

Leafroll Spread in Napa Valley

- Major spread of leafroll observed in recent years
- Began documenting spread in 2002



Grapevine leafroll disease effects:

- Can delay grape berry maturity
- Pigmentation of fruit often poor
- Yield reduction can be 30-40%
- Disease agents (virus) implicated in some types of graft incompatibility and young vine failures



Old assumptions about leafroll:

- Caused by a single virus
- Evenly distributed within vines
- Not field transmitted
- Only spread by grafting healthy stock with infected

Grapevine Leafroll Associated Viruses

GLRaV-1

GLRaV-2

GLRaV-3

GLRaV-4

GLRaV-5

GLRaV-6

GLRaV-7

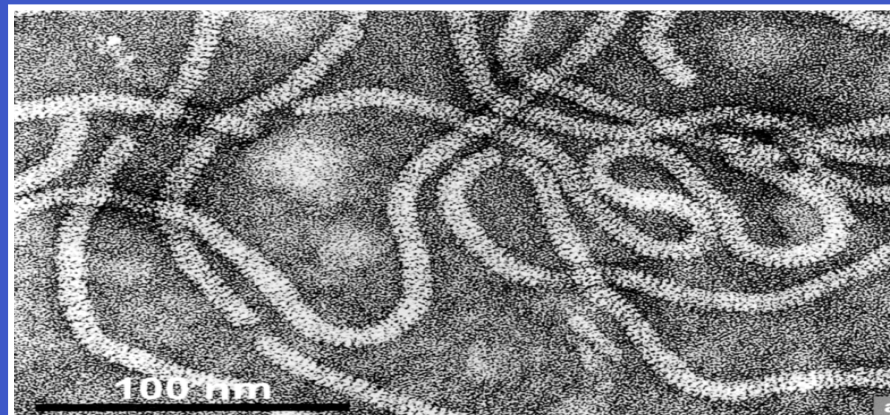
GLRaV-9

Grapevine Leafroll associated Viruses (GLRaV) Types 1 - 9:

Restricted to phloem (sap) vessels

Differ in:

- Length
- Genetic sequence
- Ability to be transmitted by mealybugs



Mealybug Transmission of Leafroll Virus



1. CLONAL
LINES
ESTABLISHED



2. POPULATION
INCREASE



3. VIRUS
ACQUISITION



4. INOCULATION
PERIOD



5. INSECTICIDE
SPRAY



6. VIRUS TESTING
ELISA and PCR tests
3-, 6-, and 12- months
post-inoculation.

Symptoms on Cabernet Franc inoculated with LR102 using longtailed mealybugs



Transmission of different leafroll virus types by different mealybug species

	Grape	Longtail	Obscure	Citrus	Vine
GLRaV-1	nt	-	-	-	nt
GLRaV-2	-	-	-	-	nt
GLRaV-3	+	+	+	+	+
GLRaV-4	-	-	-	-	nt
GLRaV-5	nt	+	nt	nt	nt
GLRaV-9	nt	+	nt	nt	nt
GVA	nt	+	+	+	+
GVB	nt	+	+	nt	+

nt = not tested

Block 1

Cabernet Sauvignon

1989 planting

Block 2

Old Cabernet Sauvignon

1970-72

Heavy Leafroll

Pulled 1994

Block 1

Cabernet Sauvignon
1989 planting

Block 2

Replanted 1998









2001?



