

Imidacloprid-induced SAR (systemic acquired resistance) in Cleopatra mandarin and HLB development

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Topics for Discussion

- What is SAR?
- How does SAR work to control canker?
- What is the mode of action for control?
- What is the prospect for control of HLB with SAR?
- What are the next steps for evaluation?

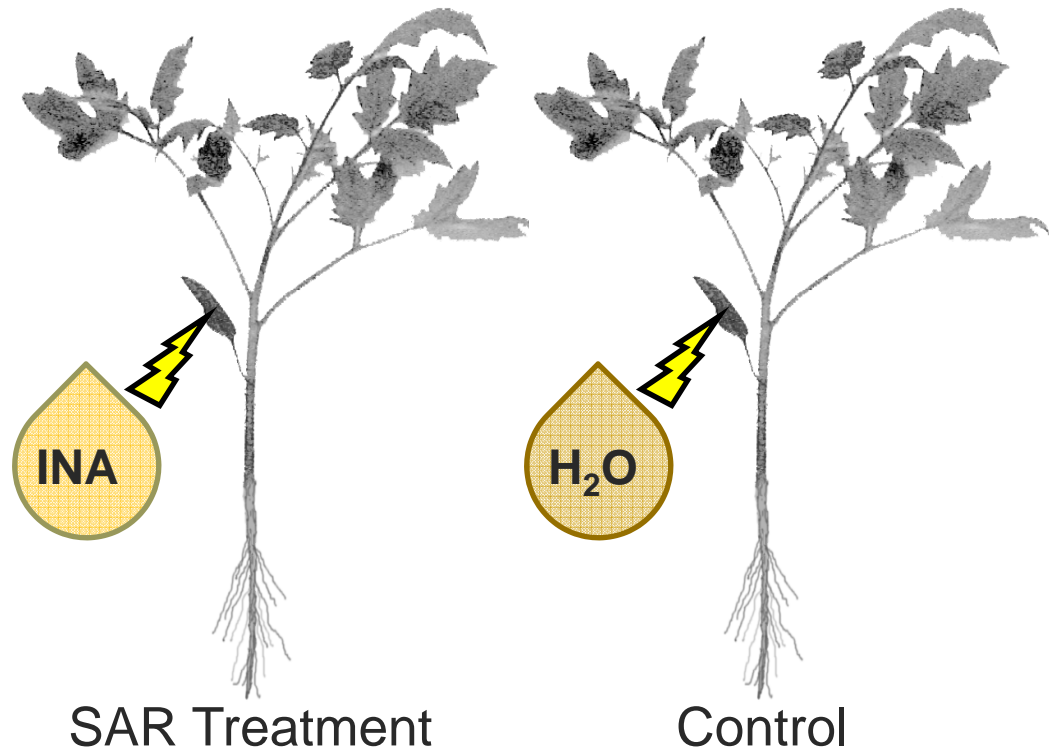
What is Systemic Acquired Resistance (SAR)?

- Plants possess an array of defenses against pathogens and non-pathogens
- SAR is an enhanced defensive capacity against subsequent pathogen attack as a result of a primary, limited infection by a weak or incompatible pathogen

What is Systemic Acquired Resistance (SAR)?

