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Nursery/Floriculture Insect and Disease Management Symposium
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Making Pest Management More Efficient -- The Bedding Plant IPM Alliance

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IPM and Agricultural Sustainability

- Profit margins are thin
- Need to provide IPM techniques that reduce fertilizer, water, and pesticide use
- External societal concerns

Be Green & Save
Reduce Reuse Recycle
Start at Home

Community
Classifieds
Green Living Discussions

Earth-Friendly Products
Apparel
Appliances
Baby
Bedding & Bath
Books, Movies & Photo
Cleaning Supplies
Electronics
Furniture
Housewares
Lighting & Decor
Outdoor Living

Walmart Stores
Our Commitment to Sustainability

In Stores Now
Auto Care Center
Baby & Me

See how being more sustainable helps us save you money.


Wind


Organic Lettuce


Solar


Packaging


Shipping

At Walmart, we're now using the sun and wind to help power our stores. Our drivers' routes are shorter, which means less diesel fuel and greenhouse gases. And the way we pack our trucks is far more efficient. Why do we do it? For one thing, it makes a difference for the environment. But we also learned these efforts save us money - a savings we can pass along to you. Which means we're not just being earth-friendly, we're also being wallet-friendly. How great is that?

How can you and your family be more earth-friendly?




Share this:

Seasonal Features
Breast Cancer Awareness
Fall Cleaning
Game Time

CA pesticide use greenhouse transplants

Plant pathogens -- top 5 materials = 59% of total

Active ingredient (ai)	*Percent of total applications for plant pathogens*	*Key pests targeted*	*FRAC[1] mode-of-action group*	*FRAC resistance risk risk*
Copper hydroxide	15.00	Bacterial and fungal leaf blights	M1	Low
Mefenoxam	13.37	Phythium, Phytopthora	4	High
Thiophanate-methyl	12.17	Fungal pathogens and water molds	1	High
Maneb	9.95	Fungal leaf blights	M3	Low
Chlorothalonil	8.33	Fungal pathogens	M5	Low

Arthropods -- top 5 materials = 47% of total

Active ingredient (ai)	*Percent of total applications for insects and mites*	*Key pests targeted*	*IRAC[1] mode-of-action group*
Azadirachtin	14.13	Thrips	unk
B.t. israelensis	9.84	Fungus gnats	11
Pyrethrins	8.18	All insects, mites	3
Permethrin	7.90	All insects, mites	3
B.t. aizawai	7.03	Caterpillars	11

CA pesticide use greenhouse container

Plant pathogens -- top 5 materials = 51% of total

Active ingredient (ai)	*Percent of total applications for plant pathogens*	*Key pests targeted*	*FRAC[1] mode-of-action group*	*FRAC resistance risk*
Thiophanate-methyl	13.83	Fungal pathogens and water molds	1	High
Mefenoxam	13.53	Pythium, Phytopthora	4	High
Iprodione	8.85	Fungal leaf blights	2	Medium-high
Phosphorus acid	7.85	Pythium, Phytopthora, downy mildew	n/a	n/a
Fosetyl-AL	7.10	Pythium, Phytopthora, downy mildew	33	Low

Arthropods -- top 5 materials = 37% of total

Active ingredient (ai)	*Percent of total applications for insects and mites*	*Key pests targeted*	*IRAC[1] mode-of-action group*
Abamectin	13.10	Mites, thrips	6
Imidacloprid	6.61	Aphids, whiteflies	4A
Acephate	6.04	All insects	1B
Spinosad	5.90	Thrips	5
Dinotefuran	5.01	Aphids, whiteflies, fungus gnats	4A

The bedding plant production system

- Short 8 to 10 week crop cycle
- Most profits are made on volume
- Typical grower will have over 200 species or cultivars
- No tolerance for plant damage

The key pests

- *Pythium* spp., *Phytophthora* spp., botrytis, INSV, other fungal and bacterial leaf spots
- Western flower thrips, fungus gnats, shore flies, aphids, spider mites, whiteflies

The IPM program

- Reduce total number of pesticide applications by 30% over three years
- Reduce organophosphate, pyrethroid, and carbamate applications to fewer than 15% of total
- Include economic analysis of IPM implementation

The IPM program

- Four collaborators, two in northern CA and two in southern CA
- Includes propagation, bedding plants, and container color
- All currently rely primarily on conventional pesticides
- Major funding from the CA Department of Pesticide Regulation

