Impact of climate on spread of virus vector insects including Vine Mealybug

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Grapevine leafroll disease:

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

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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
- Fruit/crop movement

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

Vines showing symptoms of GLRaV, Willamette Valley, Oregon



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

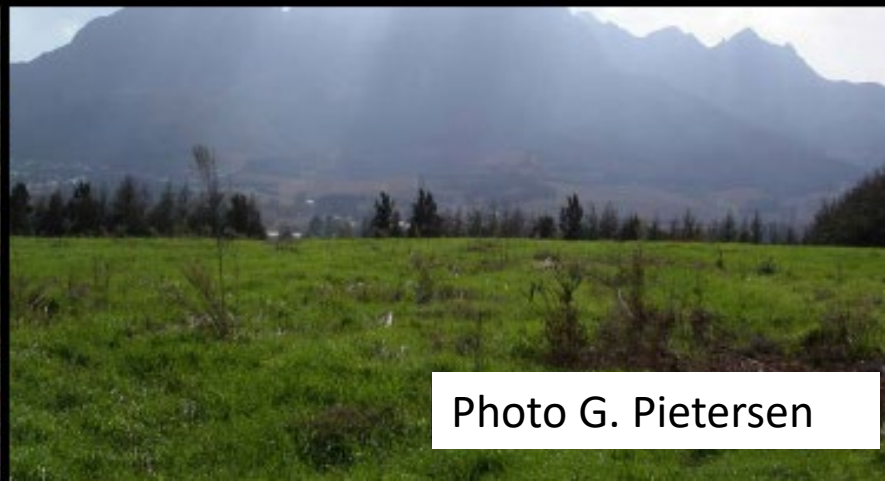



Photo G. Pietersen

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

Hand-lens Comparison

Grape Mealybug "Complex"

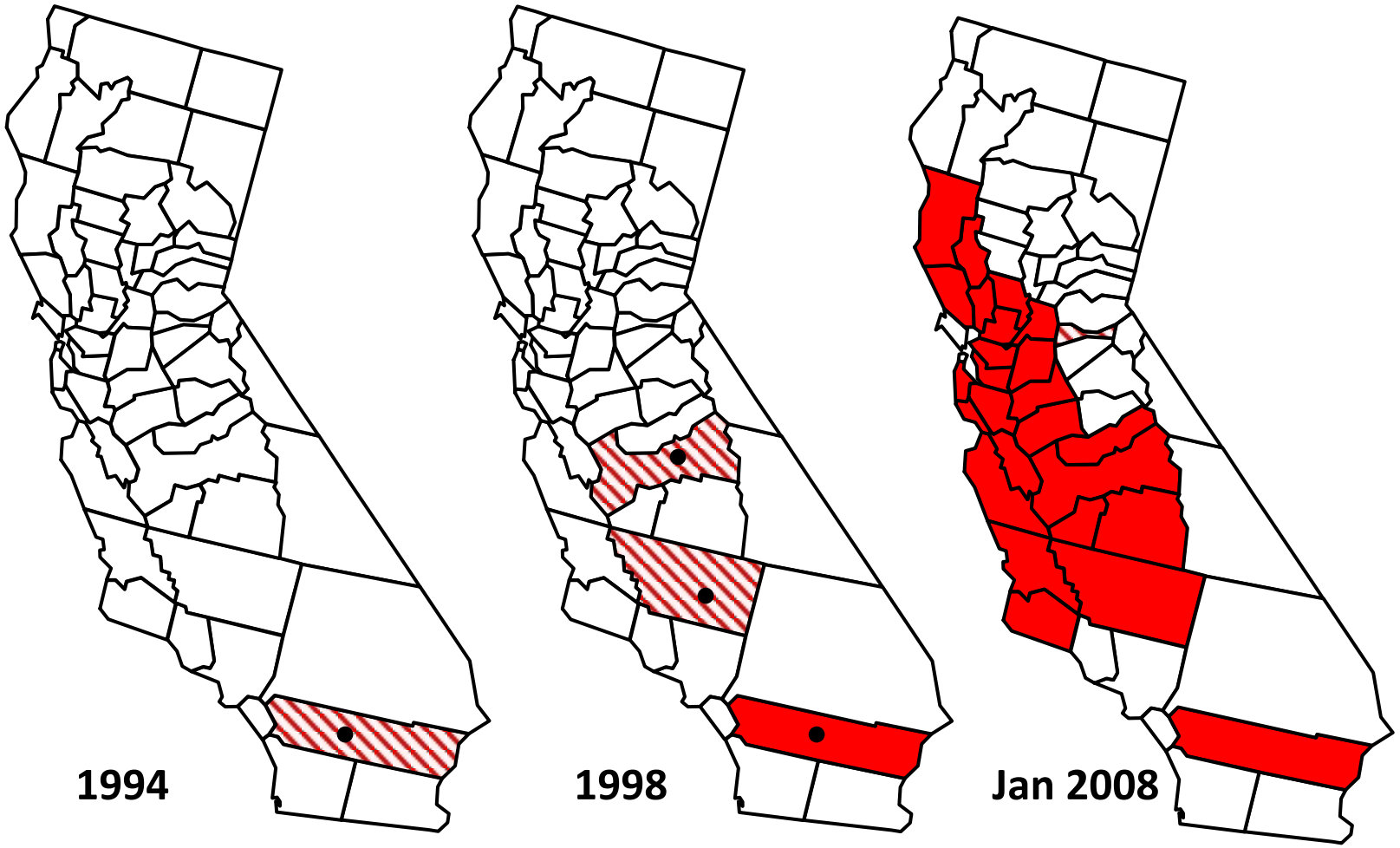
- long "tail" or caudal wax filament
- 1-3 generations per year (Oregon)
- development stages are synchronized
- moderate honeydew production
  (except for obscure mealybug)

