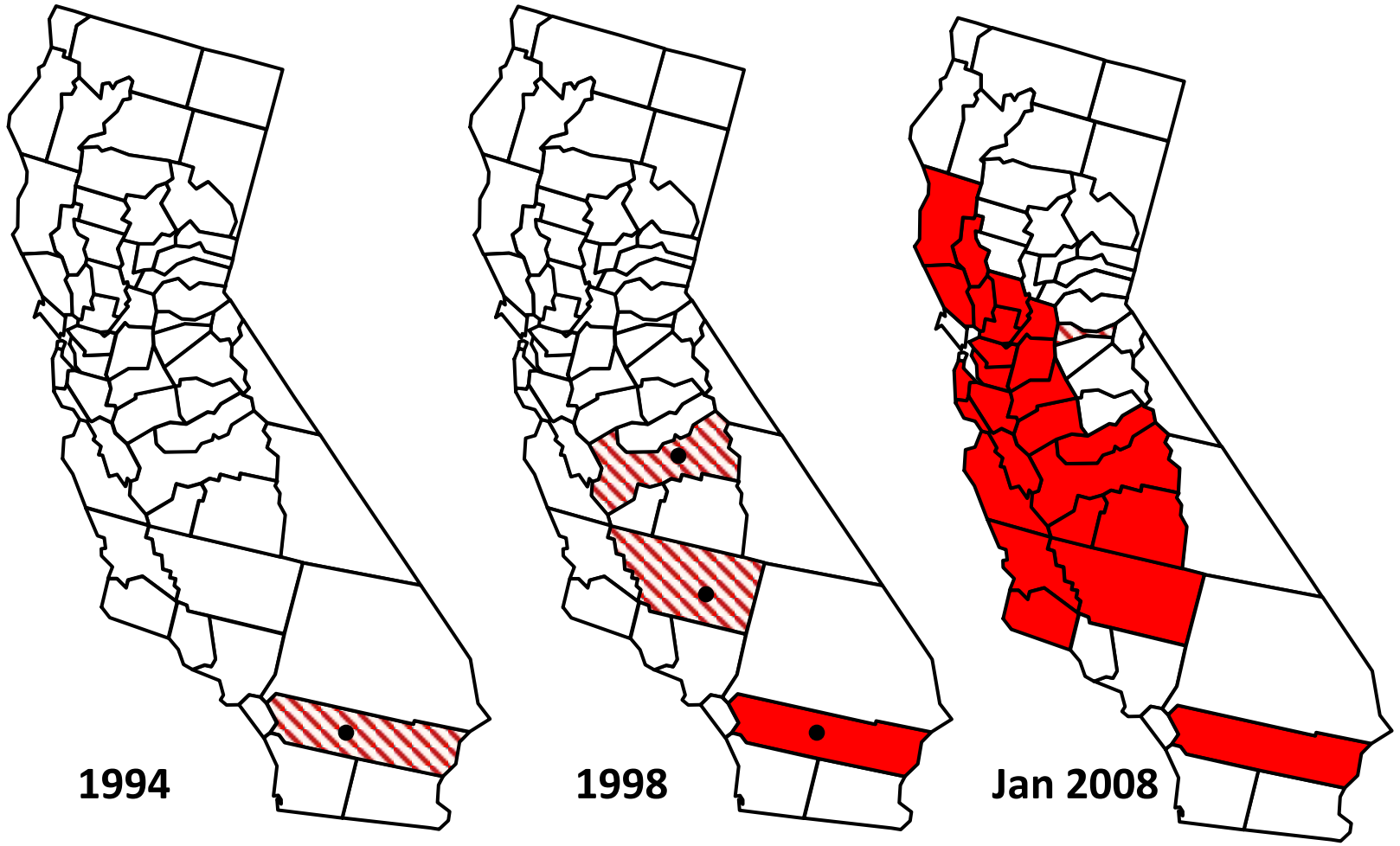
Walton & Pringle 2004a, Walton et al 2009