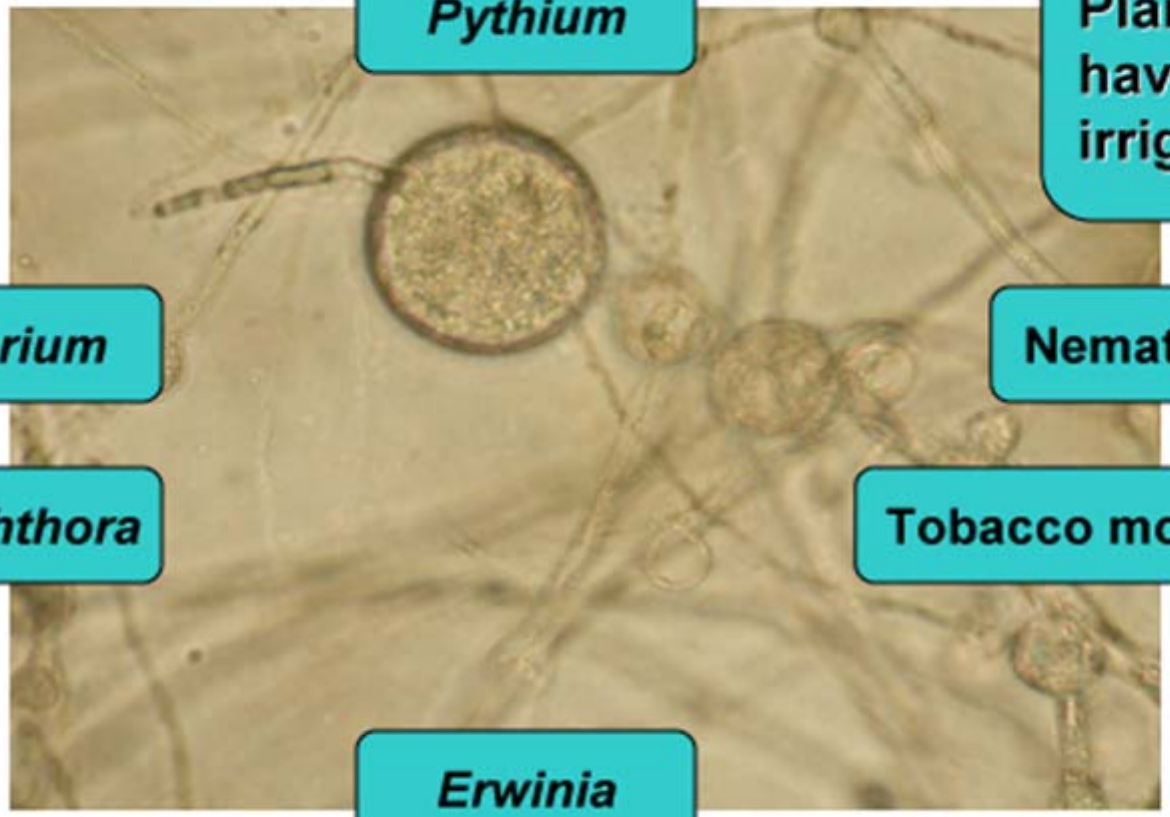
The IPM program

- Emphasize good water and fertilizer management
- Focus on pathogens
- Insect and mite sampling plans

Water

- Pest problems often related to water use -- pathogens, fungus gnats, algae
- Water management systems
  - storage and recycling
  - filtering
  - water content meters (irrigation scheduling)
  - treatment

Pathogens in irrigation water



Pythium

Plant pathogens have been found in irrigation water

Fusarium

Nematodes

Phytophthora

Tobacco mosaic virus

Erwinia

Chlorine dioxide

- Inexpensive, effective biocide
- Kills free-floating and biofilm bacteria
- Destroys the integrity of the biofilm

What pathogens will chlorine dioxide kill in irrigation water?