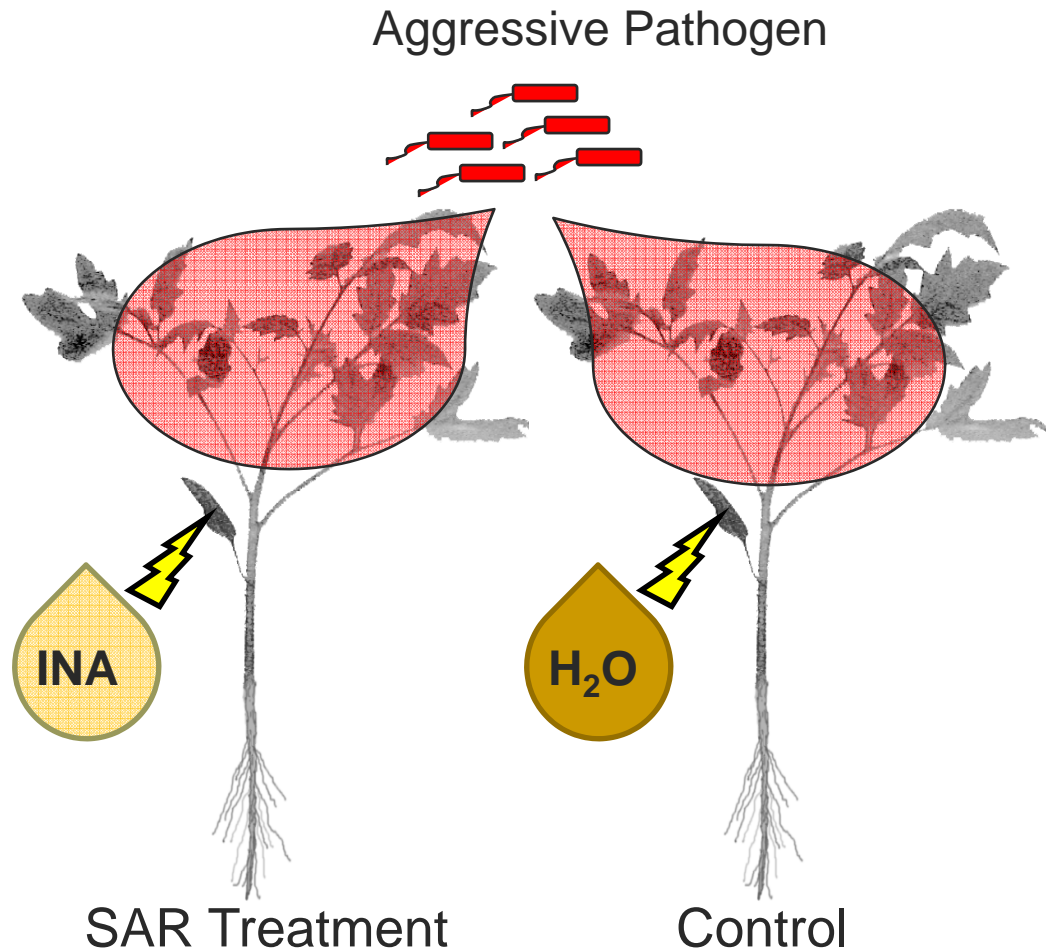
■ Classic Experiment:

- **Certain compounds**
 - Salicylic acid (SA)
 - Isonicotinic Acid (INA)
 - Acibenzolar S Methyl (ASM)



What is Systemic Acquired Resistance (SAR)?

- Classic Experiment:
 - Certain compounds - SA, INA, ASM
 - **Challenge with an aggressive pathogen**

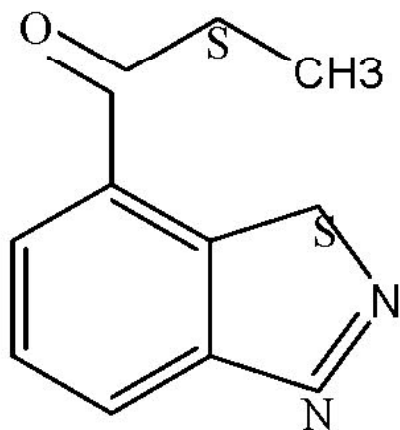


Registered product on vegetables that induces SAR

- *Acibenzolar-S-methyl* (ASM) – Actigard (Syngenta Crop Protection) is a commercial SAR inducer used for control of bacterial spot on tomato and pepper

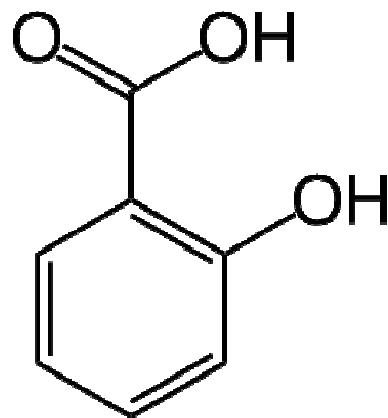
SAR inducing chemicals are closely related