World Distribution



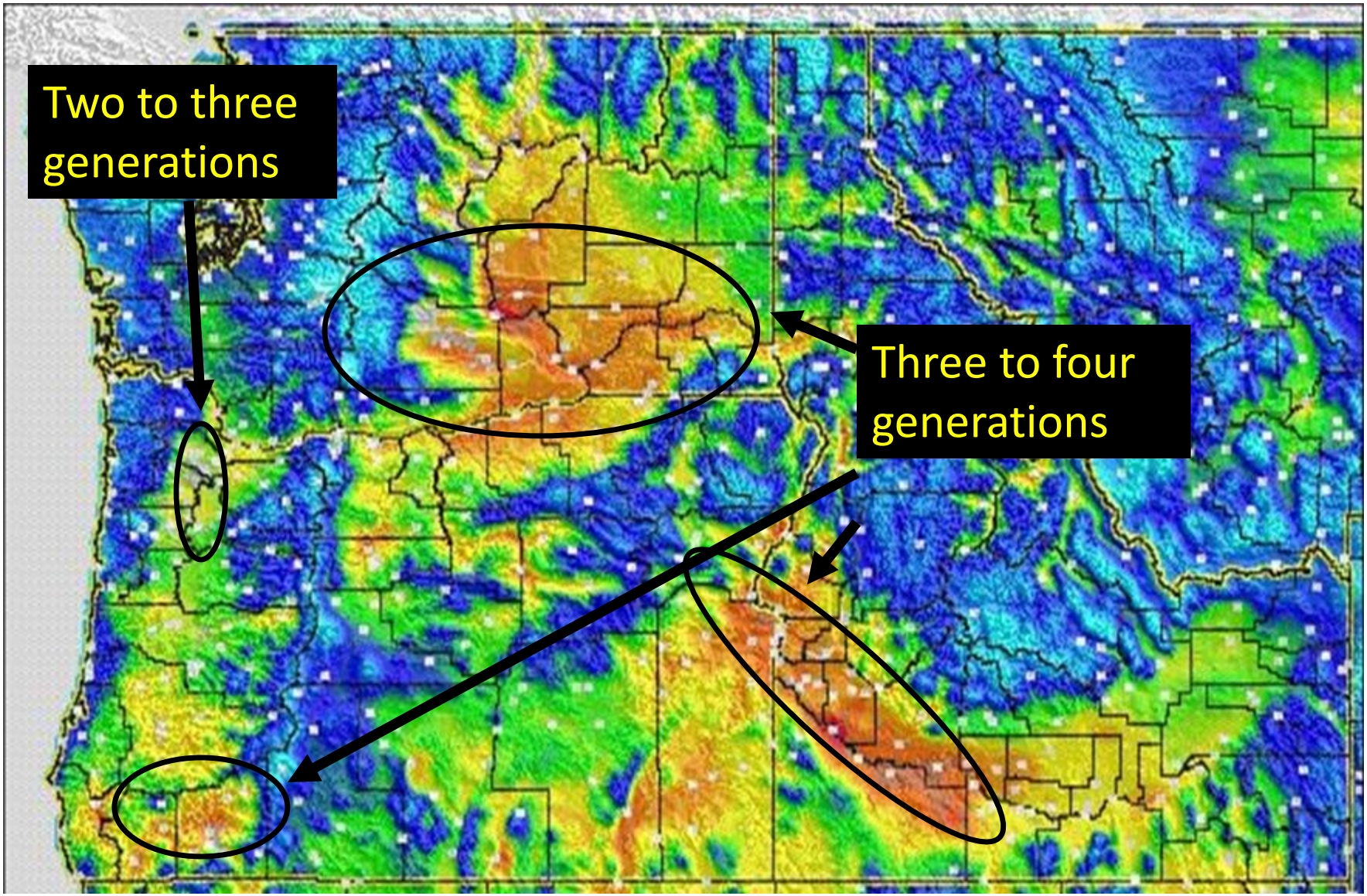
Walton et al. 2003

P. ficus as an Invasive Pest: Rapid California Spread



K. Daane data

Potential spread in the Pacific Northwest

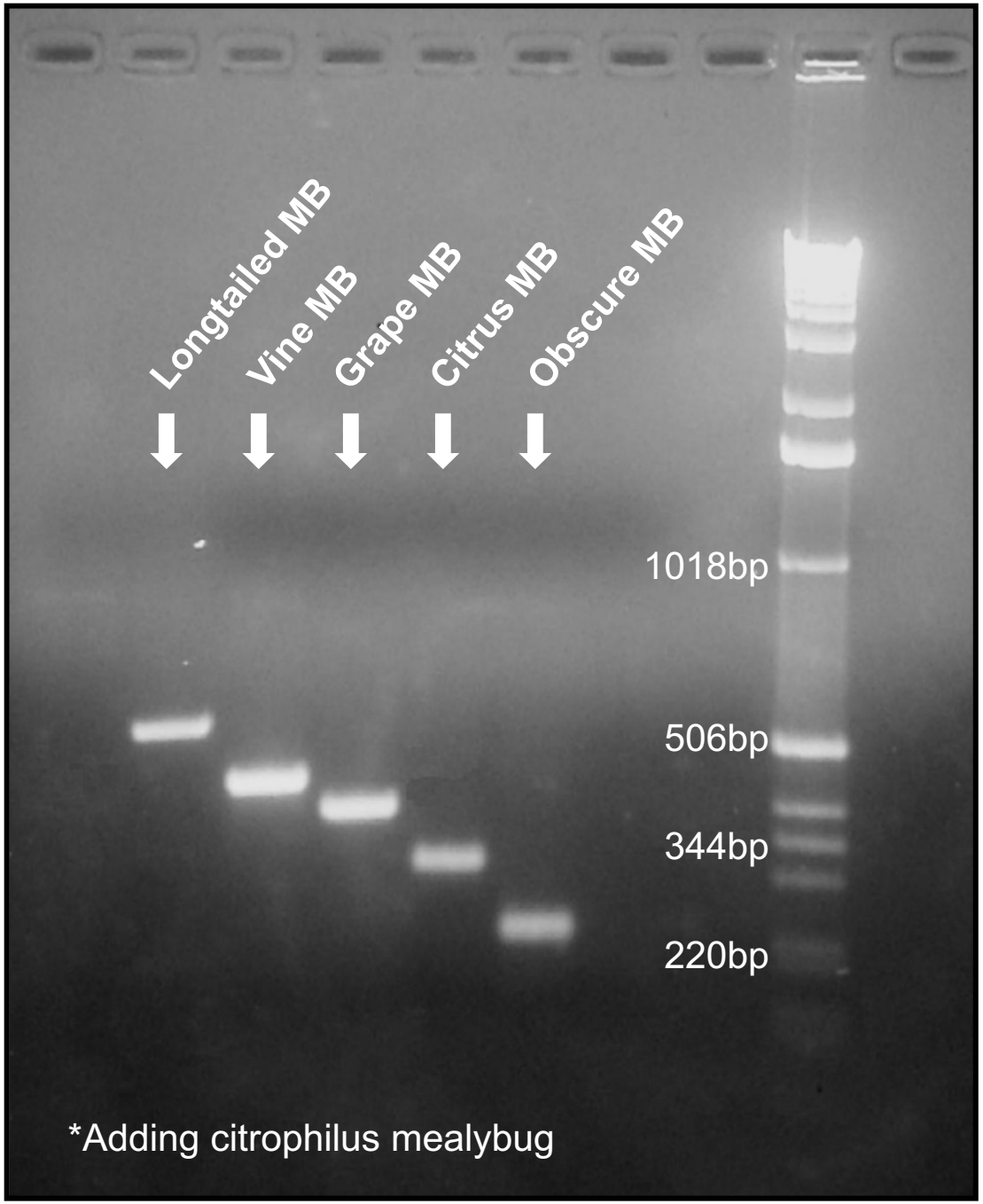


Adapted from Walton and Pringle 2005

