Rose Day 2009
Activities and Recreation Center: Ballroom
University of California, Davis
May 1st, 2009

Pests of Roses

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UC DAVIS
COLLEGE OF AGRICULTURAL & ENVIRONMENTAL SCIENCES
where knowledge meets need...

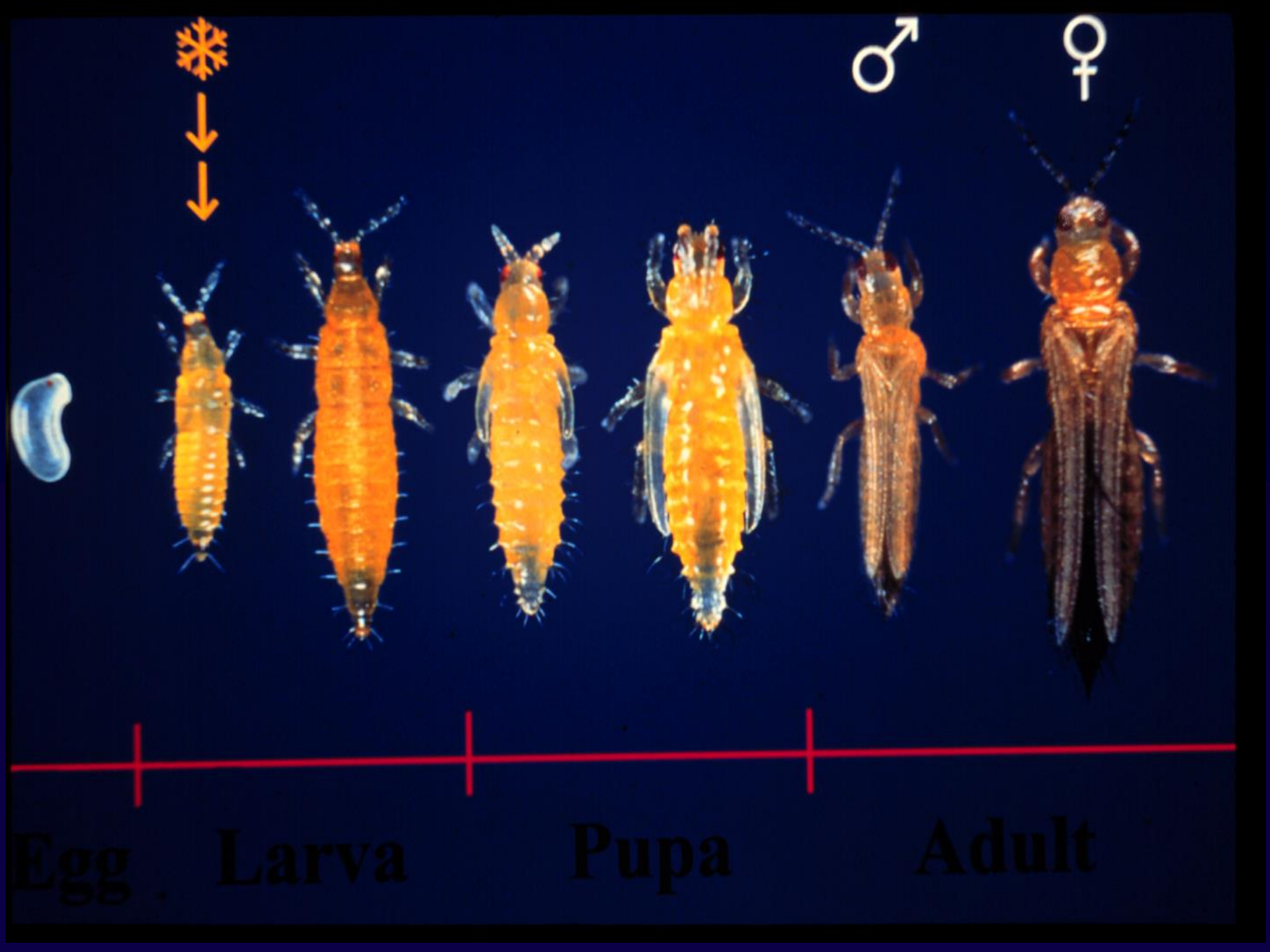
Overview of Presentation

- Rose Pest Management Alliance
- Reducing Pesticides
- Biological control
- Silicon amendments