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

P. ficus as an Invasive Pest: Rapid California Spread



K. Daane data

Current distribution and risk in Napa Valley

Vine Mealybug

Detection 2014 to 2018

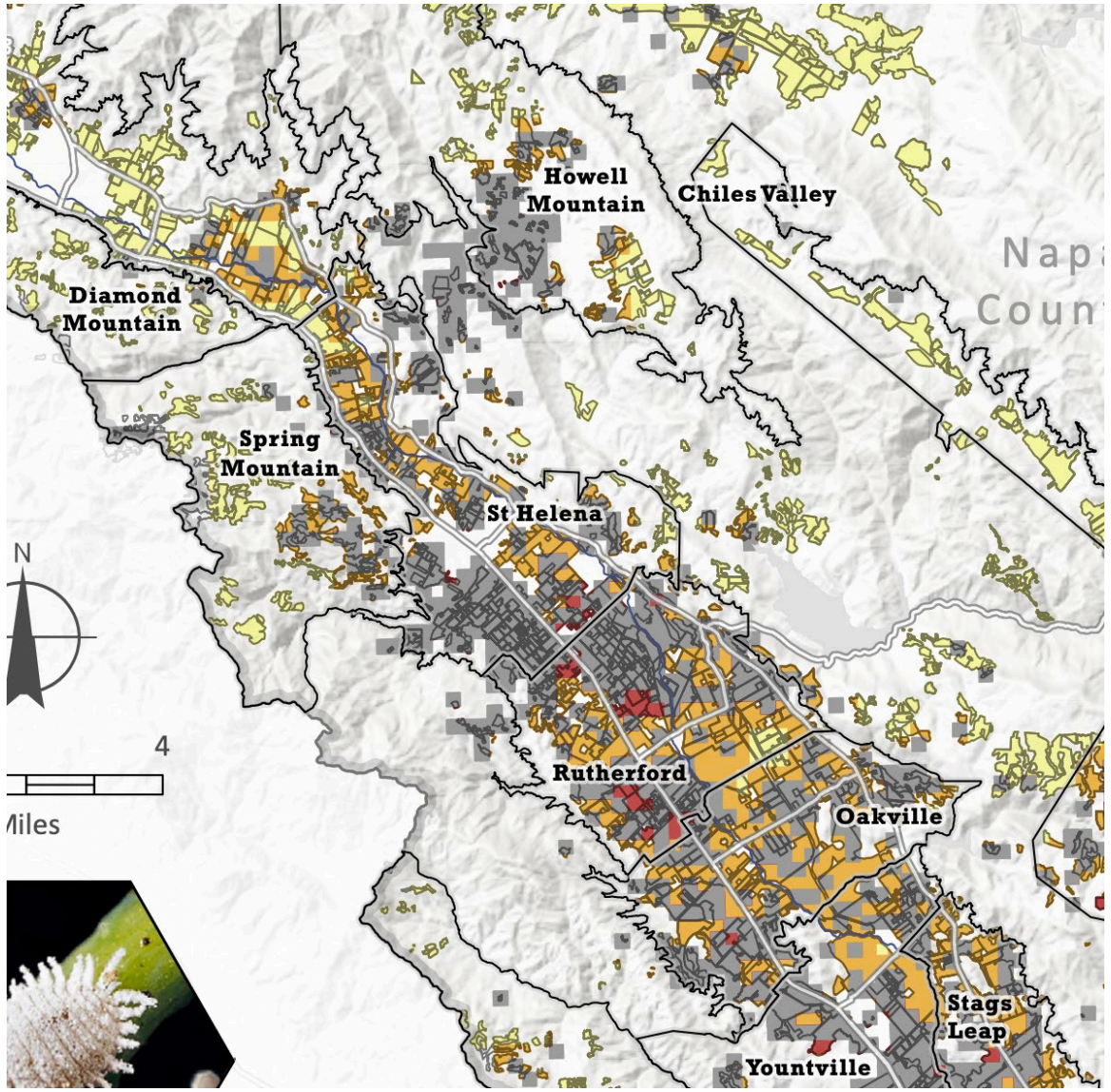
VMB Males >1 ct.