Actigard

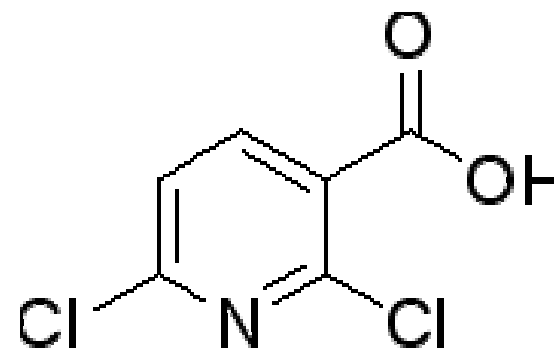


Acibenzolar-S-methyl

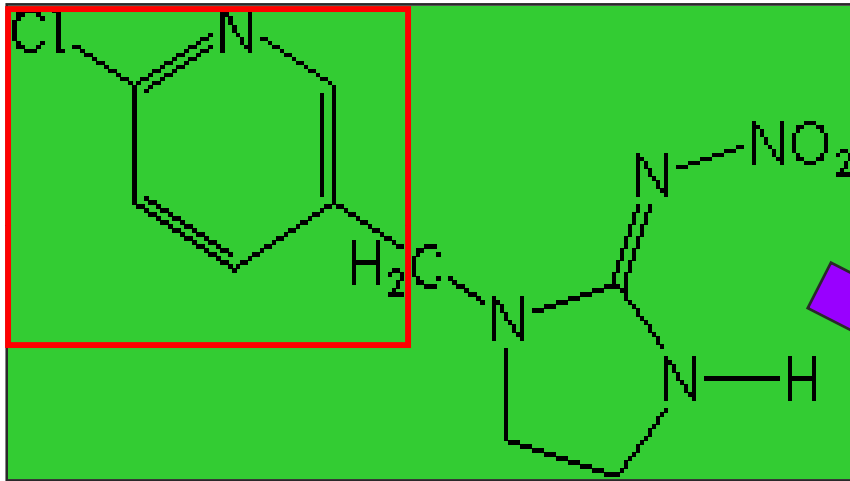
SA



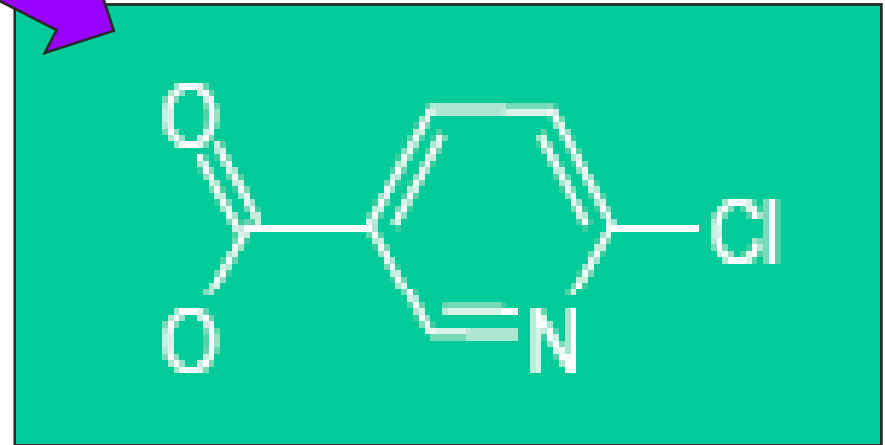
INA



The systemic insecticide, imidacloprid (Admire), is a “neo-nicotinoid” that breaks down in the plant into an analog of INA