USDA Floriculture & Nursery Research Initiative Research

University of California, Davis

- Formation of a Rose and Gerbera Pest Management Alliance
- Development and implementation of an IPM Program for Roses & Gerbera

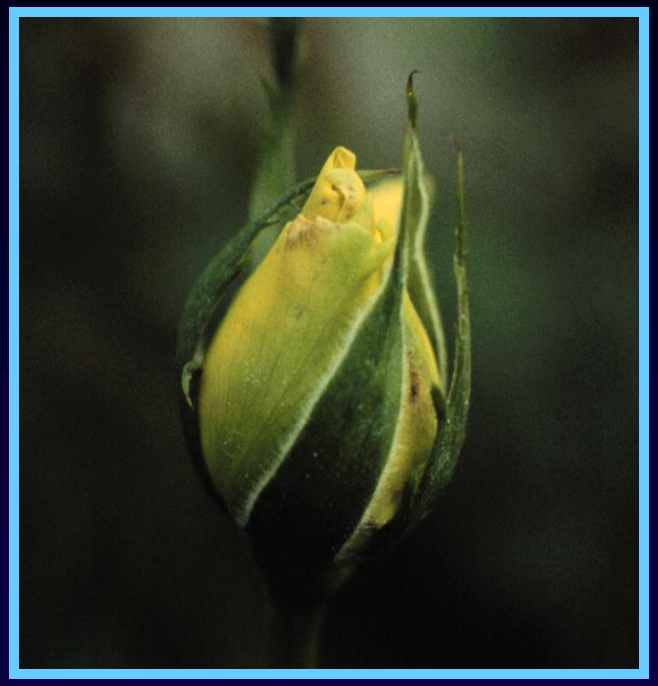

♂
♀
Egg
Larva
Pupa
Adult

Key Arthropod Pests

Western flower thrips

Frankliniella occidentalis

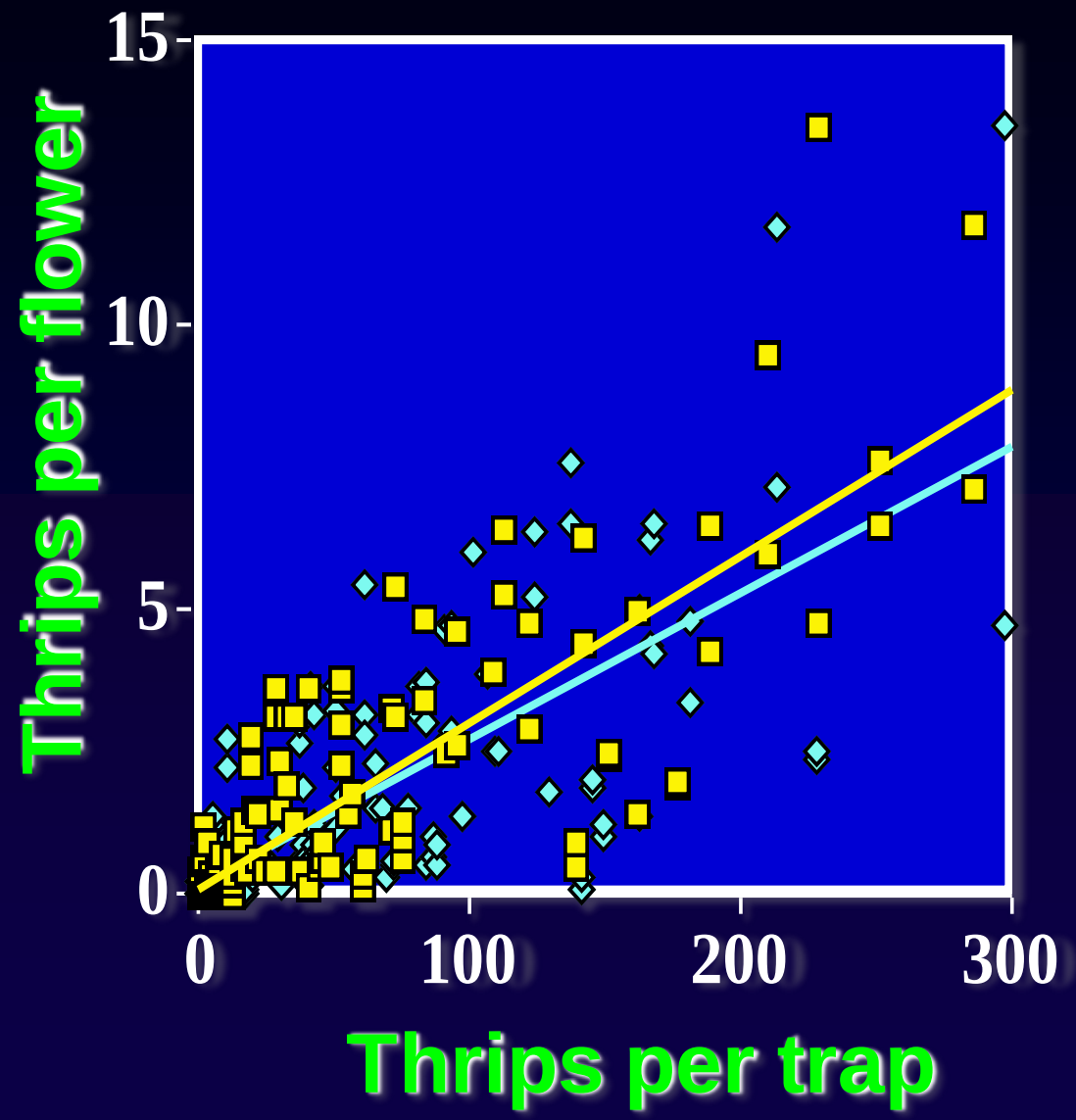
WFT Rose Petal Damage



Light Damage.

0-2.0 WFT/Bud

Western flower thrips



$y = 0.029x + 0.087$ $r^2 = 0.679$ $p<0.0001$

Yellow trap

$y = 0.0026x + 0.118$ $r^2 = 0.559$ $p<0.0001$

Blue trap

'GrowerTalks'®

August 1991

Loren Oki, Oki Nurseries, Sacramento, California, and Michael Parrella, University of California, Davis

