



# Developing Biopesticides for Conventional Agriculture

Sarah Reiter

Director Global Marketing



# Meet the Competition

## Synthetic Pesticides

*Good*

- Cheap
- Stable
- Highly effective
- Well characterized safety profile and phys properties
- Highly concentrated
- Easy to formulate



# Meet the Future

## Modern Biopesticides

*Good*

- Cheap
- Stable
- Highly effective
- Well characterized safety profile and phys properties
- Highly concentrated
- Easy to formulate

*Better & Best*

- Residues
- Regulatory pressures
- Worker safety
- Shifting consumer preferences
- Resistance
- Environment





# Safe, Effective, Consistent

## Importance of Natural Product Chemistry

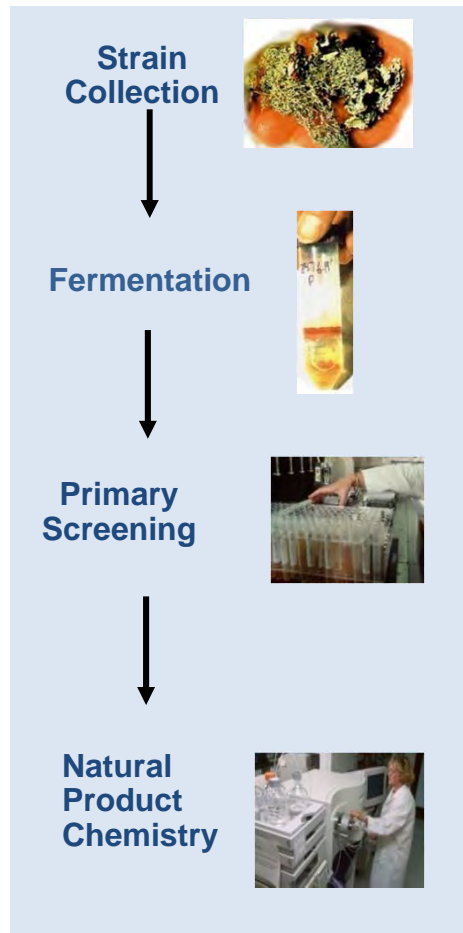
- Every microbial biocontrol agent produces bioactive metabolites
- Essential from a commercial perspective to identify these compounds
  - Safety: what metabolites are produced
  - Manufacturing consistency
  - **Product performance: stability, compatibility**