Laboratory cultures of these pathogens were tested using both clean and nursery pond water

- *Phytophthora sp.*
- *Pythium sp.*
- *Colletotrichum sp.*
- *Fusarium sp.*
- *Alternaria sp.*
- *Cylindricladium sp.*

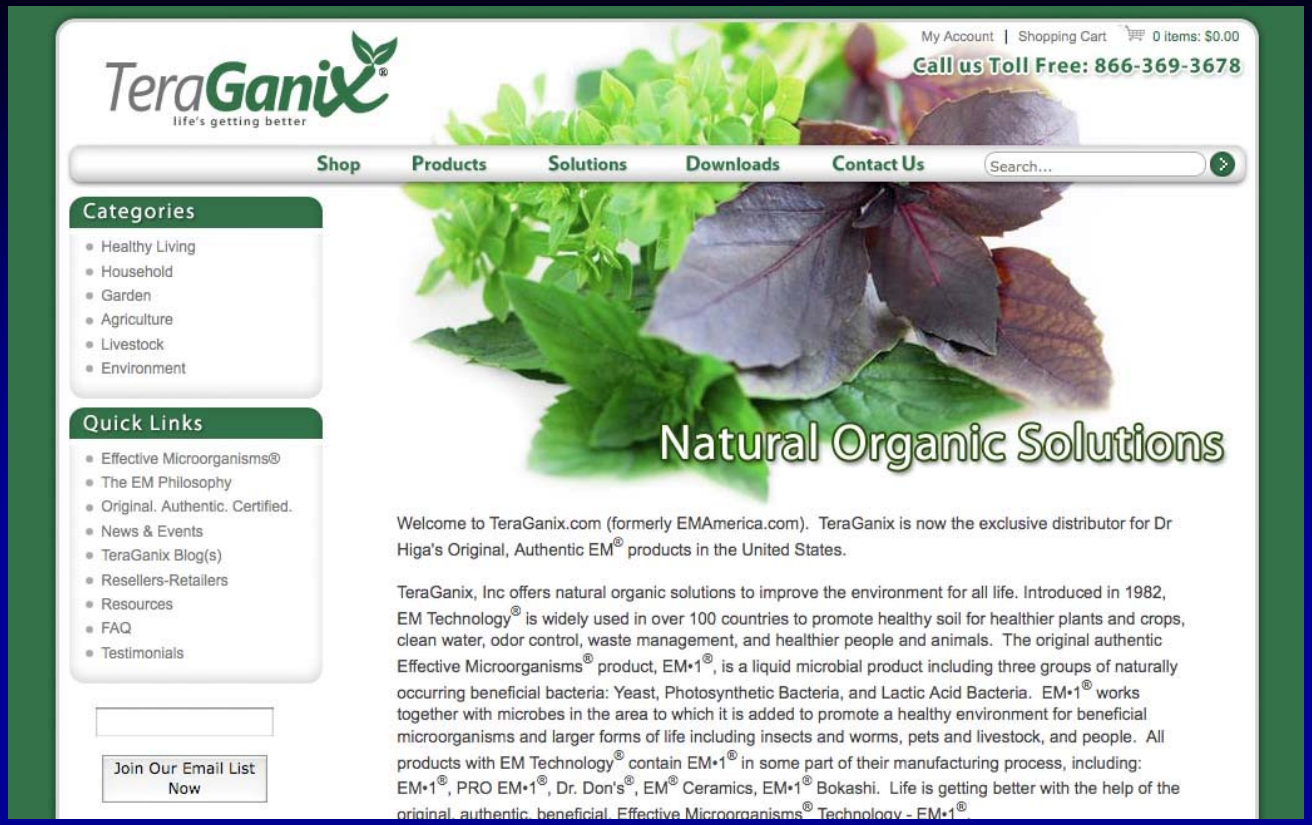
(J. MacDonald, UC Davis)

Demonstration-scale chlorine dioxide systems will be used at two greenhouses

www.aquapulsesystems.com

Effective Microorganisms (EM•1®)