Sampling follows mealybug colonization patterns

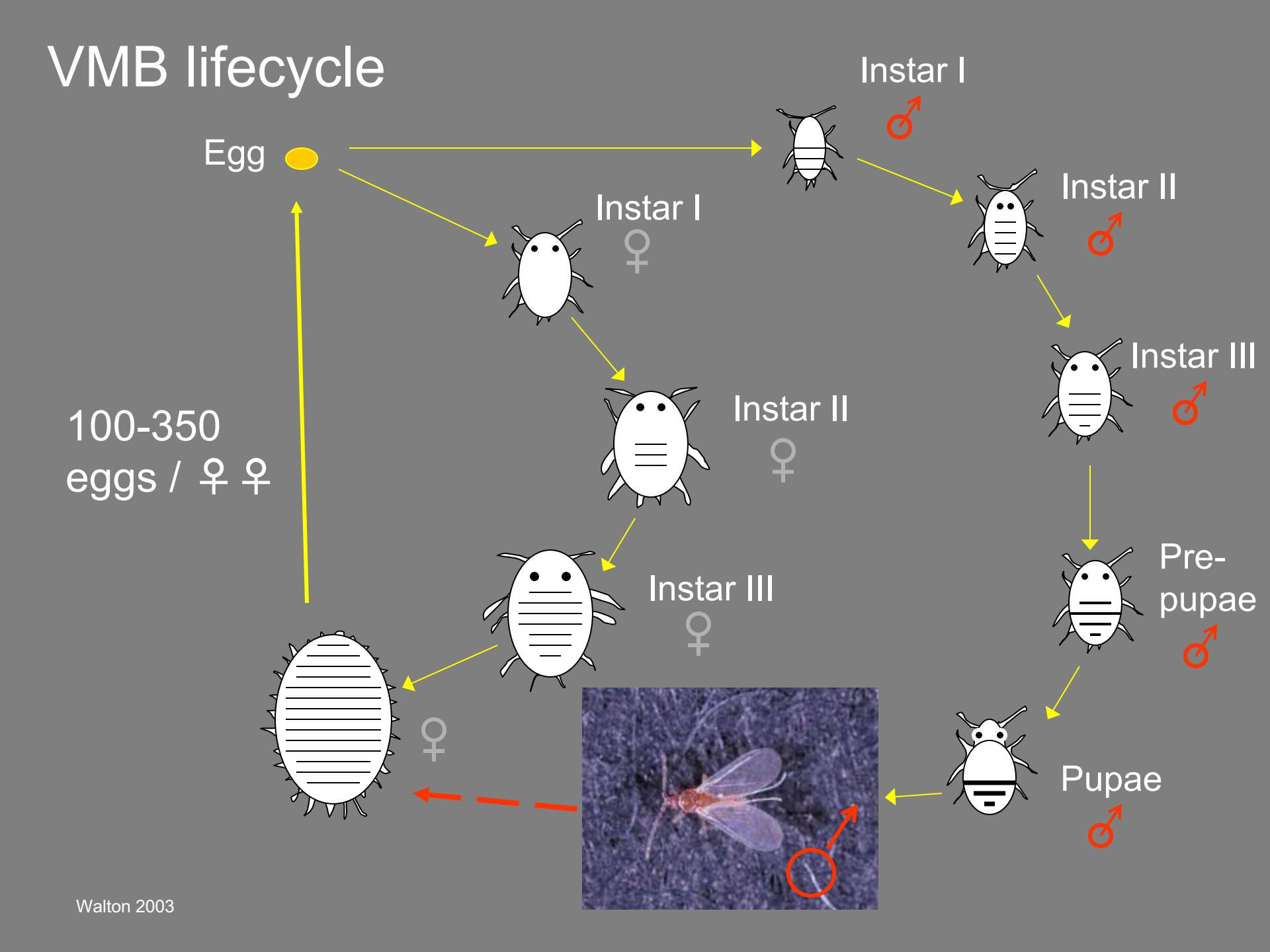
"Multiplex" PCR for Mealybug ID

5 species* crawlers-adults 1-day ID



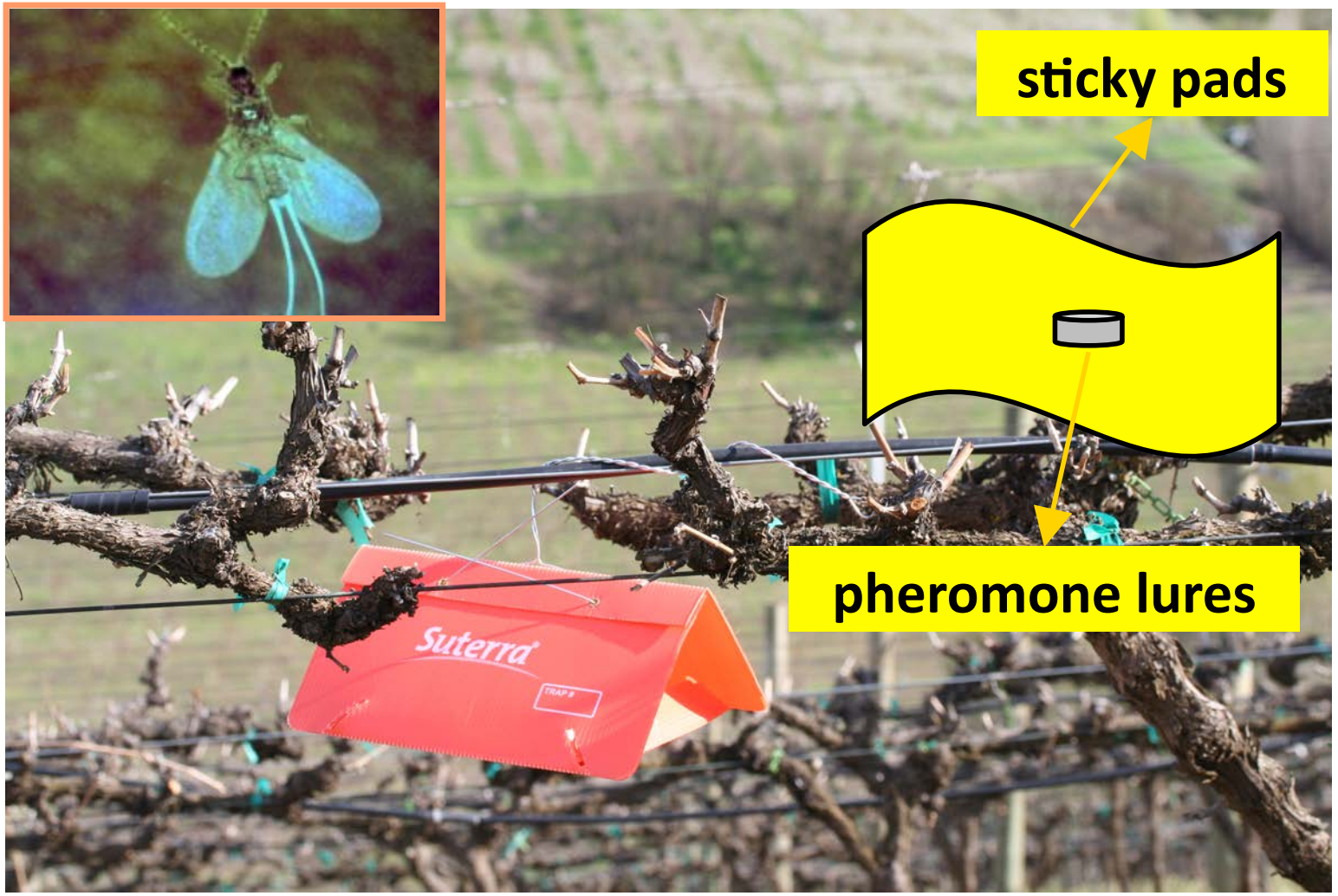
Daane et al 2011

VMB lifecycle



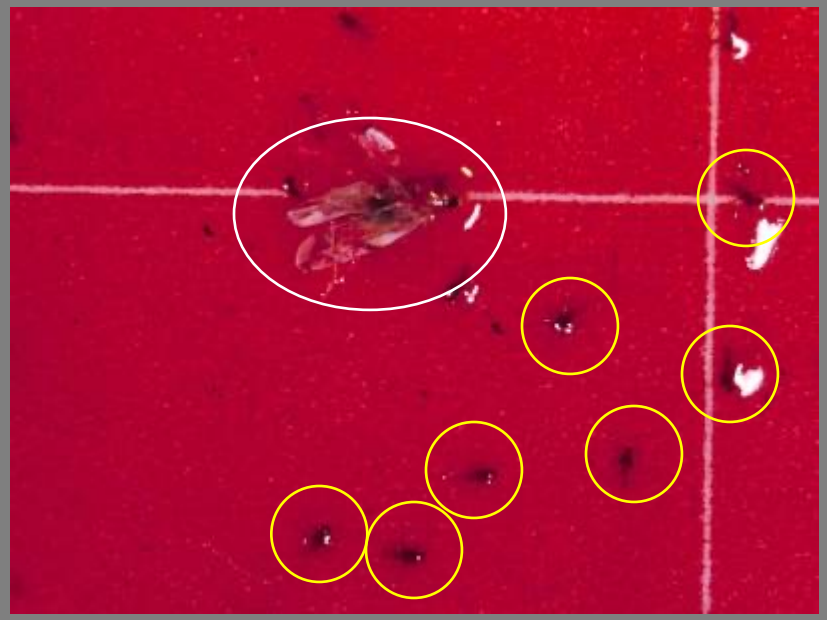
Walton 2003