Risk for Spread

Low

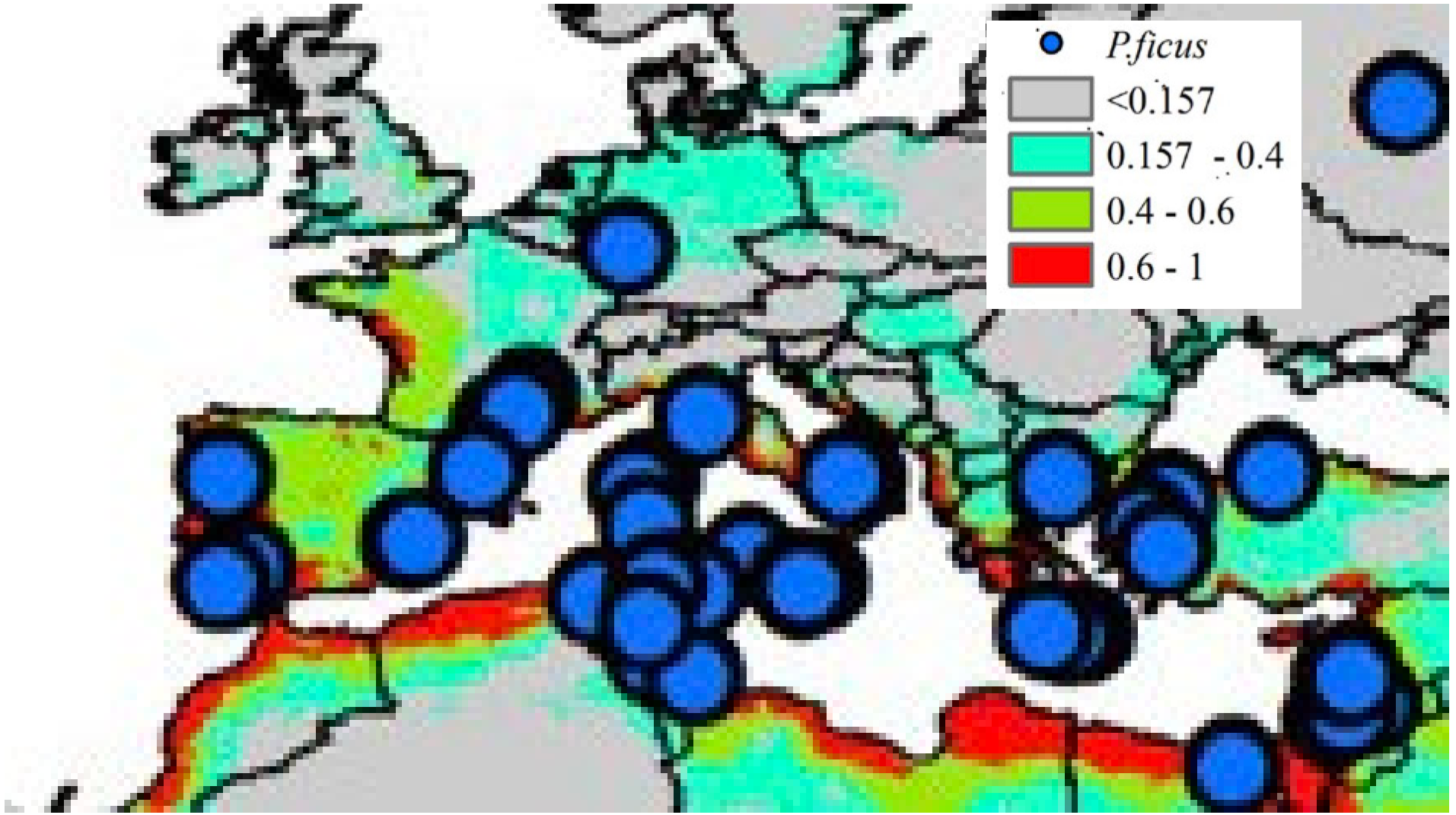
Medium

High



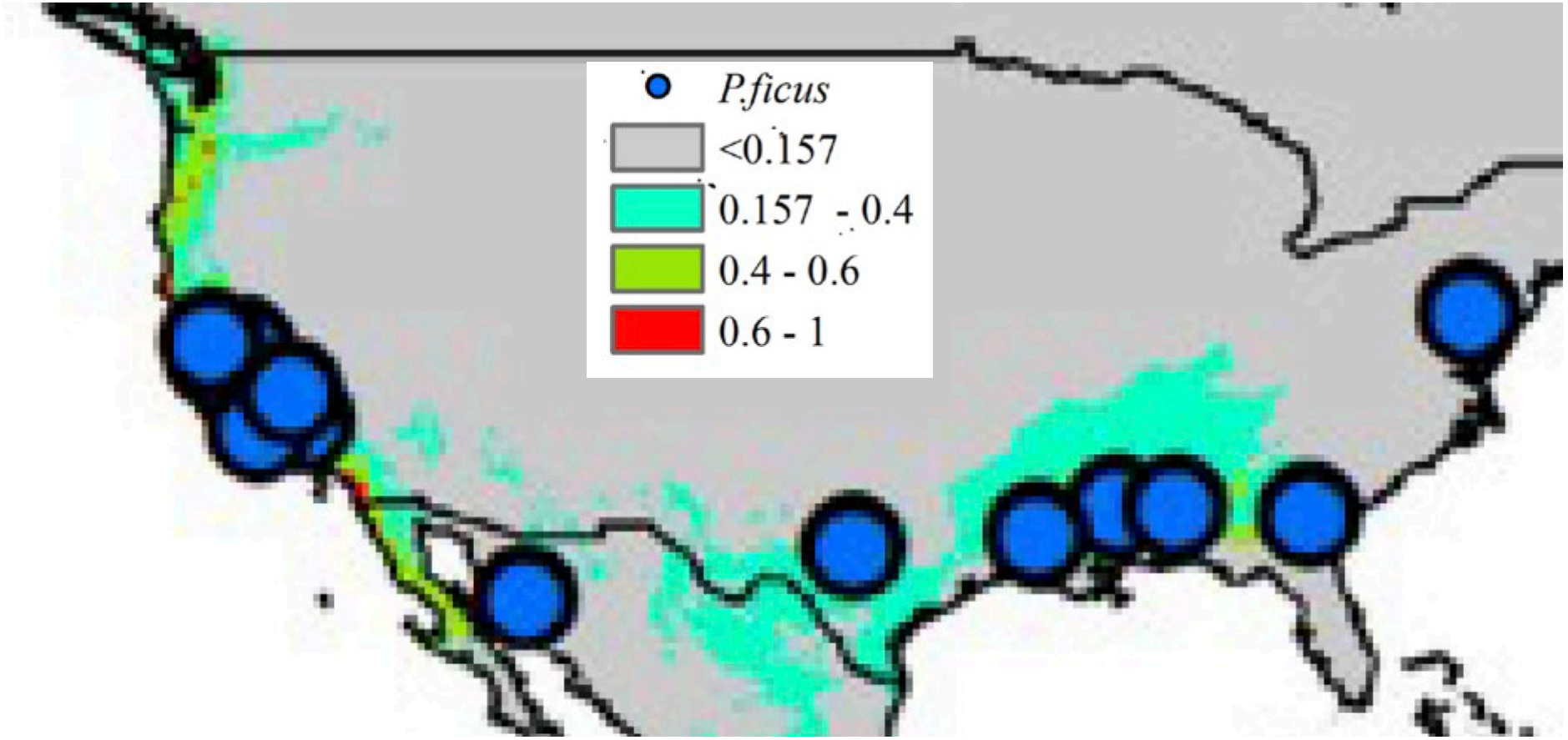
UC Extension

Current European distribution and risk