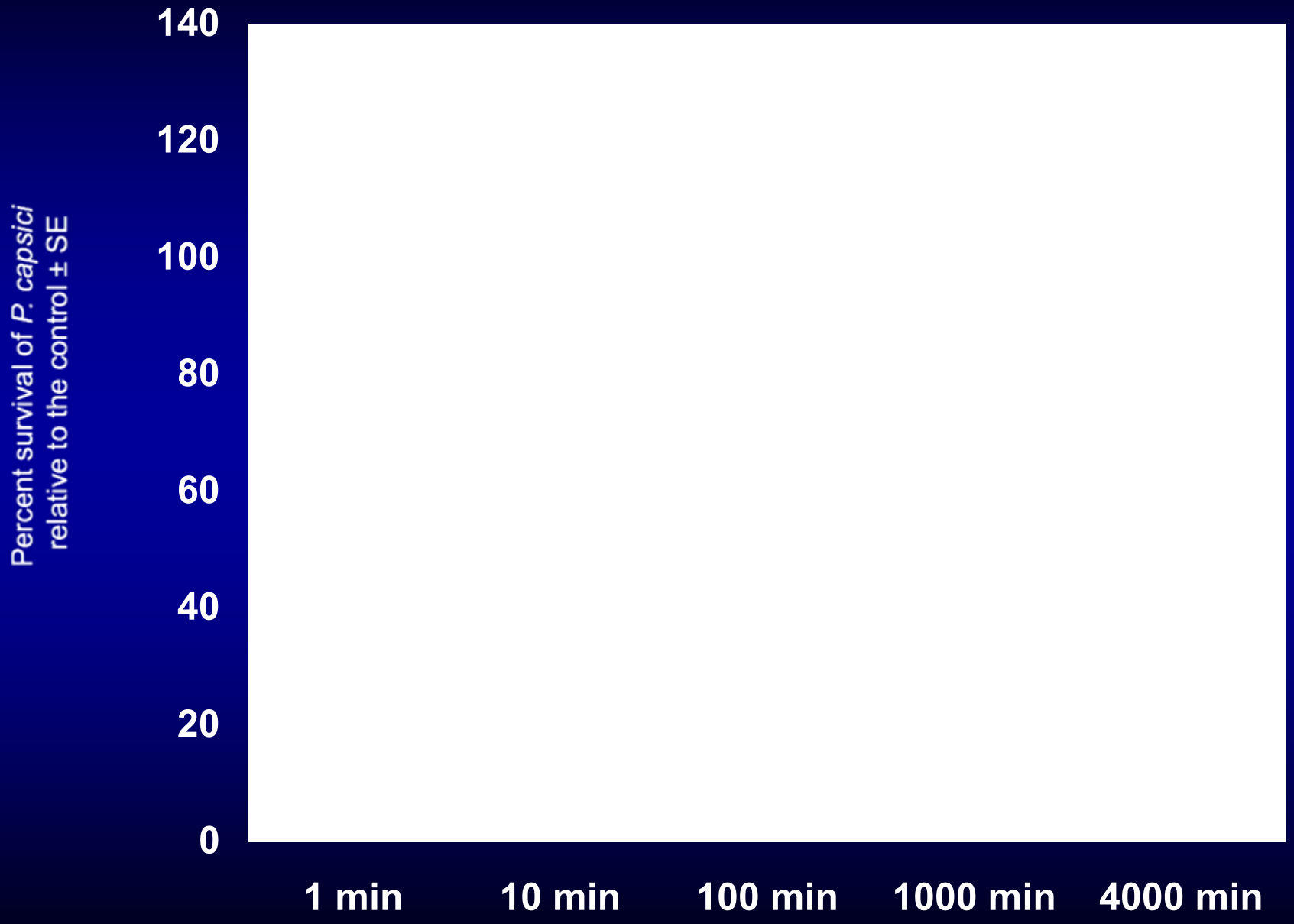
- **Many biological controls for plant pathogens are available**
- **Compost teas have varying degrees of efficacy**
- **EM1® (*Lactobacillus casei, Saccharomyces cerevisiae, and Rhodopseudomonas palustris*) has shown good efficacy against Phytophthora diseases.**