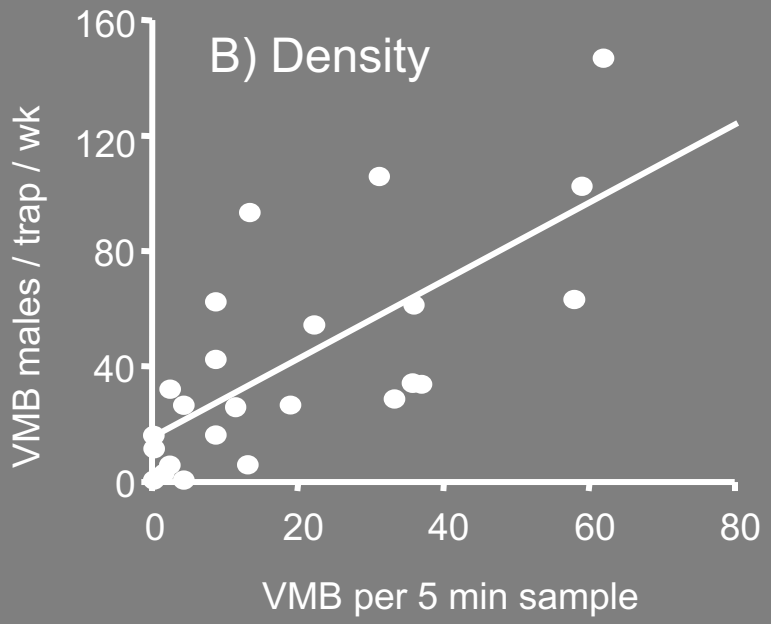
Monitoring with pheromone traps

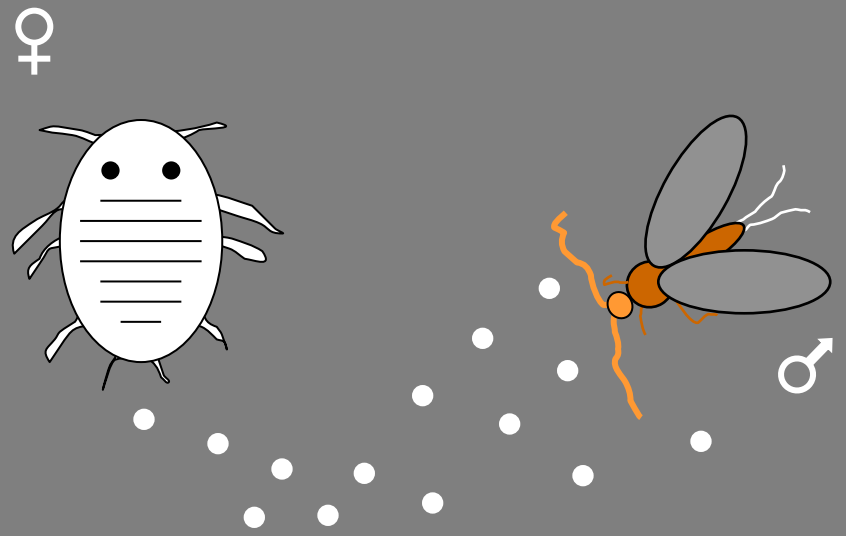


Walton et al. J Econ Entomol 2006

Pheromone Monitoring



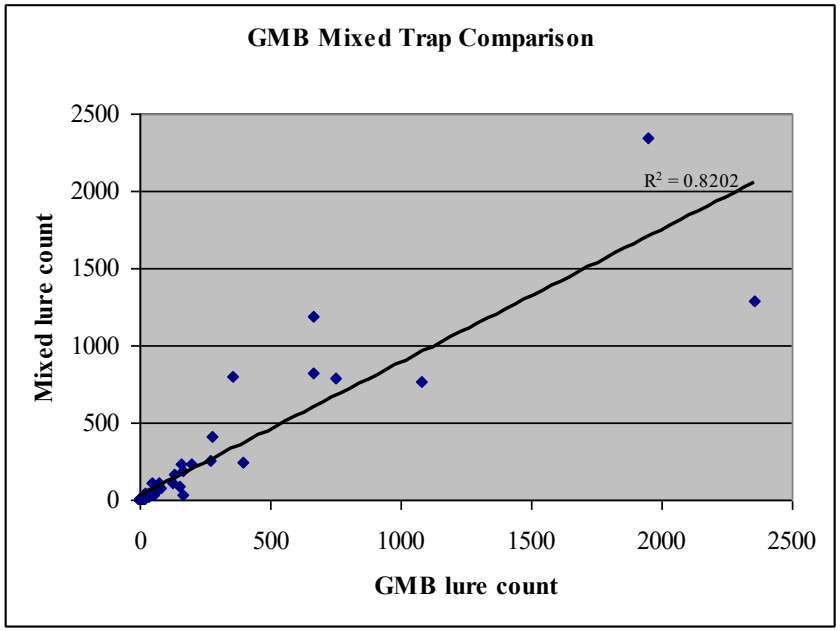




Walton et al. J Econ Entomol 2006

Traps and Lures

Pheromone	Pest Common Name	Latin Binomial
VMB	vine mealybug	*Pl. ficus*
OMB	obscure mealybug	*Ps. viburni*
Mixed*	* combination of four pheromones	
LTMB	long-tailed mealybug	*Ps. longispinus*
GMB	grape mealybug	*Ps. maritimus*



Walton et al. J Econ Entomol 2006,
Walton et al Ann Ent Soc Am 2012

Intensive Sites

Columbia River Gorge

Walla Walla Valley

Willamette Valley

Eight sites within four regions:

Southern Oregon

See Rick Hilton slides

Key points:

- Vine mealybug is a key pest in vineyards worldwide
- Significant costs to control ($5---$1,500 control costs/year)
- It spreads quickly
- VMB is in Oregon
- It is more suited to the environment than any other scale insect found in vineyards
- It can be found underground
- Chemical control difficult
- Is a vector of vine leafroll virus
- Quarantine may be key to manage spread (See Josh Vlach slides)


Thank you!