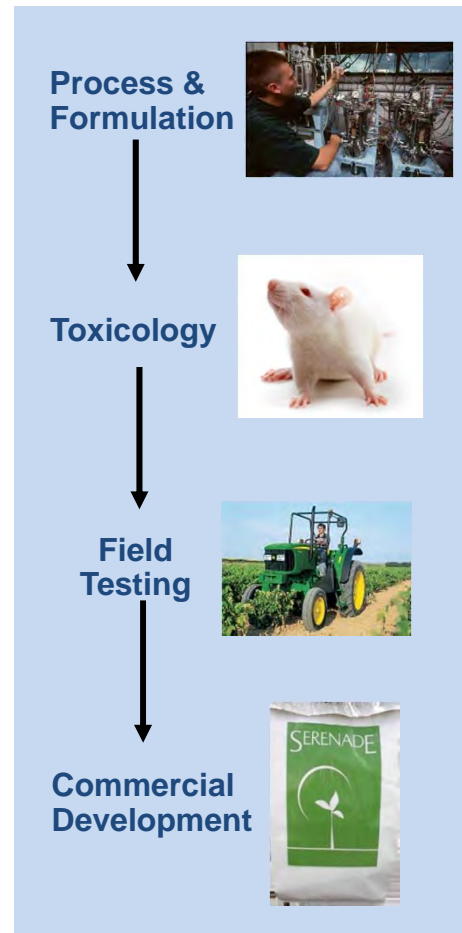
# Maturation of AgraQuest's Pipeline

## Developing Next Generation

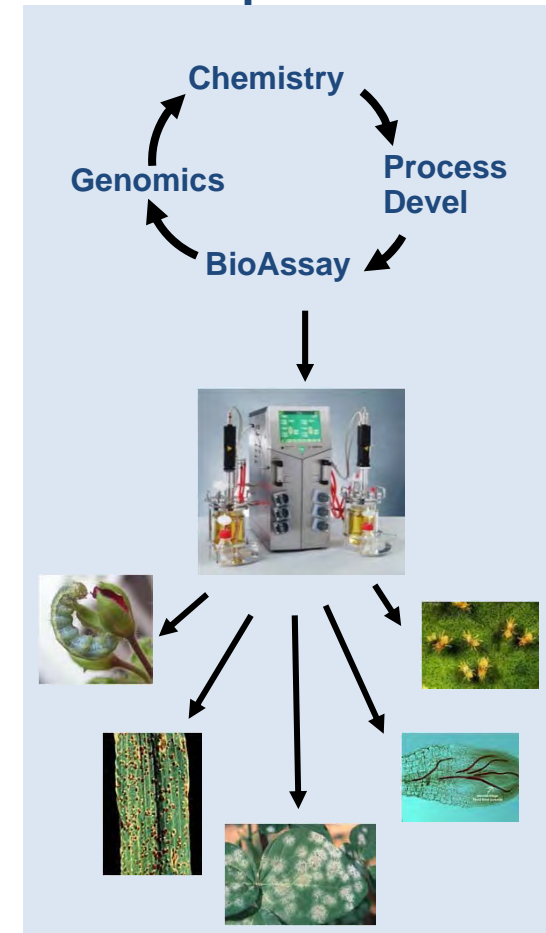
### Discovery Phase 1995-2003



### Single Product Development 2001-2007

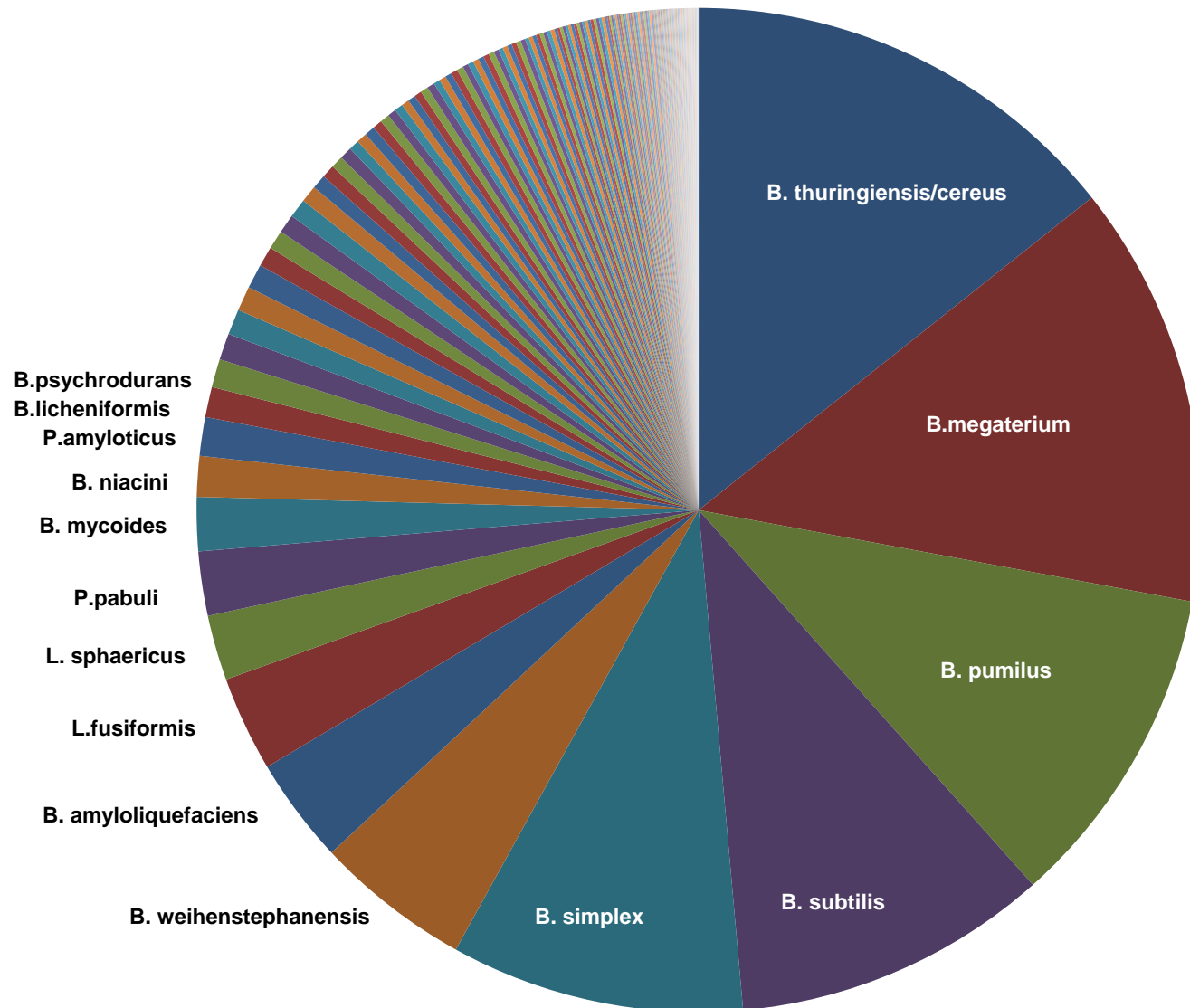


### Rigorous Multi Product Development 2008-present



# 