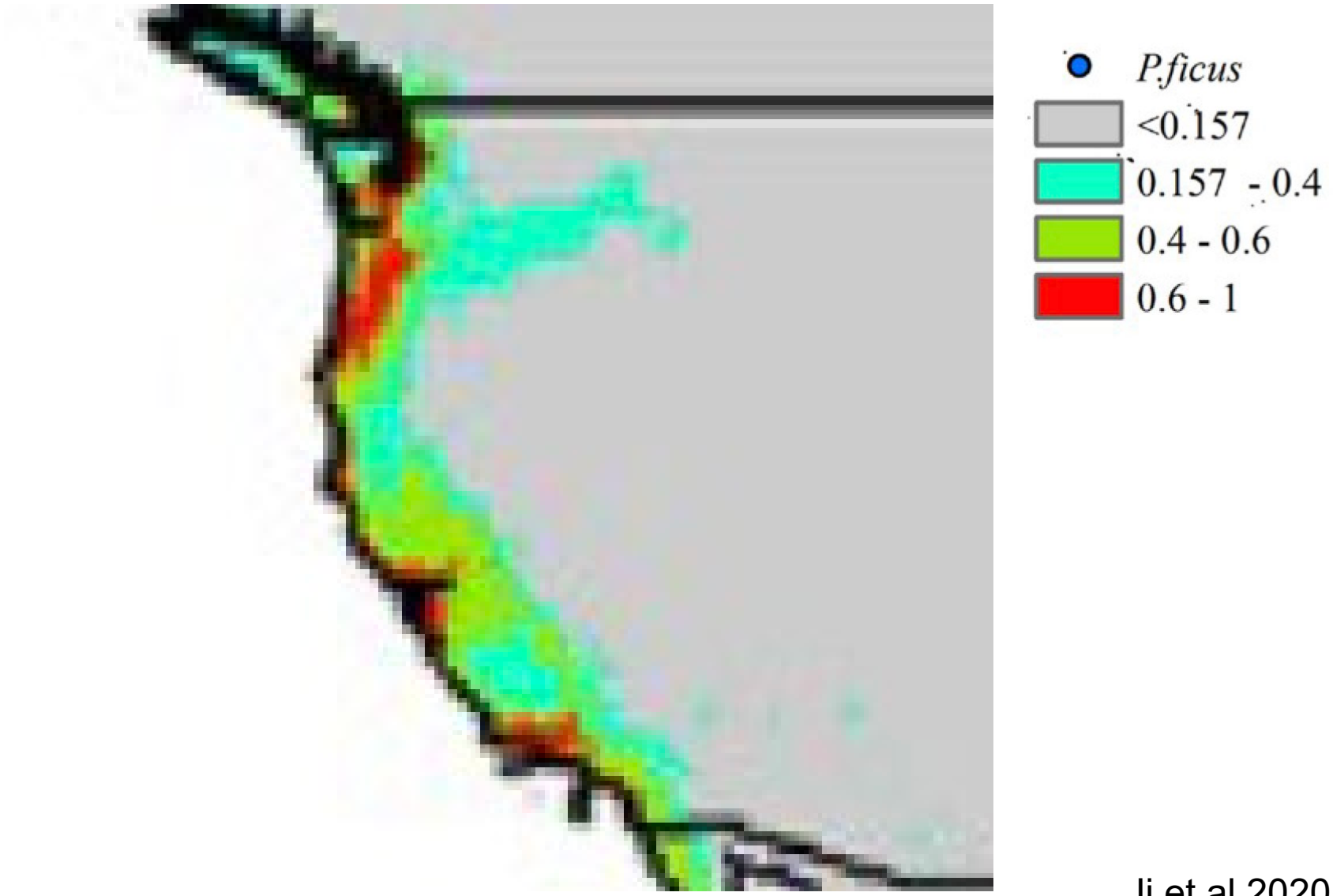
Ji et al 2020

Current USA distribution and risk



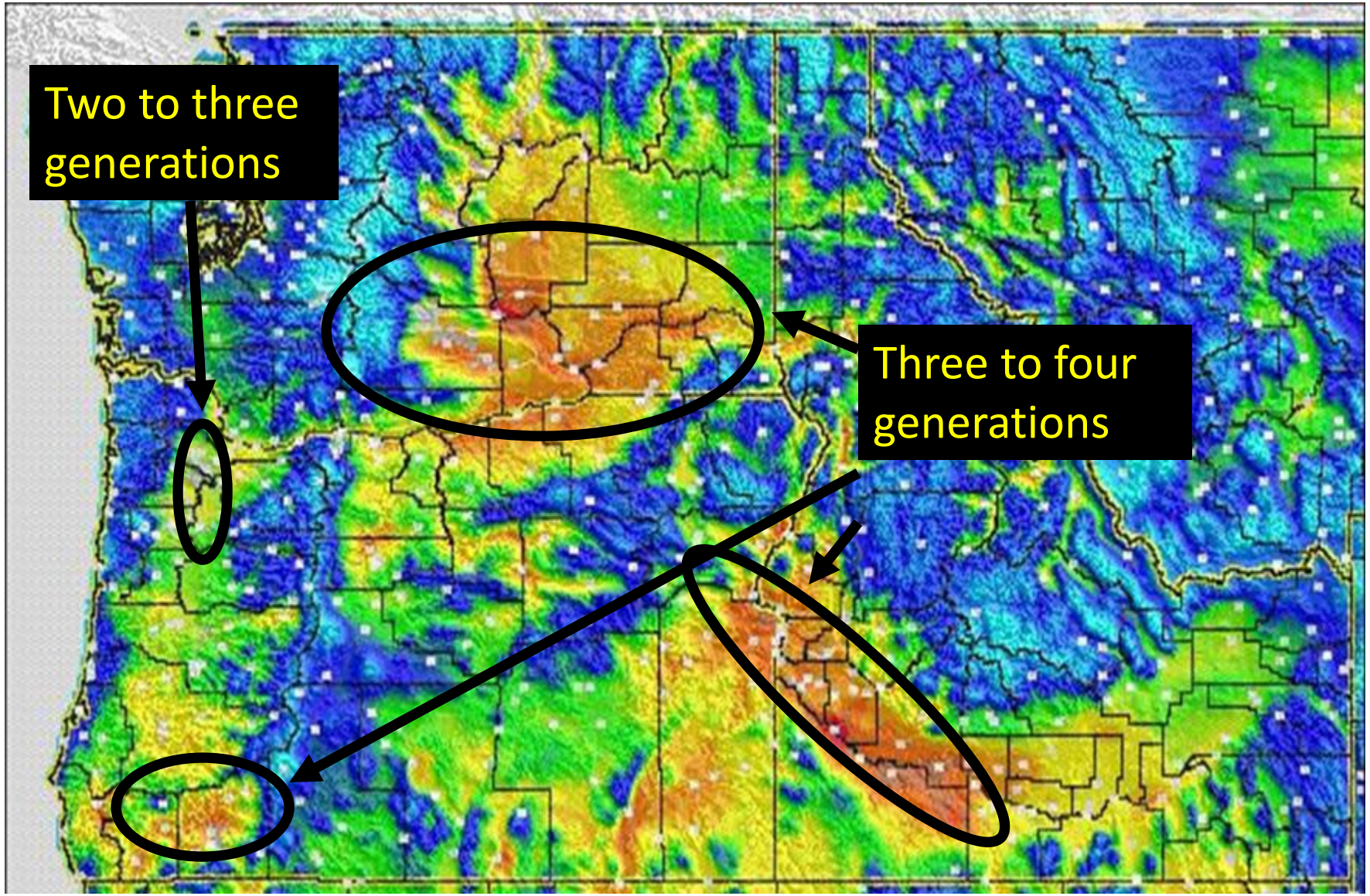
Ji et al 2020

Future Western USA distribution and risk