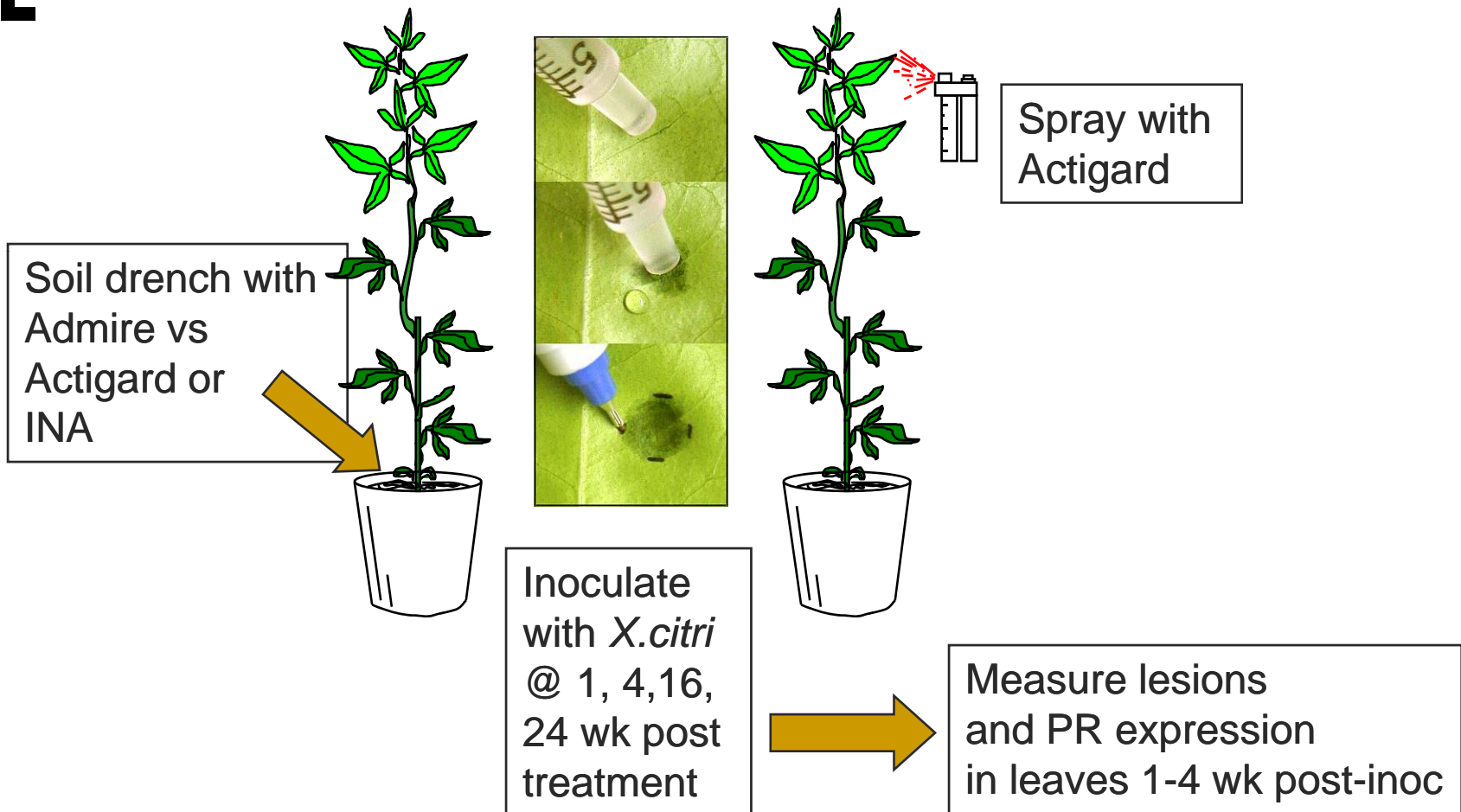


Imidacloprid

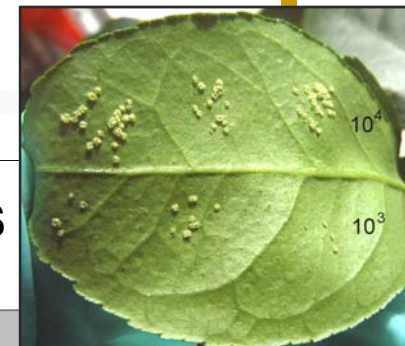


6 chloro-nicotinic acid