20,000 Microbes

## 157 Species Represented in the Collection\*

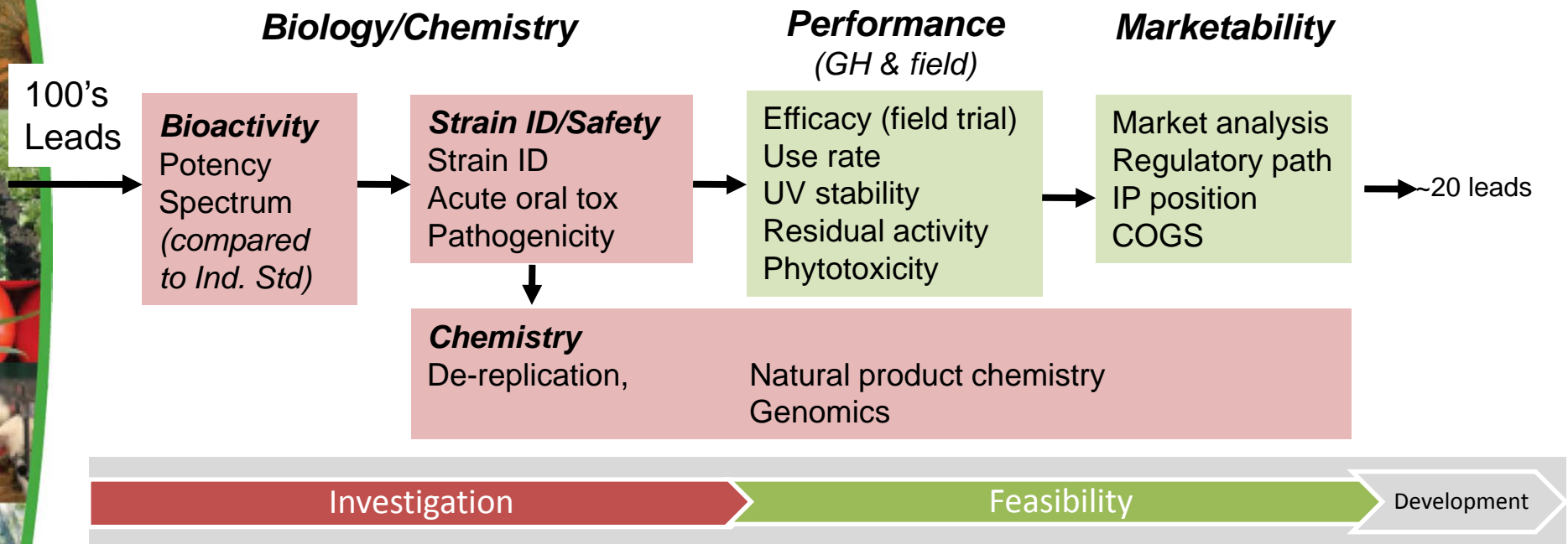


# Pipeline: Rapid Lead Evaluation

- Build on past screening program to accelerate process
- Conduct early assessment of late-stage development hurdles

*Efficacy, Safety, Use rate & COGS*

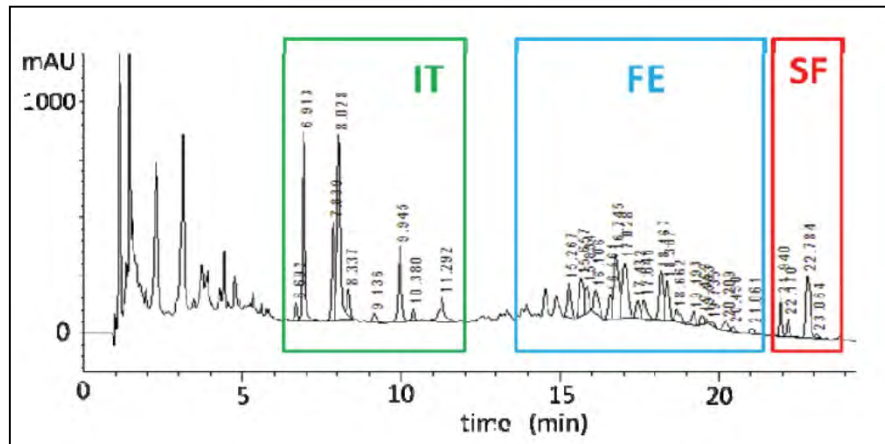