Speed up sticky trap counts

cover story page 40

Grower report: Putting IPM to the test

page 21

How to keep 1991 poinsettias whitefly-free

page 72

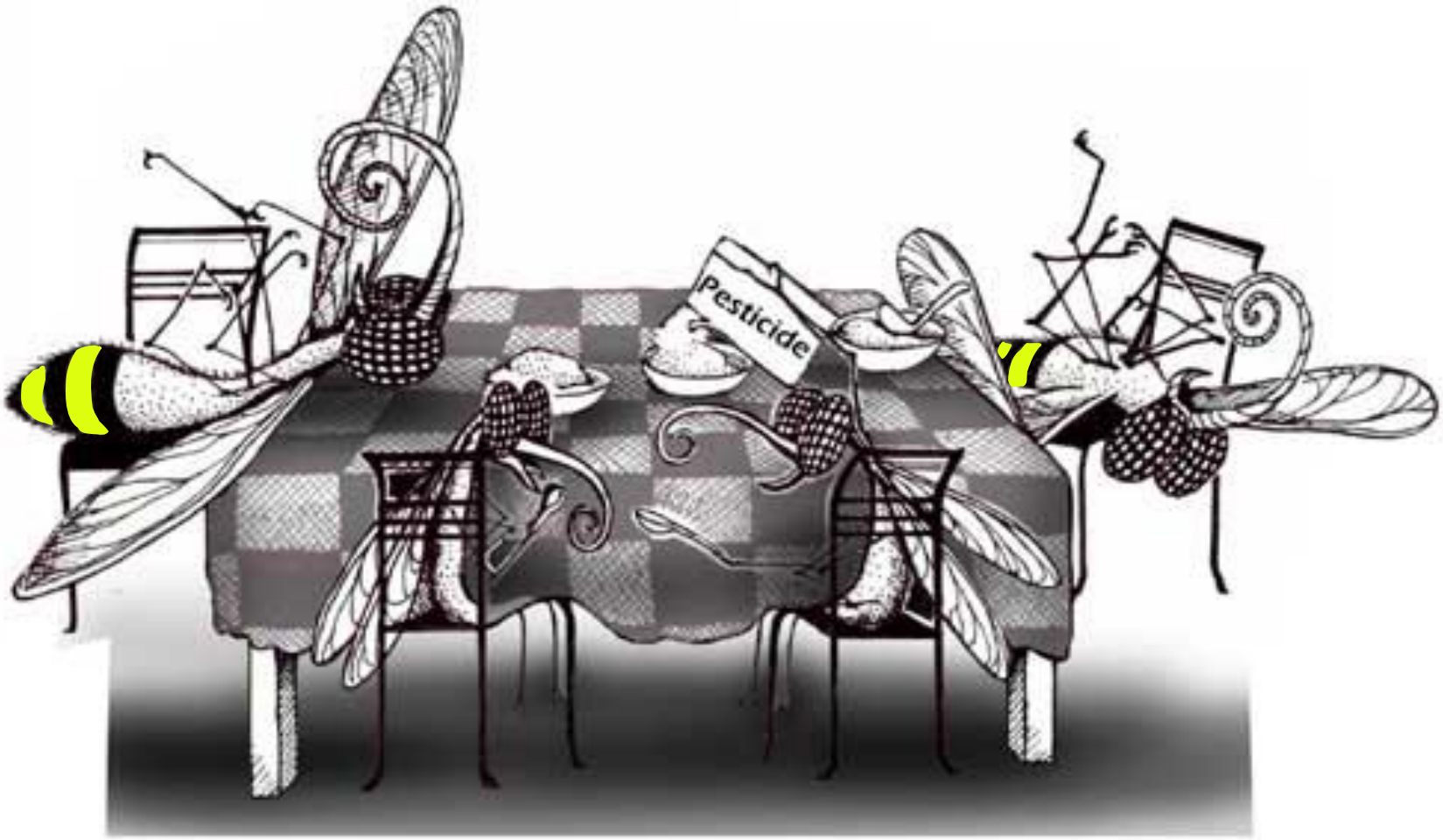
Pest control from plants

page 113

Integrated Pest Management issue

LAB INITIO

by Nick D Kim



"Of course, that's the trouble with the older generation: they're so intolerant."

CAPITOL & CALIFORNIA
www.sacbee.com/politics

State toughens rules on a household pesticide

Low levels of pyrethroid products kill aquatic life

By Matt Weiser
BEE STAFF WRITER

California next month will begin to regulate a broad class of pesticide that has become the dominant home and garden bug-killer.

The state Department of Pesticide Regulation in August will notify manufacturers of pyrethroid insecticides that they must share data on their products or those products will be banned from sale in California. The data will drive a regulatory review that could result in use restrictions or a ban on specific products.

In doing so, California steps out ahead of the federal government and other states in regulating pyrethroids, found to be deadly to aquatic life at very low concentrations.

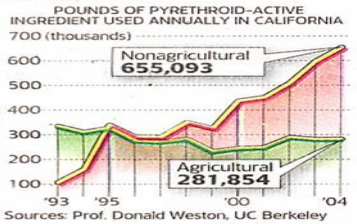
Mary-Ann Warmerdam, director of the Department of Pesticide Regulation, said it will be the biggest pesticide regulation effort in state history, involving 600 consumer products sold in hardware stores, garden centers and pet stores.

"We know we have enough caution flags, and that requires a

► PESTICIDE, Page A4

Pyrethroid use in California

Commercial use of pyrethroid pesticides in California has been increasing dramatically, mainly because of urban use. The data below do not include usage of retail products by homeowners, which does not have to be reported to regulators and is suspected to be much greater.



Sources: Prof. Donald Weston, UC Berkeley
Sacramento Bee/Nam Nguyen

Sacramento Bee/Jay Mather

Researchers address people from government agencies Thursday at Roseville's Pleasant Grove Creek. The pyrethroid class of pesticide has been found in stream sediment at levels toxic to tiny crustaceans.