Block 1

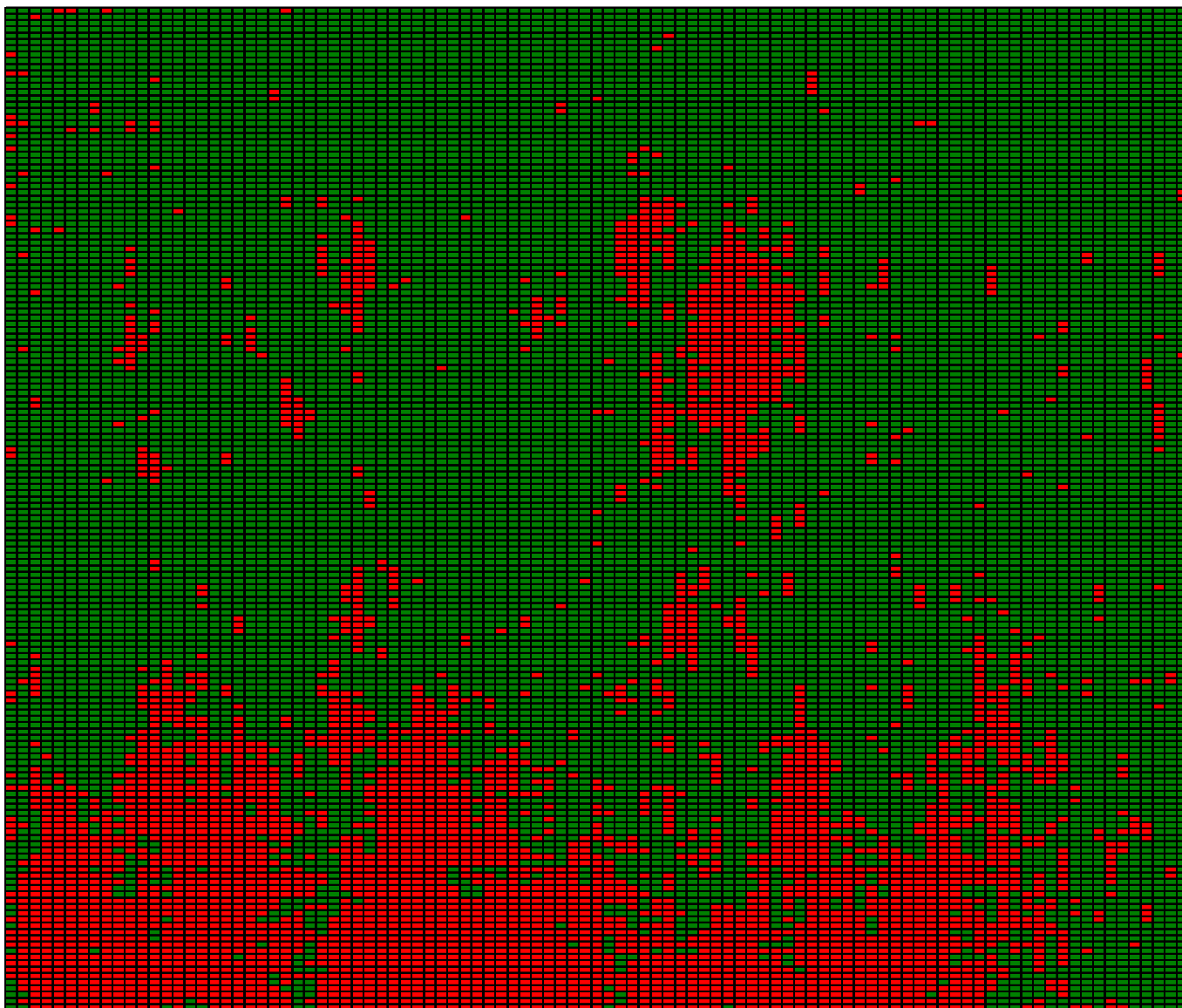
Cabernet Sauvignon
planted 1989

Mapped Area - 7.2
acres

Block 2

Old Cabernet Sauvignon 1970-72
Heavy Leafroll
Pulled 1994