Three stage evaluation process to advance pipeline leads



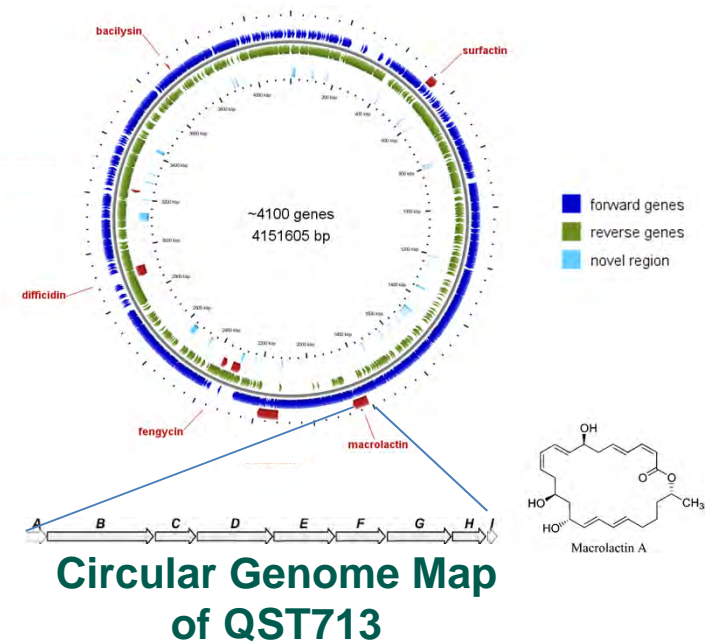
# Chemical Characterization

## Combine chemistry and bio informatics

- Essential to identify all metabolites even those not expressed in fermentation
- All commercial and development strains are sequenced