The Role of Silicon in Plants

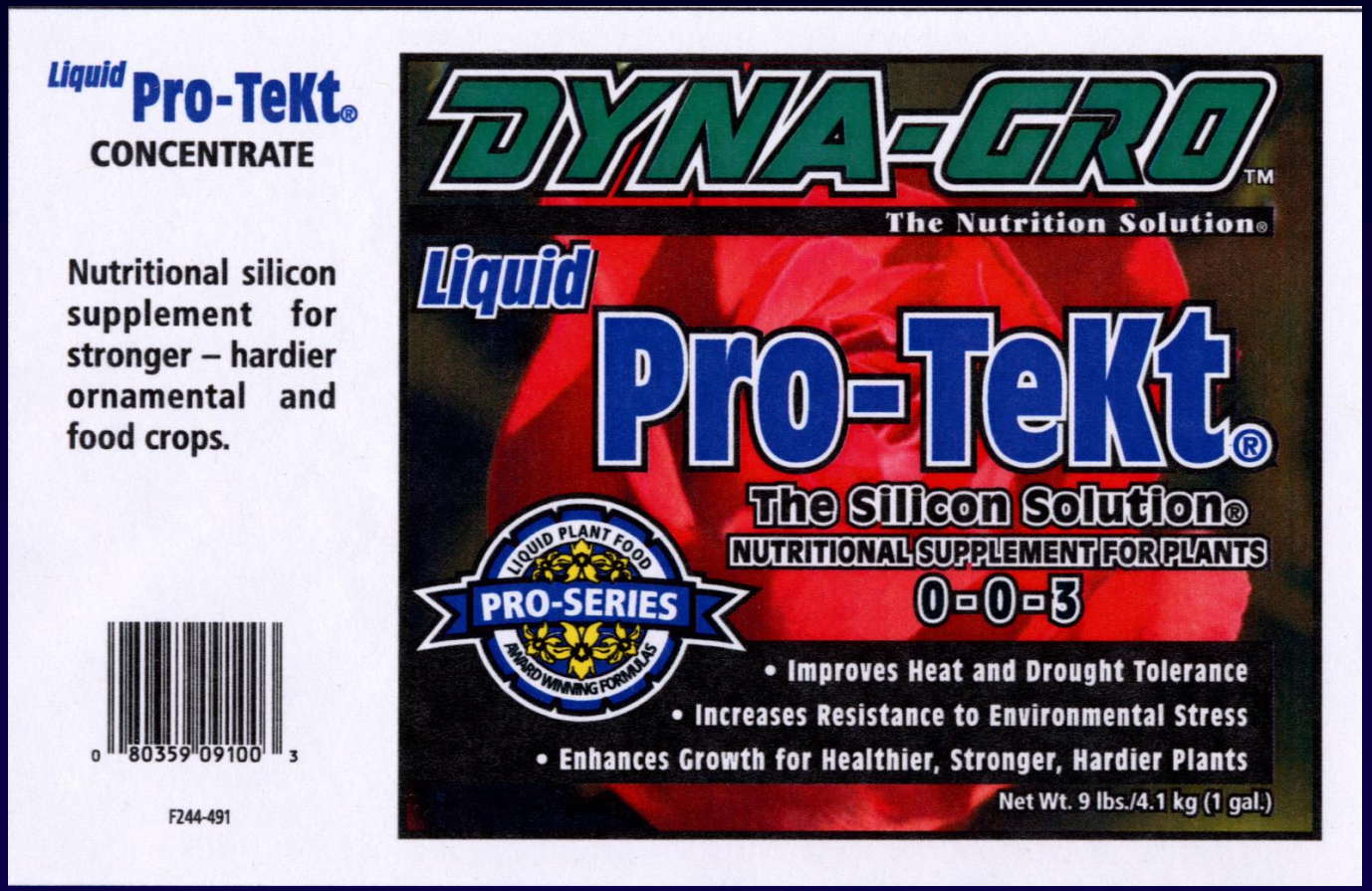
- Silicon (Si) is second to oxygen as the most abundant element in the earth's crust
- While its role in plant growth is not understood, its role in mitigating plants stress (abiotic and biotic) is beyond doubt
- Si is taken up by the plant in the form of monosilicic acid and is transported from the roots to the shoots
- Absorption through the leaves remains controversial
- When concentrated over a critical level (usually at 100 ppm), it polymerizes as opaline phytoliths, that comprise the bulk of a plants Si content

The Role of Silicon in Plants

- Si deposition in the epidermal cells of plants is thought to be responsible for the protective effects against biotic stress
- Numerous studies have shown both direct and indirect effects against insects and diseases
  - Reduce insect growth and reproduction, others ?
  - Grass defense, diatomaceous earth
- Calcium silicate (Ca_2SiO_4)
- Sodium silicate (N_2SiO_3)
- Potassium silicate (K_2SiO_3)