We are using EM•1® at all of our collaborating grower sites

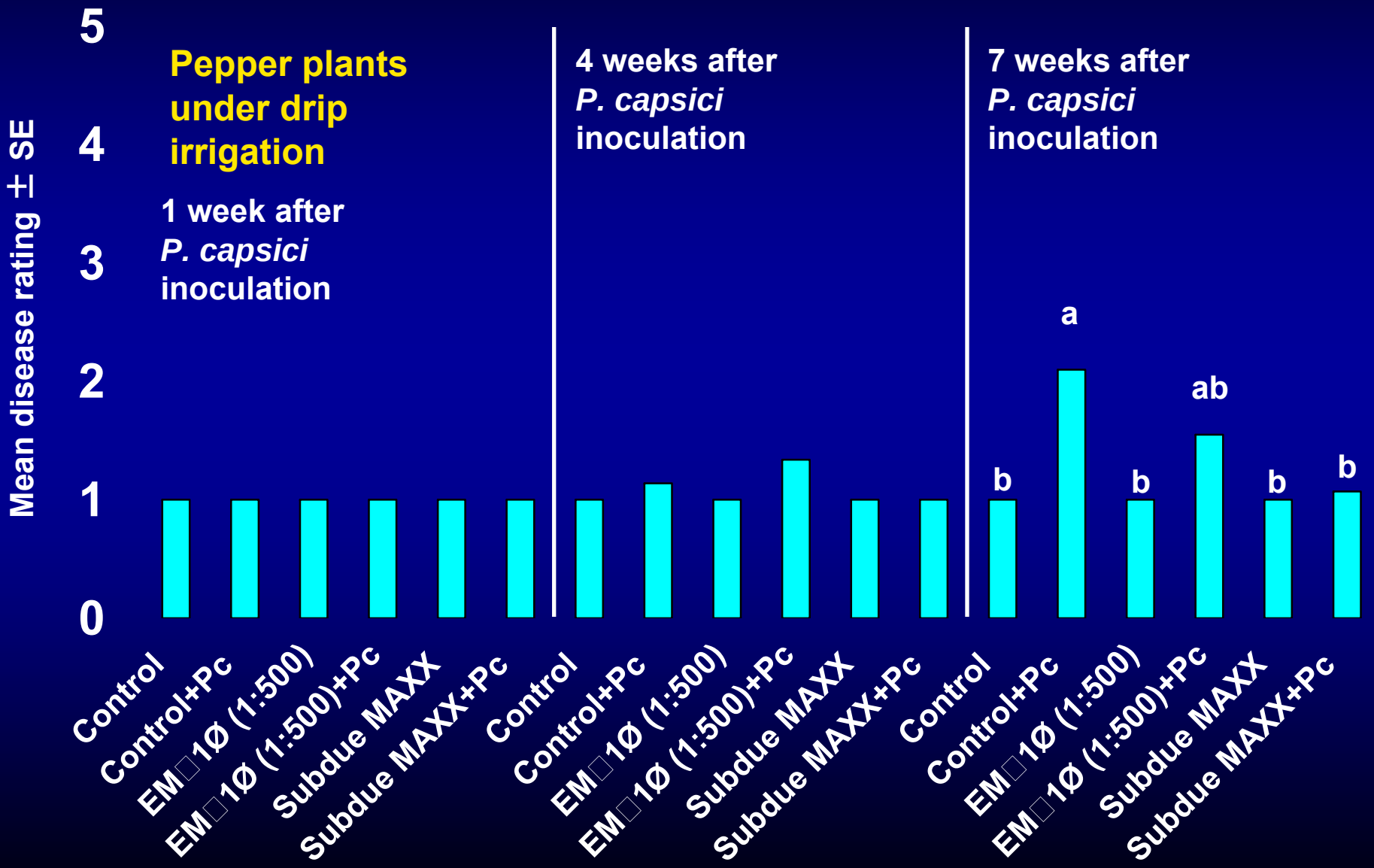
www.teraganix.com

Phytophthora capsici survival in EM•1® treated water



P. capsici disease in EM•1® treated plants

EM•1® applied for 4 weeks; plants then inoculated with *P. capsici*

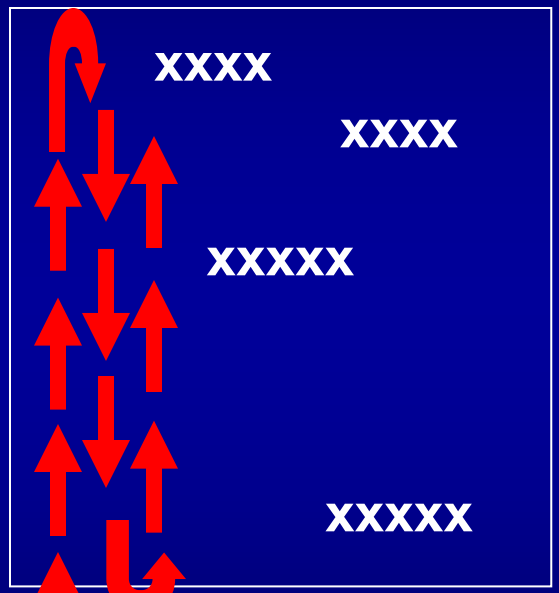


Sampling for nursery pests

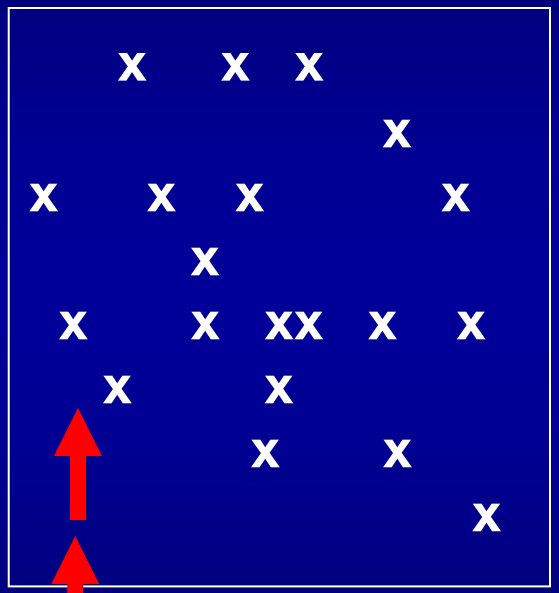
- Why sample? New pests, correct timing of controls, look for natural enemies.
- How many plants do you look at?
- The more aggregated a pest's distribution is, the more plants you will need to look at to find it.

Fixed precision sampling plans

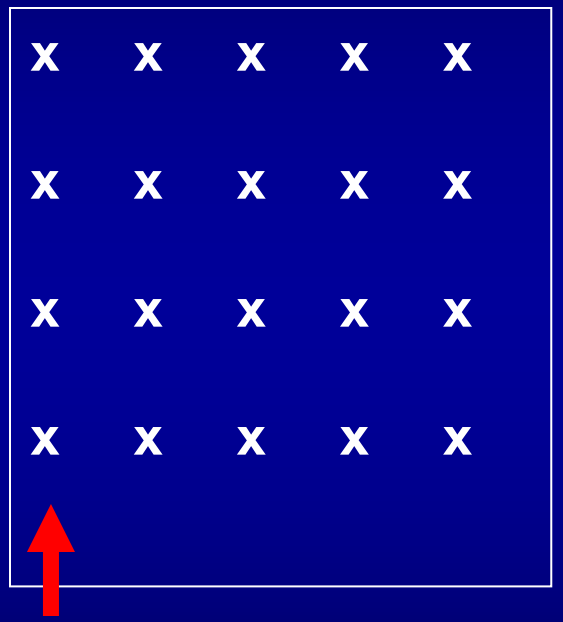
Relate sampling to pest distribution



Clumped



Random



Uniform

= Scouting pattern

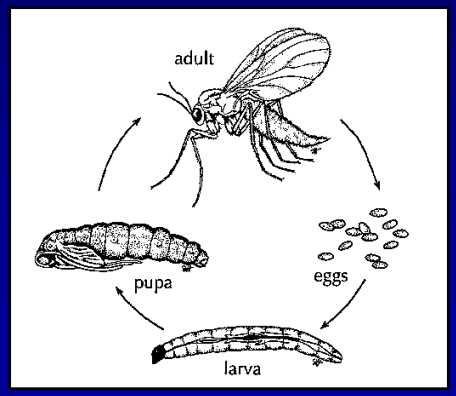
x = infested plant

Fixed precision sampling plans

- **Thrips:** uniform when plants are flowering, random or clumped otherwise
    - YSC; use to assess rising or falling populations and chose control accordingly
    - 3 cards per 10,000 ft^2
- **Whiteflies:** clumped; use YSC to find hot spots
- **Spider mites:** clumped; 38 plants per 10,000 ft^2 examined to determine proportion infested

Fungus gnats, shore flies, moth flies

Biology and damage



Fungus gnats

Shore flies

Moth flies

Fungus gnats, shore flies, moth flies
Monitoring

- **Visual**
  - observe flies on foliage, soil surface
- **Sticky traps**
  - 3x5 inches; bright yellow; orient vertically or horizontally
  - cover with plastic wrap and count a 1 inch vertical strip under a microscope
- **Potato slices at the soil surface @ 48 hr**
  - detect presence of larvae and evaluate control

Summary

- Sustainable practices are becoming a necessity
- Water will be a predominant issue for growers for the foreseeable future
- New approaches to conserving and disinfecting water are here now
- Good water practices can reduce pest problems


Thank you
Questions?