Serenade QC

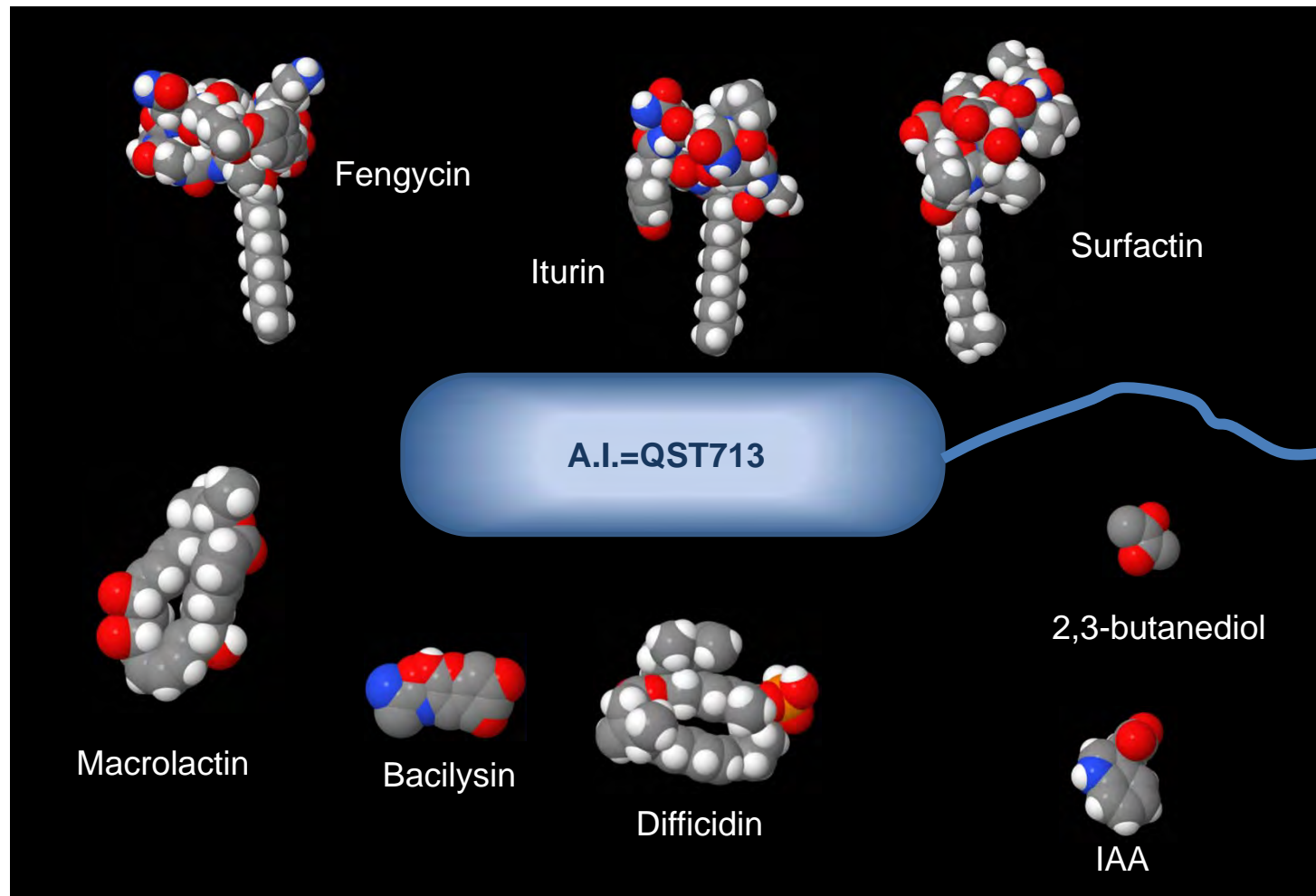


Circular Genome Map  
of QST713



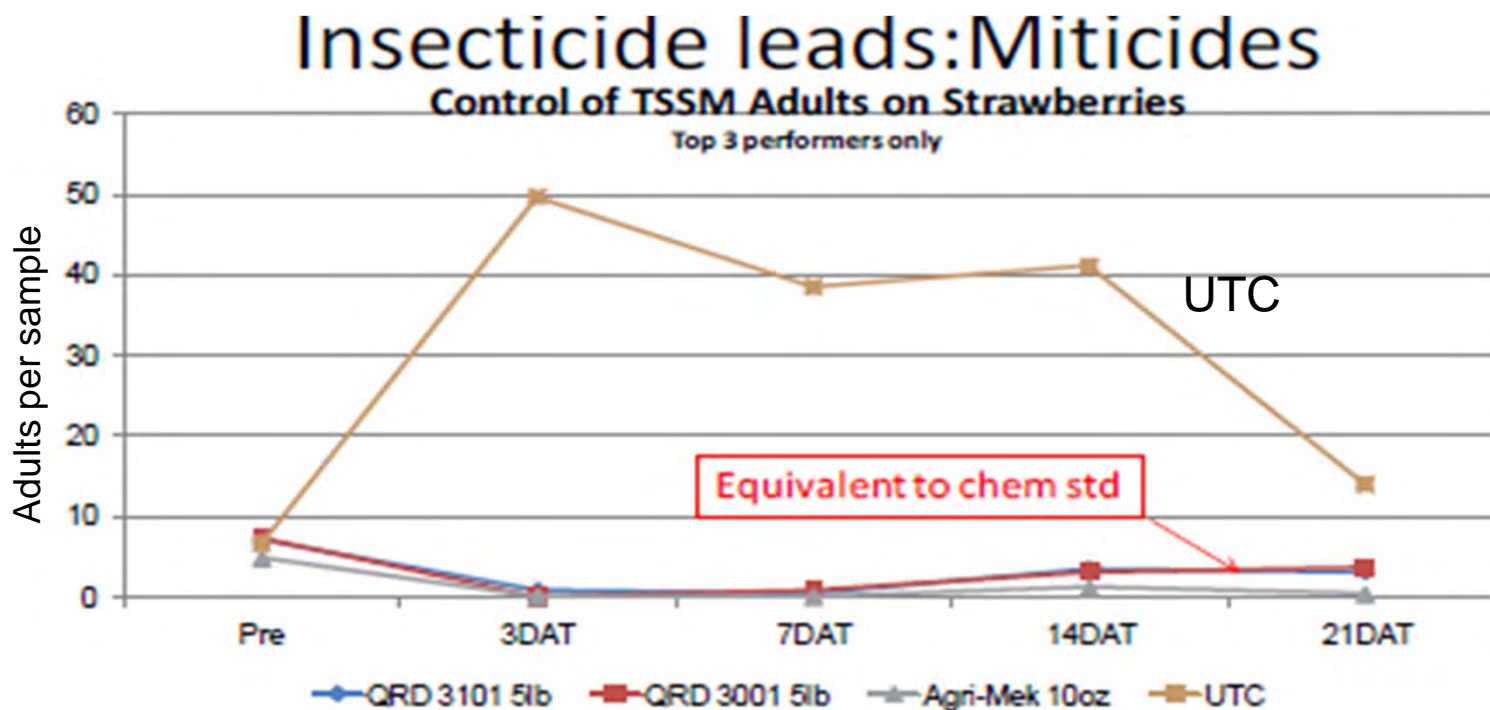
# Complex Chemistry from Single Microbe

Identification requires an aggressive natural product chemistry program.