Replanted 1998

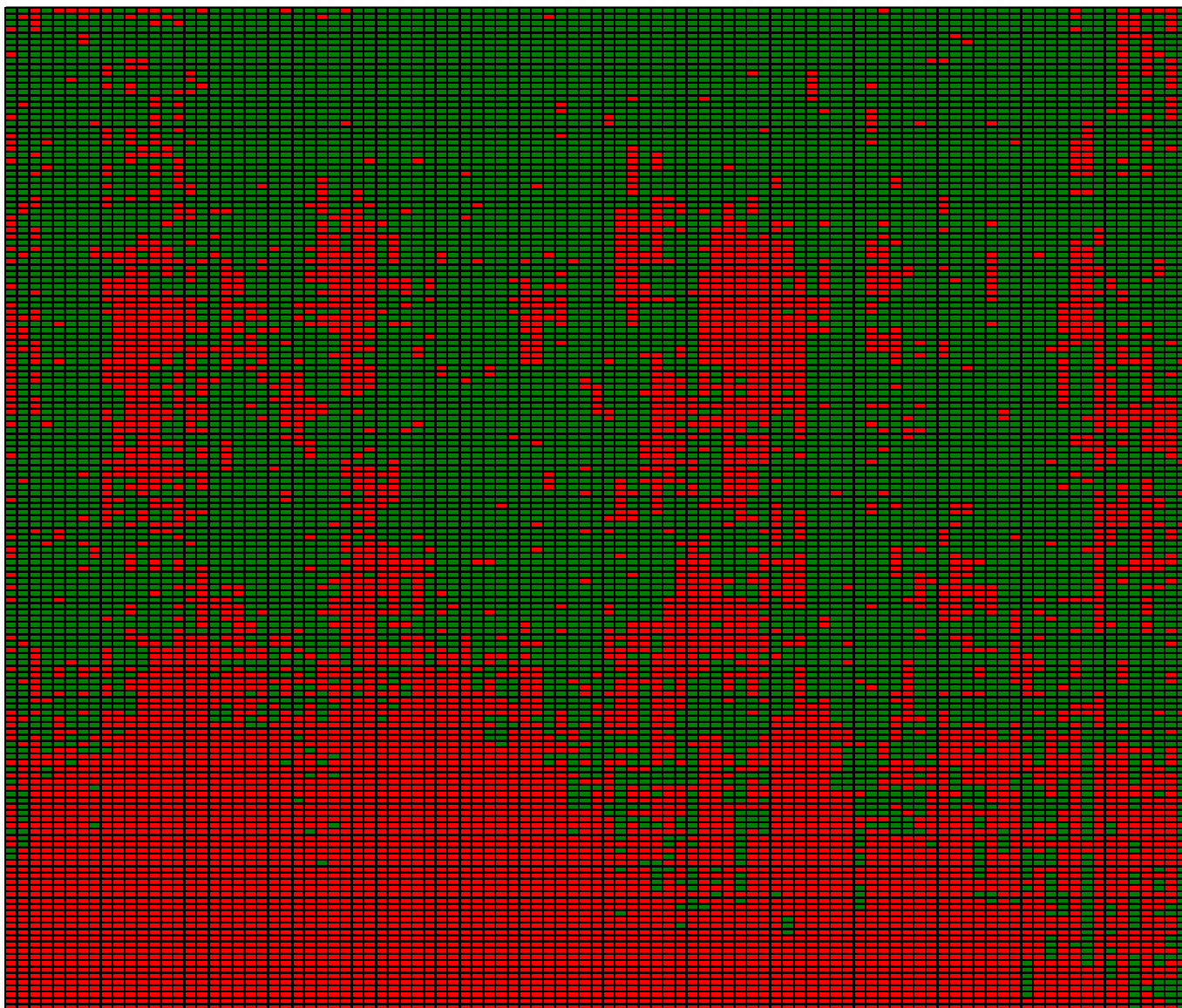




2002

Total Leafroll Rating:

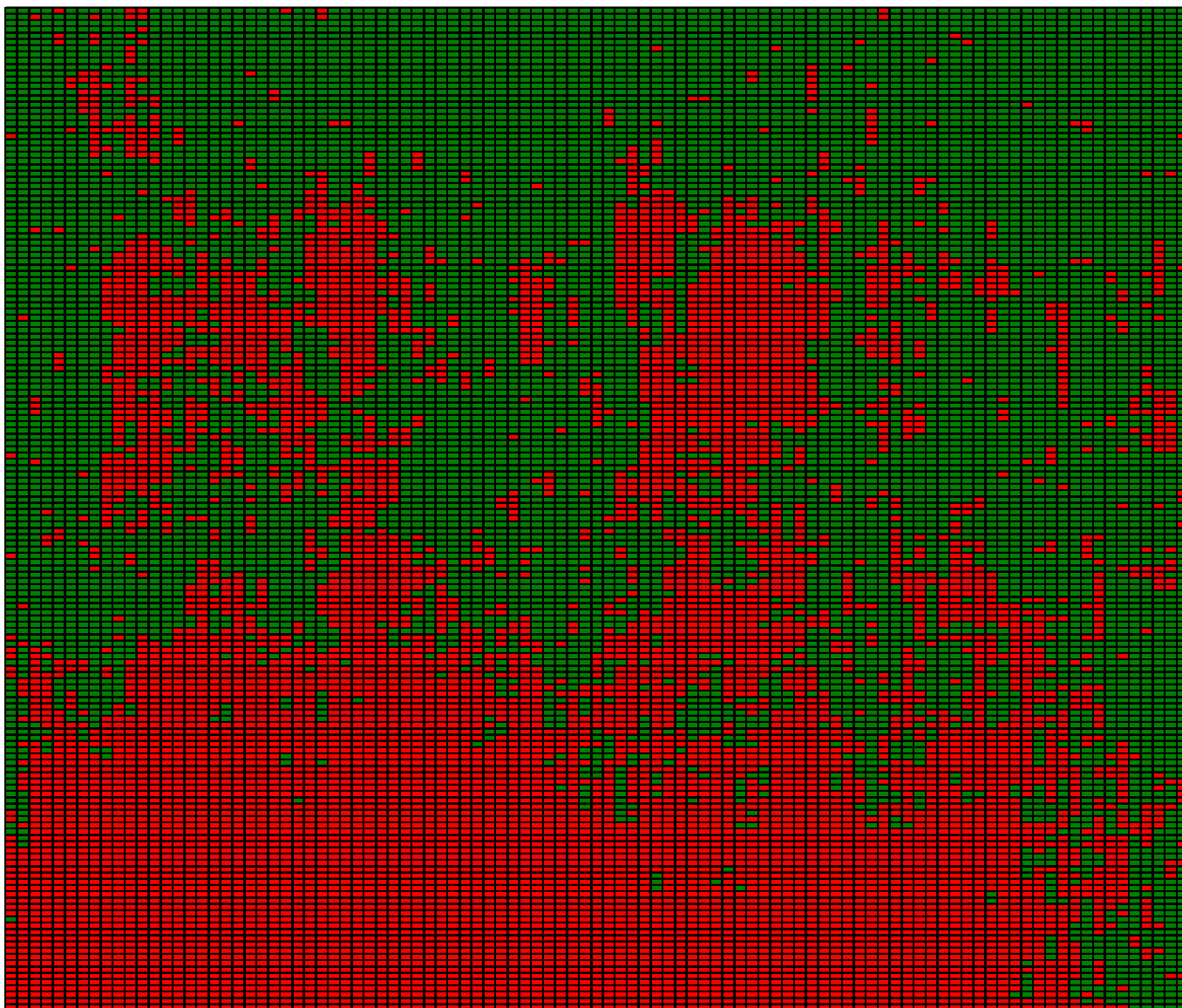
23.3%



2003

Total Leafroll Rating:

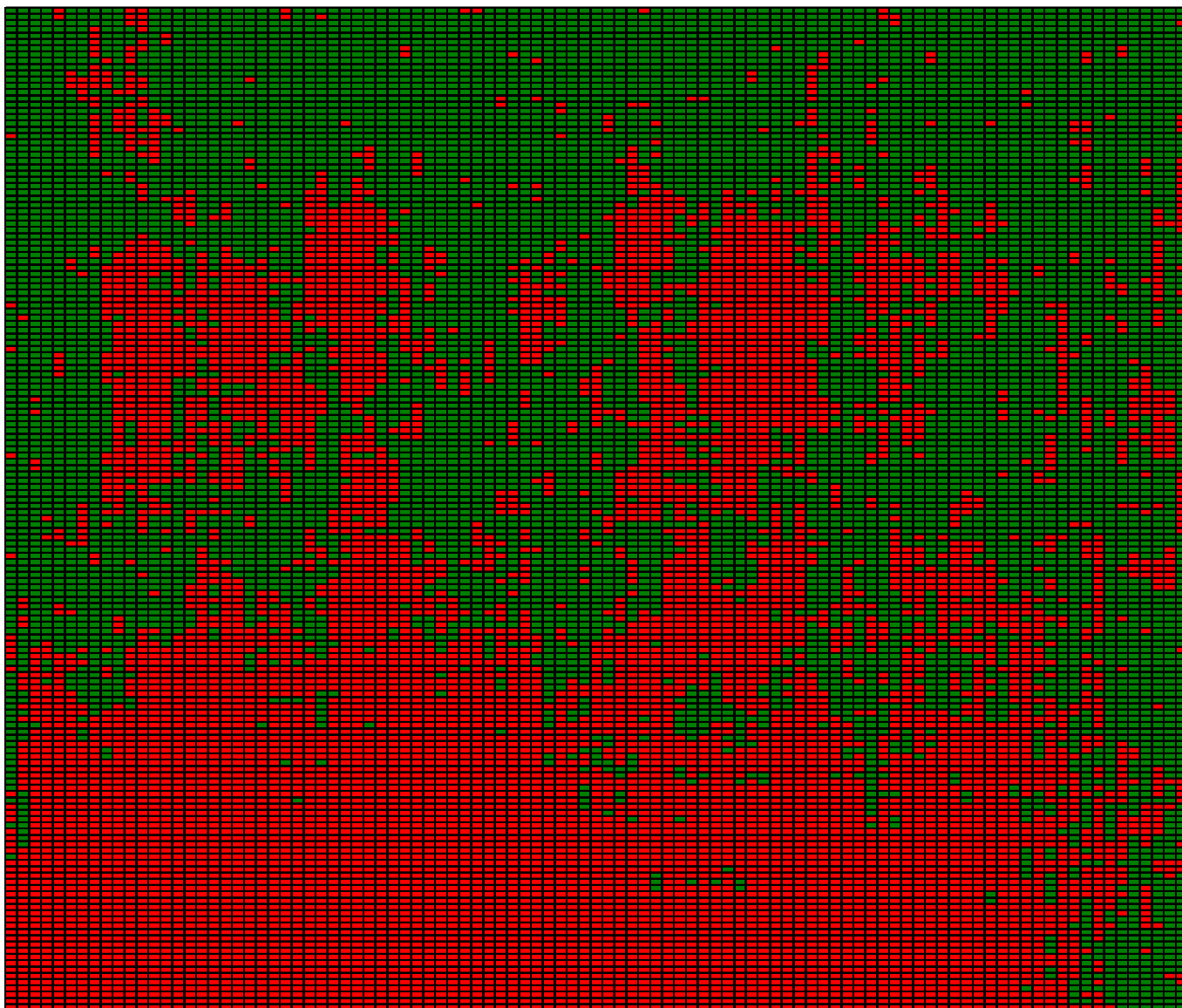
41.2%



2004

Total Leafroll Rating:

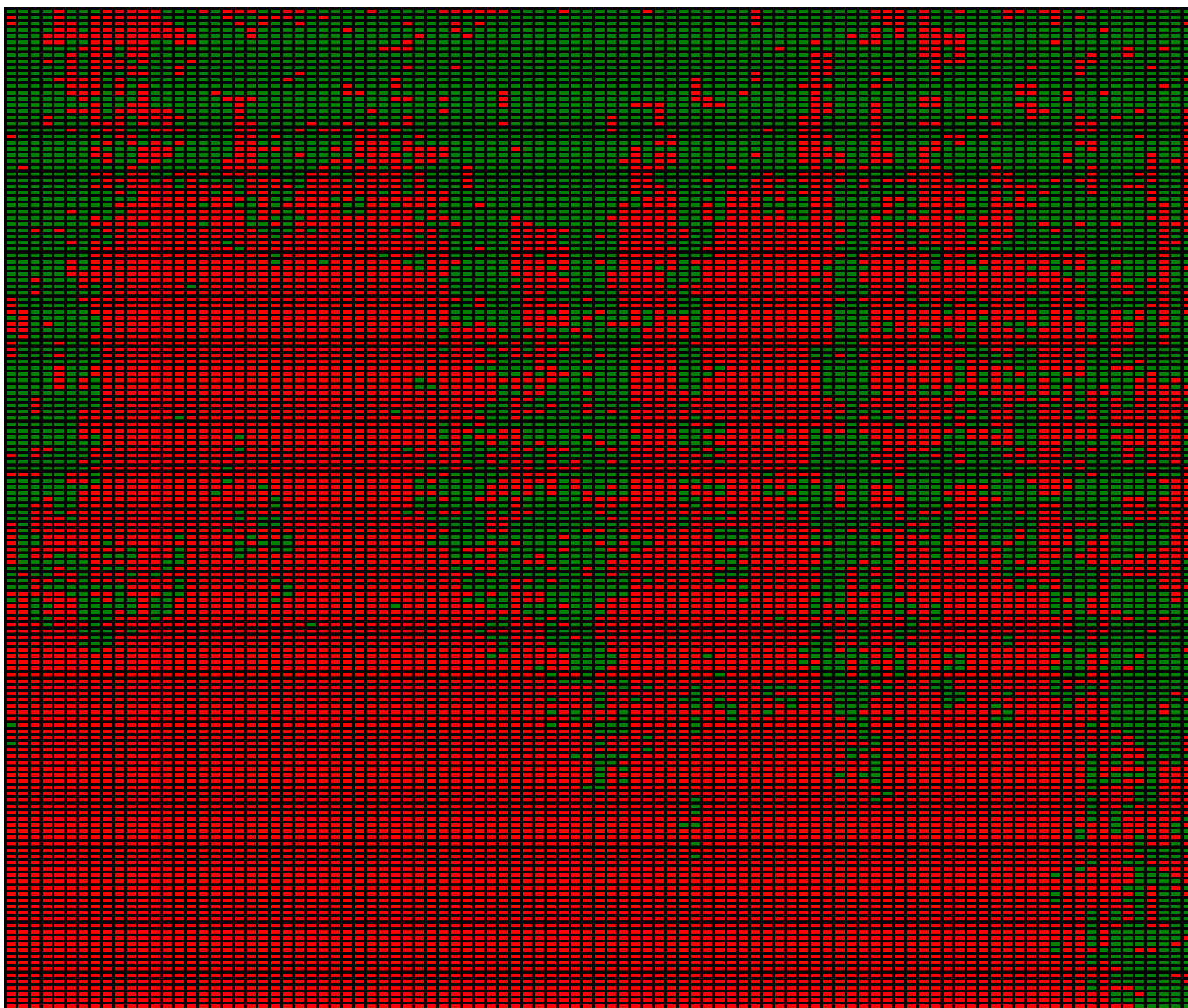
45.8%



2005

Total Leafroll Rating:

49.8%



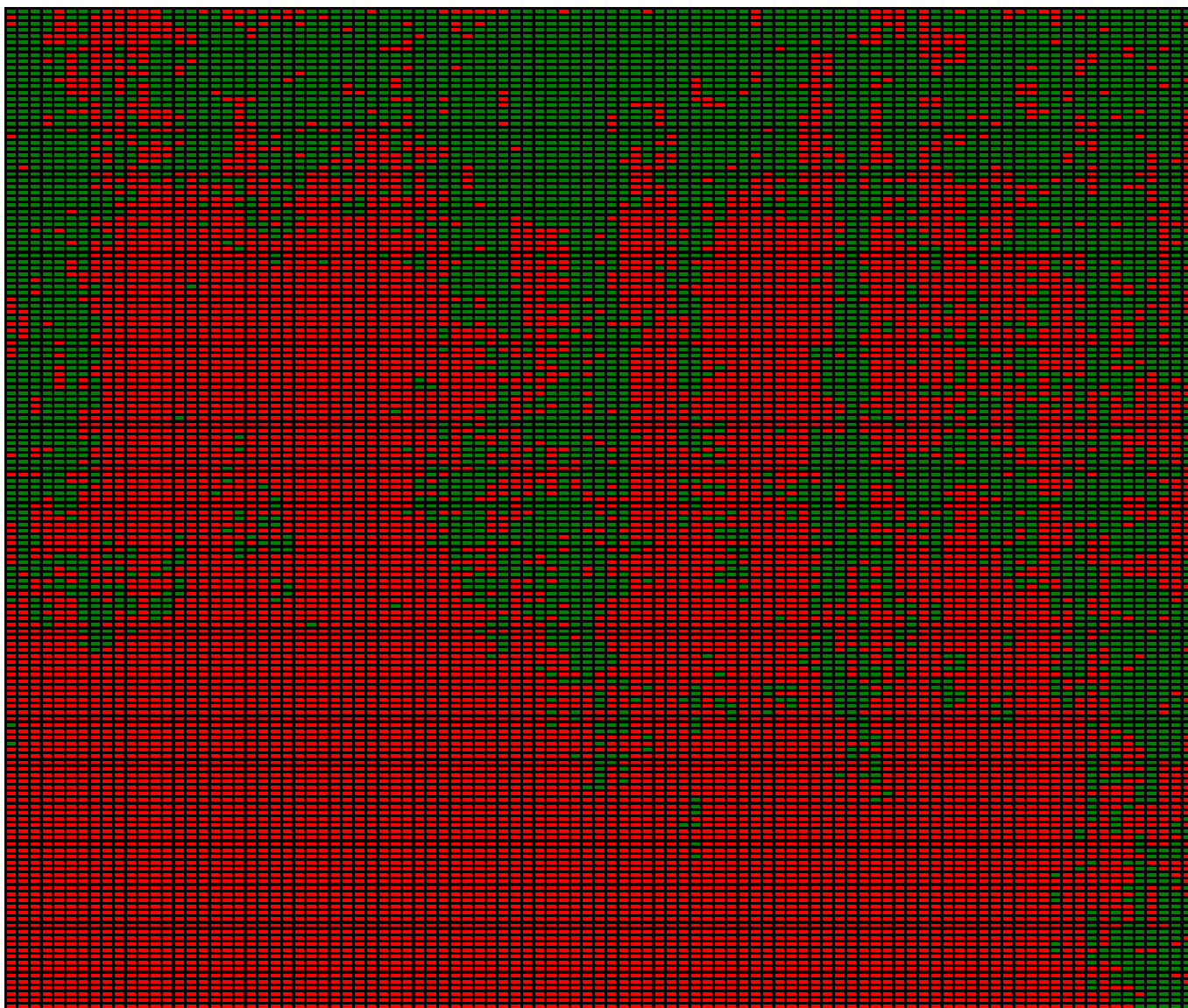
2006

Total Leafroll Rating:

66.1%





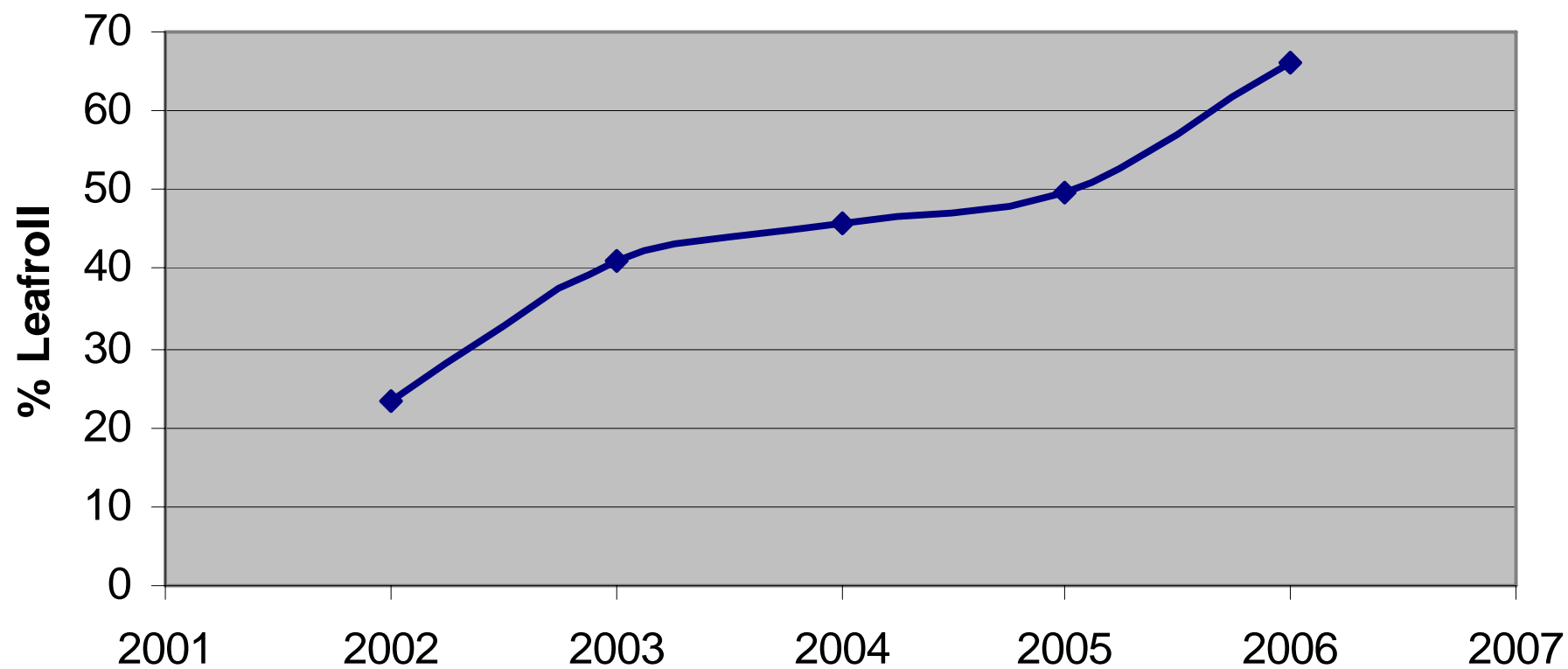


2006

Total Leafroll Rating:

66.1%

Leafroll Mapping





2001?

An aerial photograph showing a patchwork of agricultural fields. A large, dark green field occupies the upper half, while the lower half is dominated by a large, brownish-gold field. A red line runs diagonally across the top right corner. A yellow text box with the text '2001?' is overlaid on the dark green field. The bottom of the image is a solid black bar.

2006



2006

















Leafroll Spread in Napa Valley

- Why is it happening now when it didn't seem to in the past?

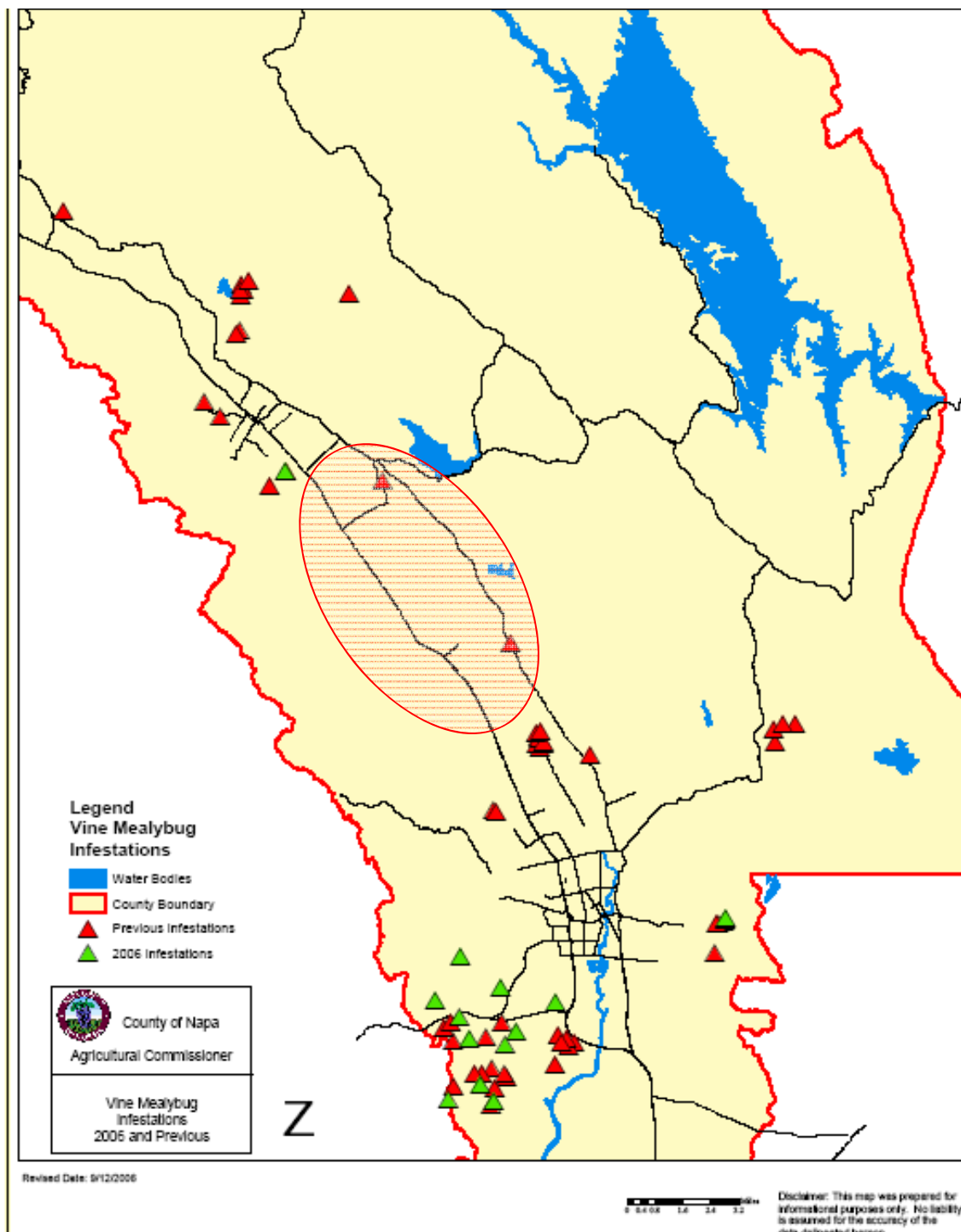


Why is leafroll spreading now when it didn't seem to in the past?