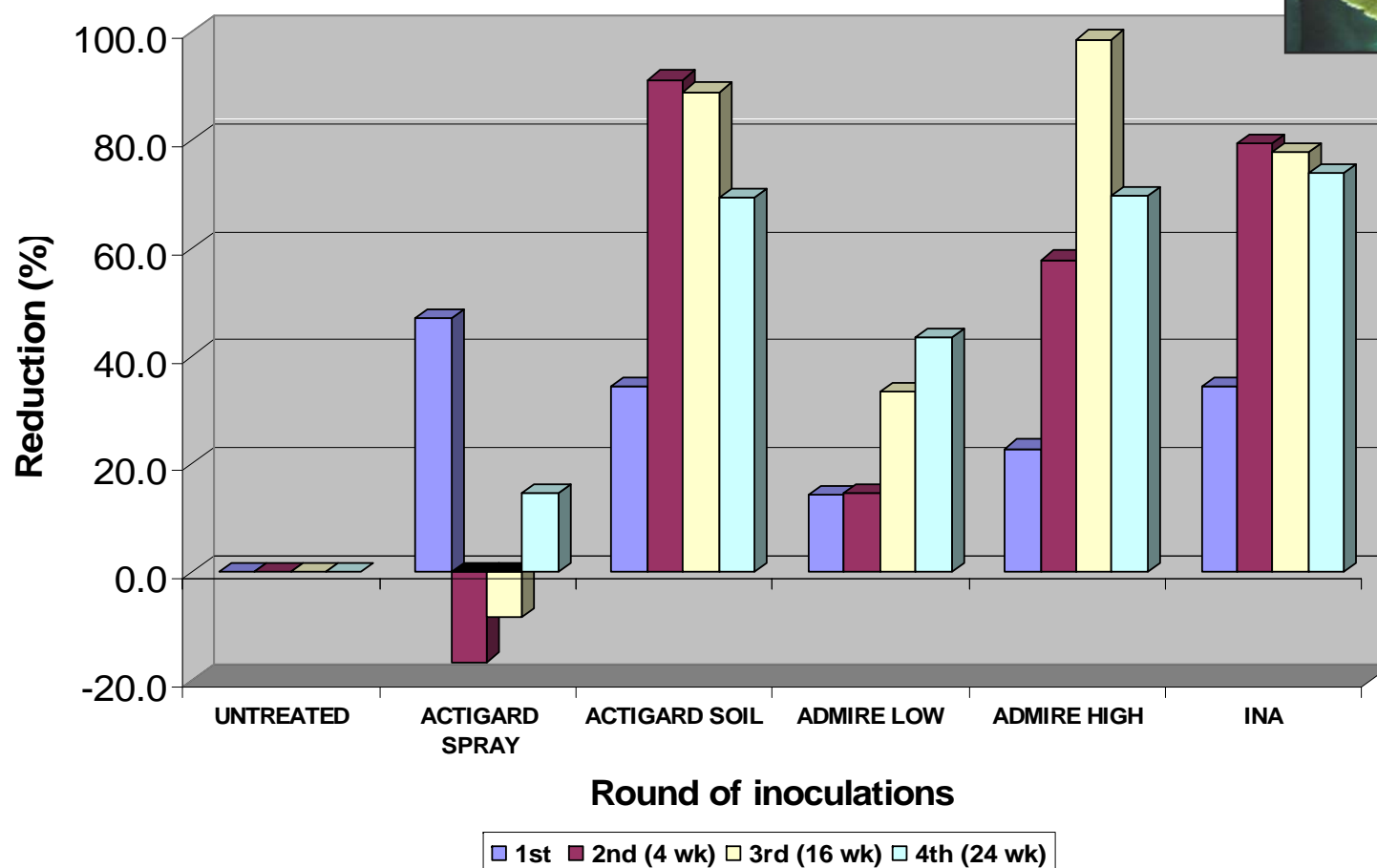
Demonstration of soil applied Admire as an inducer of SAR for control of canker