Ji et al 2020

Current risk in the Pacific Northwest

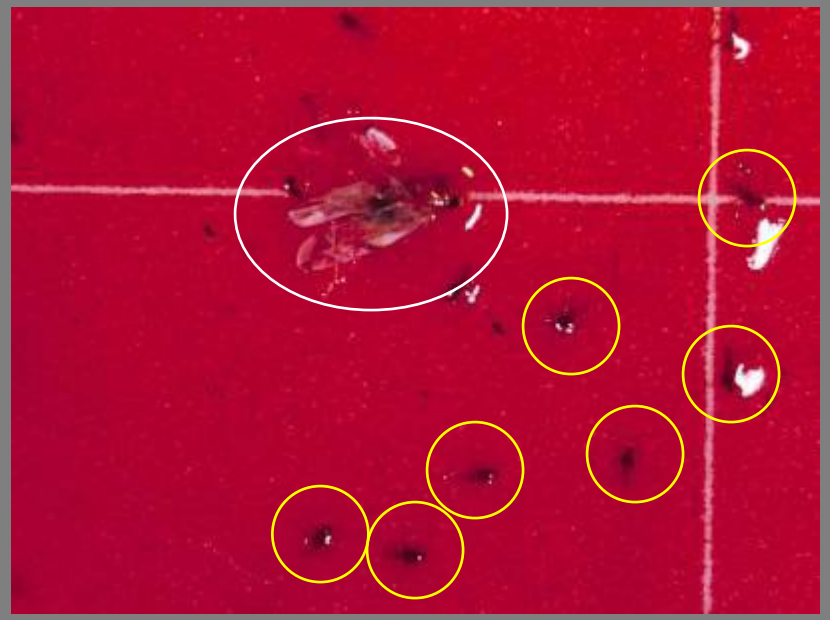


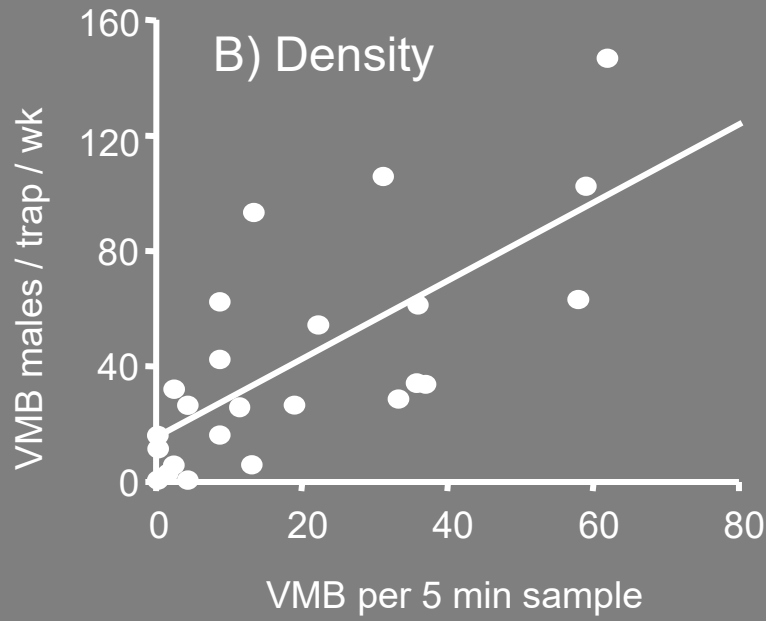
Adapted from Walton and Pringle 2005