Commercial Sources of Silicon

- Zacil AG
- Pro-Tekt



The Role of Silicon in Plants

- Silicon has been shown to protect plants
  - Biotic Stress (fungi, bacteria and insects)
    - *Magnaporthe grisea* on rice: Onodera (1917)
    - Powdery mildew: Adatia & Betsford (1986), Fawe et al. (1998), Heckman et al. (2003)
    - *Pythium* spp.: Cherif et al. (1994)
    - *Piricularia grisea* (grey leaf spot pathogen): Brecht et al. (2004)
    - Diplocarpon rosae (black spot) on rose: Gillman et al. (2003)
  - Silicon applications in rice (Savant et al. 1997): stem borers, rice green leafhopper, white backed & brown planthopper, and mites can be controlled/suppressed
  - Silicon application in sugarcane: stalk borer, Keeping and Meyer (2002); shoot borer, Rao (1967)

The Role of Silicon in Plants

- **In Floricultural Crops**
  - Savas et al. (2002) has shown higher quality gerbera flowers produced when silicon was added
  - Gillman et al. (2003) showed that roses were able to uptake silicon (as potassium silicate) and accumulate it in the leaves; suppresses black spot
  - Ehret et al. (2005) showed addition of silicon (as potassium silicate) in a recirculating nutrient system resulted in higher quality rose flowers
  - Hwang et al. (2005) did similar work with similar results in miniature roses