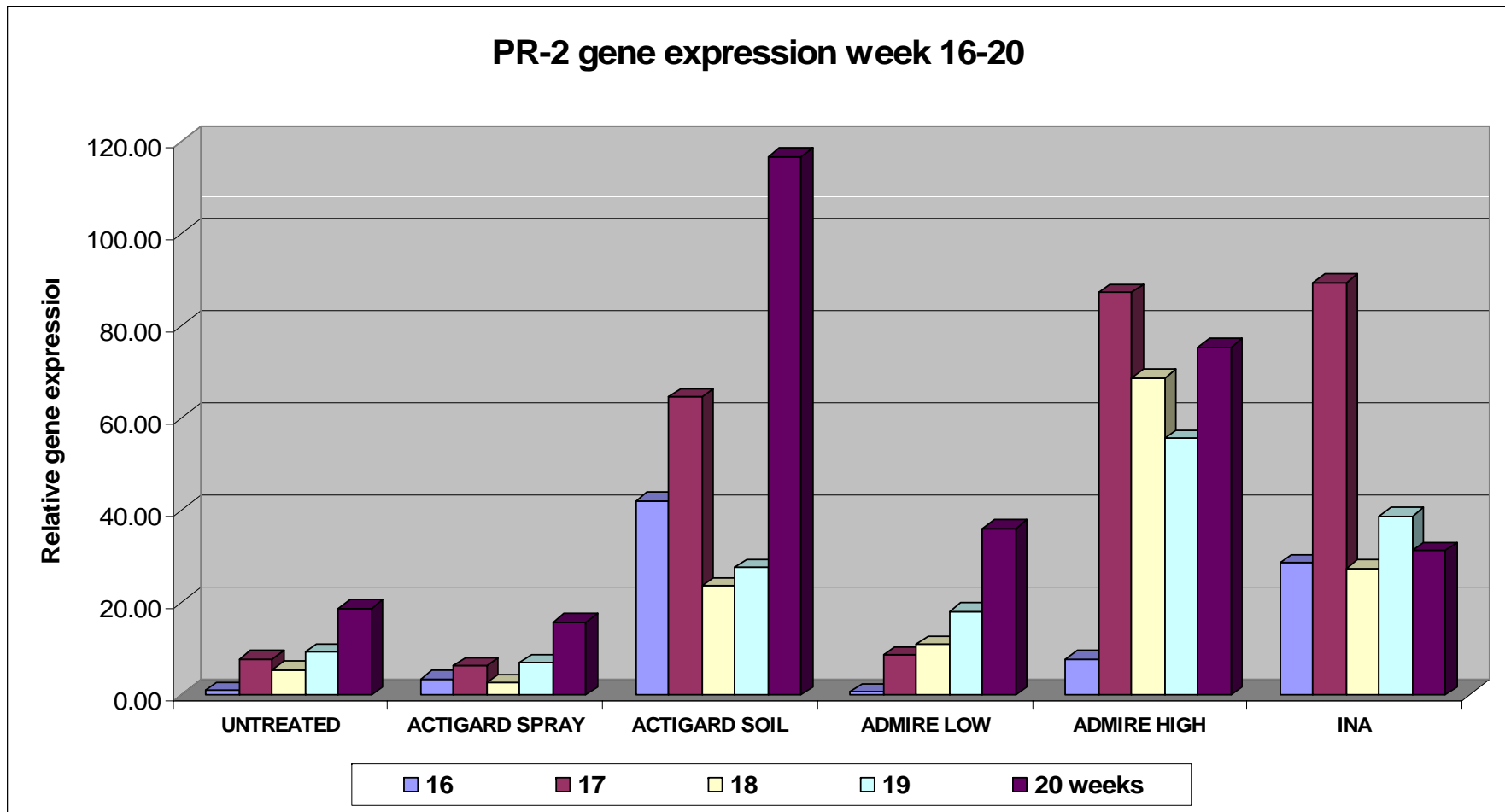
Control with soil applied Admire, Actigard & INA lasted up to 24 wk



REDUCTION OF CANKER LESIONS BY SAR INDUCERS



PR-2 gene expression is increased by Admire comparable to the SARs Actigard & INA



*Lesions greatly reduced in size & no. at 16 wk
after soil treatments with SAR inducers*