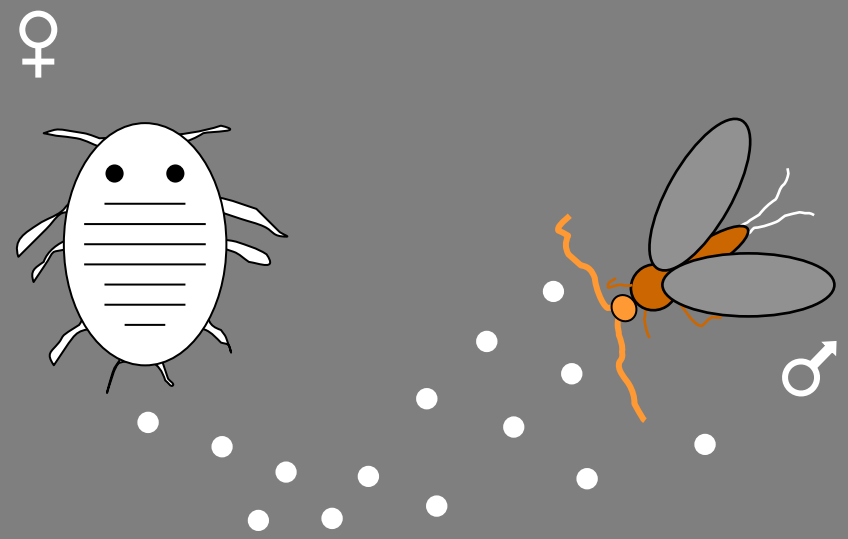
Limiting risk: monitoring

Walton et al. J Econ Entomol 2006

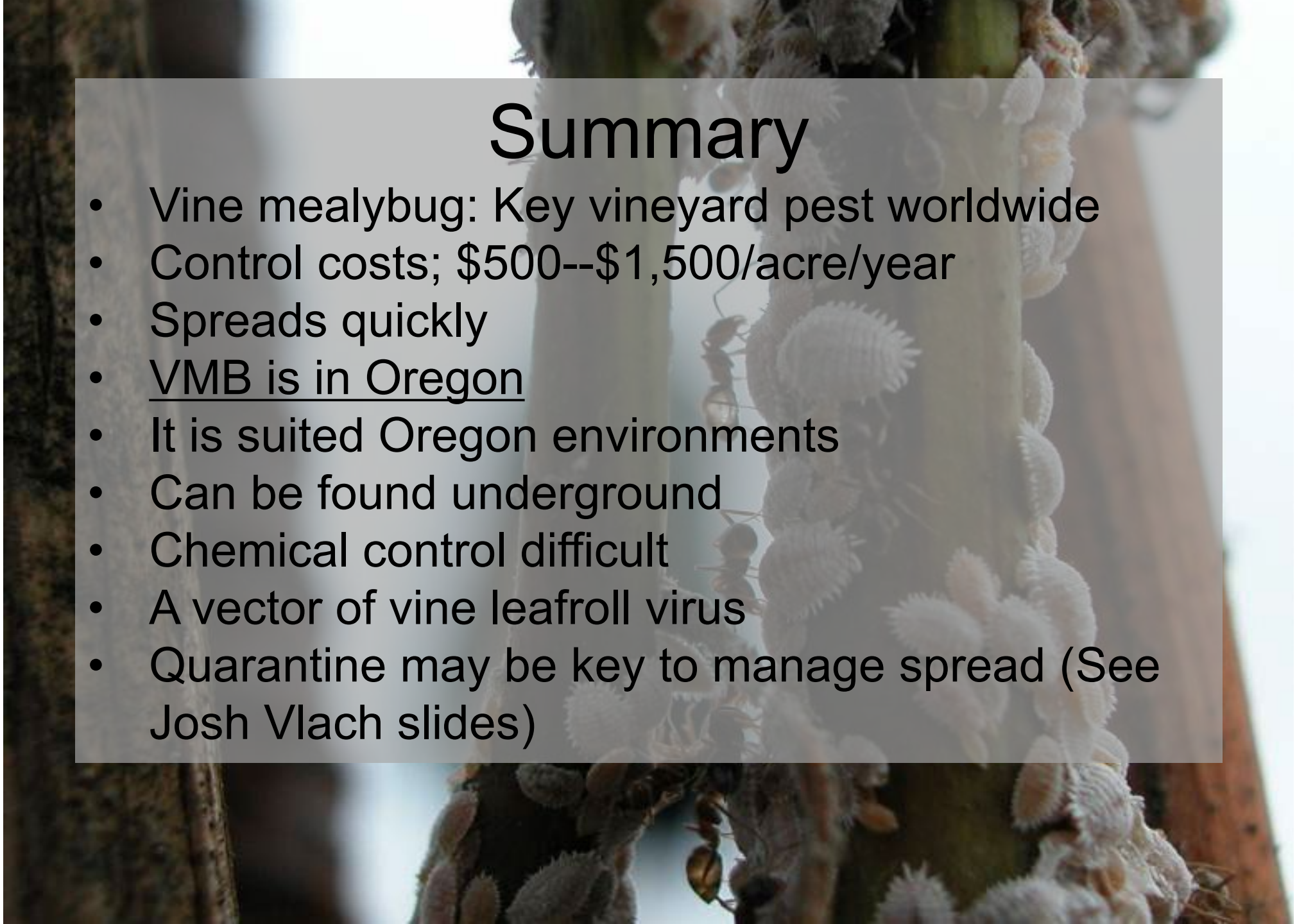
Pheromone Monitoring







Walton et al. J Econ Entomol 2006



Summary

- Vine mealybug: Key vineyard pest worldwide
- Control costs; $500--$1,500/acre/year
- Spreads quickly
- VMB is in Oregon
- It is suited Oregon environments
- Can be found underground
- Chemical control difficult
- A vector of vine leafroll virus
- Quarantine may be key to manage spread (See Josh Vlach slides)


Thank you!