1) New vectors?

Are there new insects present that are now spreading leafroll that we didn't have before?





Why is leafroll spreading now when it didn't seem to in the past?

2) Rootstock differences?

AXR and St. George are more tolerant of some viruses than other rootstocks. Did this type of spread always occur but was less obvious before?



Why is leafroll spreading now when it didn't seem to in the past?

3) Was Leafroll 3 recently introduced to California via “suitcase selections”?

Other strains of leafroll are not transmitted by mealybugs.



How can we minimize the potential for spread?



Limiting Leafroll Spread

1) Plant Certified Grapevines!

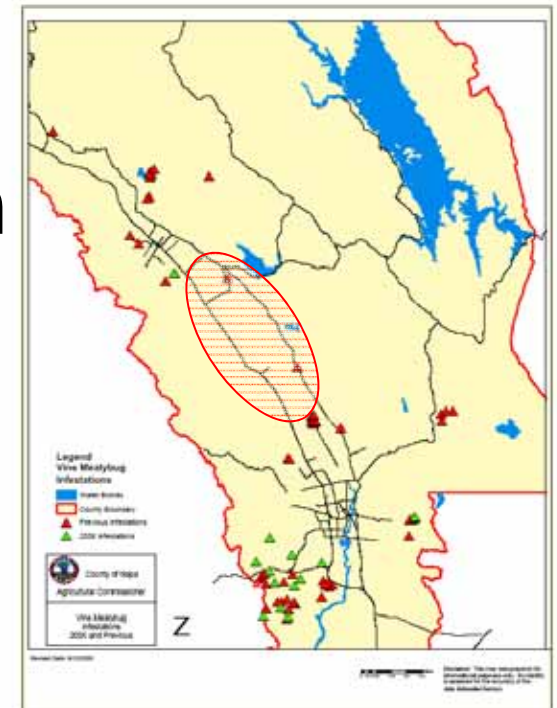
Most plants sold in California are uncertified. To get certified plants from your nursery, you must ask.



Limiting Leafroll Spread

1) Plant Certified Grapevines

2) Consider implementing a mealybug control program



Mealybugs in California Vineyards

University of California Cooperative Extension

Wanted: Vine Mealybug
Se Busca: El Piojo Harinoso de la Vid

The Vine Mealybug is a serious new insect pest for California vineyards. It is important to locate any new infestations as soon as possible. If you find insects that look like the Vine Mealybug, notify your local Cooperative Extension or Agricultural Commissioner office for verification.

El Piojo Harinoso de la Vid es una nueva y seria amenaza para los viñedos en California; es importante encontrarla lo más pronto posible cualquier nueva infestación. Si encuentra insectos parecidos, avise a su oficina local de Extensión Cooperativa o al Comisionado de Agricultura para verificación.



Infested vines can be spotted by the large masses of white masses of white masses and the dark, sooty masses.

Las plantas infestadas se destacan por las masas de insectos blancos y las hojas negras.



The adult insect is about 3 mm long; it is often tended by ants.

El insecto adulto mide alrededor de 3 mm, se encuentra asociado con hormigas.

The Vine mealybug feeds on the entire vine, including the roots. The earliest indications of an infested vine are often wet spots on the lower trunk; peeling back the bark reveals the mealybugs.

El Piojo Harinoso de la Vid habita todas las partes de la planta, incluyendo las raíces. La primera indicación de que la planta está infestada suele ser manchas húmedas en la parte inferior del tronco; poniendo la corteza se descubre la infestación.

University of California Cooperative Extension
For more information: <http://www.ucanr.org/extension/pests/pests.htm>
Download this file: <http://www.ucanr.org/extension/pests/pests.htm>

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MEALYBUGS
The California Vineyard

The most common mealybug in many vineyards is the native grape mealybug. Other mealybugs are most common in the United States. Vine mealybug is a recently introduced exotic pest in California.

VINE MEALYBUG



Adults and juveniles (small orange nymphs). The body shape of larger immatures and adult females is oblong (wider at the center of the body).

VINE MEALYBUG SYMPTOMS



Vine mealybug adults and juveniles (small orange nymphs) feeding on vines.

University of California
Agriculture & Natural Resources

Mealybugs in California Vineyards

University of California
Agriculture & Natural Resources
Publication 1111

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