Untreated



Actigard Spray



Actigard Soil



Admire Low



Admire High



INA

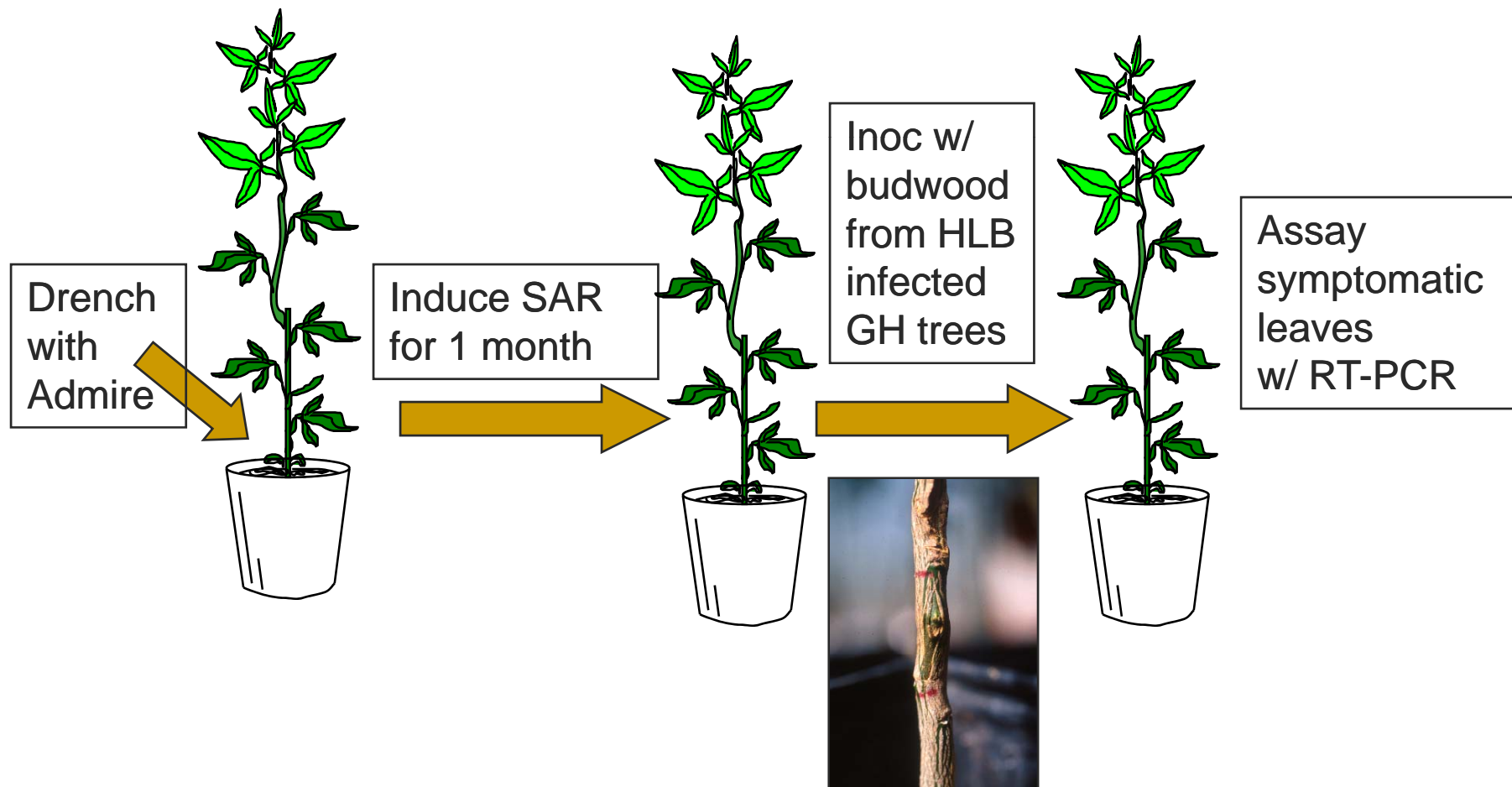


Phytotoxicity
symptoms

What about SAR for control of a systemic bacterial pathogen?