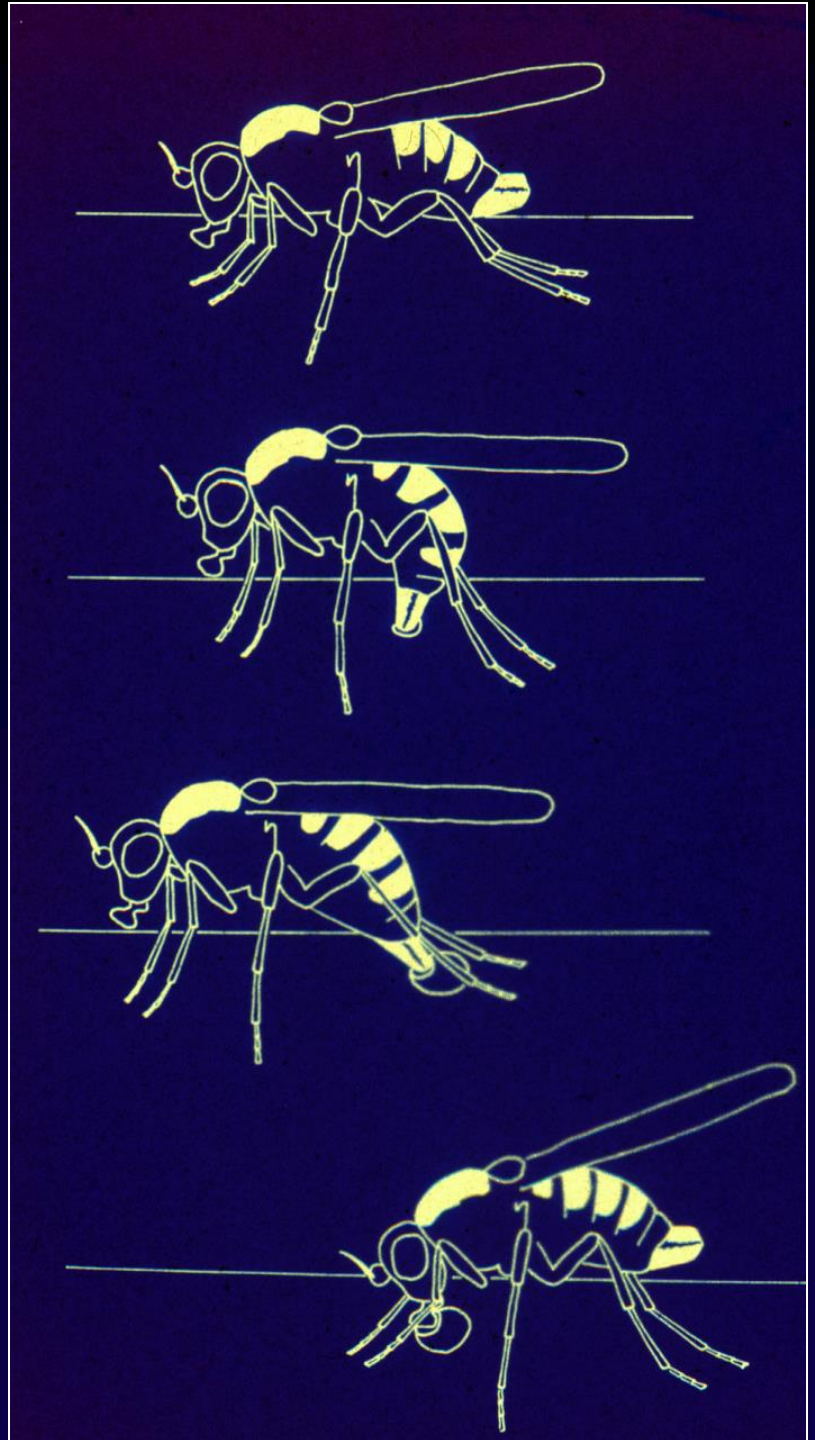
Investigation of Silicon Labels

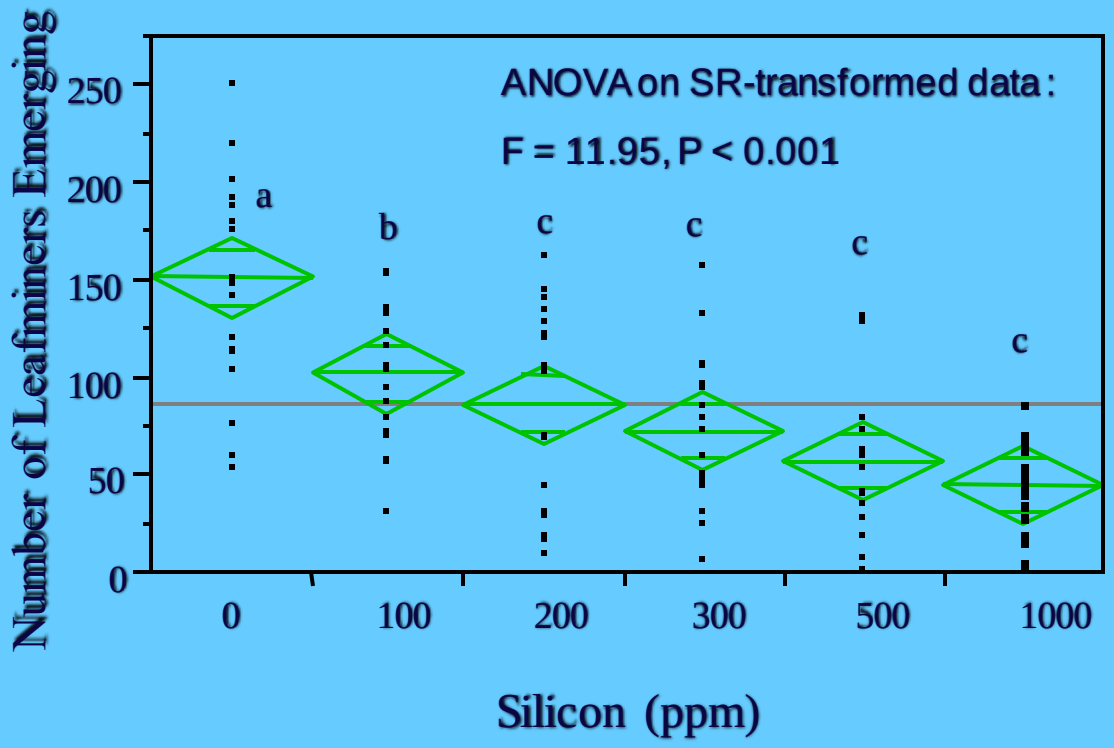
- Fertilizer/amendment labels for various silicate materials suggest the following:

  "provides increased potassium and silicon to build strong cell walls that protect against piercing insects and invading fungi. This formula improves photosynthesis, stem strength, heat and drought tolerance, plus it helps plants recover quickly from insect damage."

- If true, this would be a passive way to increase host plant resistance; soil amendment

Liriomyza trifolii (Burgess)




ANOVA on SR-transformed data:
F = 11.95, P < 0.001
Number of Leafminers Emerging
250
200
150
100
50
0
a
b
c
c
c
c
0
100
200
300
500
1000
Silicon (ppm)

Hydroponic long-stem roses