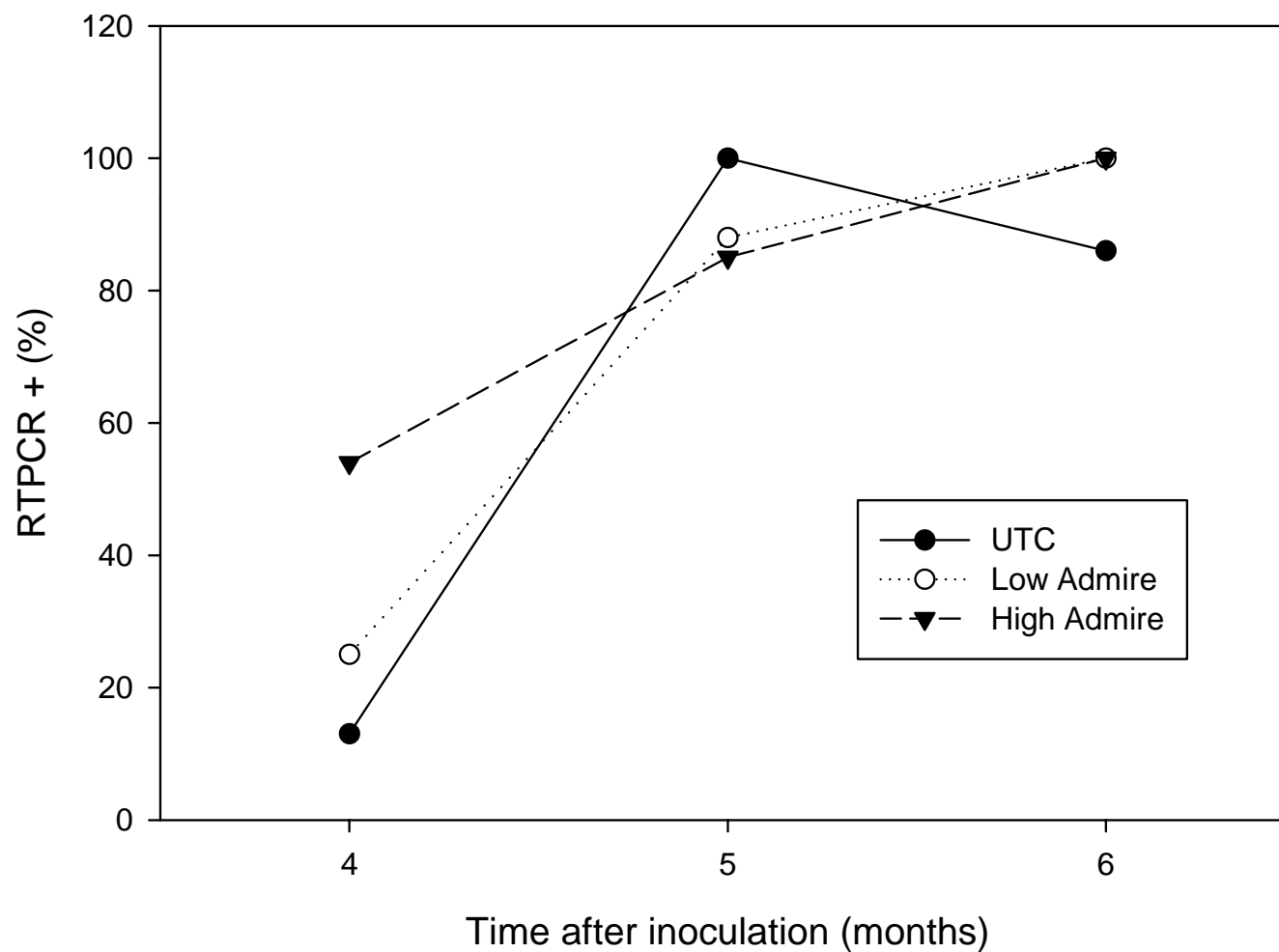
Measure rate of HLB symptom development in potted trees treated with and w/o Admire



When present, symptomatic leaf tissue is sampled for RT-PCR assay



Increase in RT-PCR positive plants was similar for Admire treated and untreated



*Admire-treated plants 4 mo. post-HLB inoc.
with leaf symptoms and short internodes*



Conclusion/next step for evaluation of SAR for HLB control

- Imidacloprid failed to control HLB infection process
- HLB-infected budwood inoculation of greenhouse plants maybe an unrealistic inoculum challenge
- Lifting of select agent status allows this experiment to be conducted with field-inoculated young trees
- Control of psyllids with non-neonicotinoid insecticides permits treatments with soil applied Admire to control for the insecticidal effect on psyllid transmission
- Trial will be include a positive transmission treatment by inoculation with HLB- infected buds
- Trial will be replicated in Brazil

Field studies are supported by FCPRAC