# Pipeline: Miticides

## 2010 Initial Field Evaluation

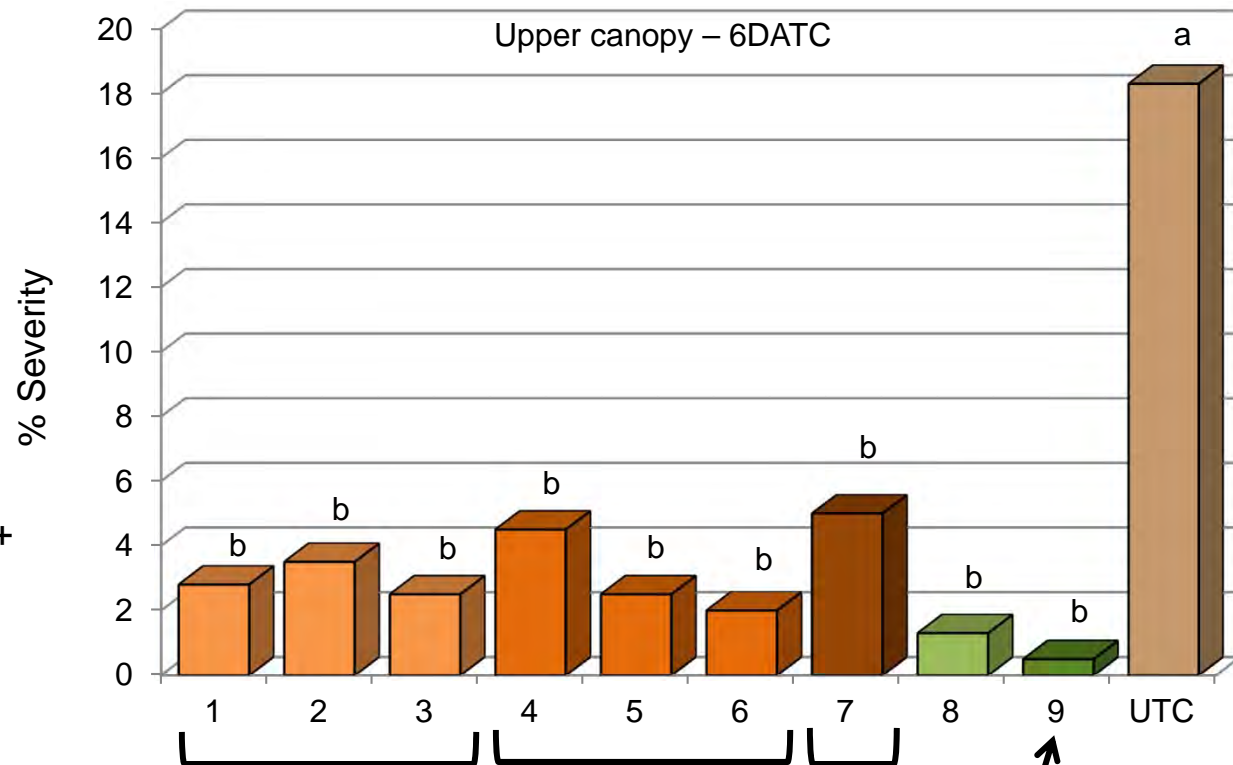


Year 1 field trials: single dose, limited sites  
Studies performed with unformulated, technical broth

# Candidate Bactericides

## Target Spot\* on Tomatoes (*Corynespora cassiicola*)

- 1 – QRD 1501 1.2lb
- 2 – QRD 1501 2.4lb
- 3 – QRD 1501 3.6lb
- 4 – QRD 1601 1.2lb
- 5 – QRD 1601 2.4lb
- 6 – QRD 1601 3.6lb
- 7 – QRD 1701 3.6lb
- 8 – QRD 711 3lb
- 9 – SERENADE MAX 1lb +  
Kocide 1.75lb



G. Cloud, GLC Consulting, Reno, GA – 2011. Materials were applied using a CO2 backpack compressed-air sprayer and a 4-ft boom equipped with disc cone nozzles delivering 50 GPA at 60 psi. Applications were made on the following dates: A = 5/6, B = 5/13, C = 5/20 and D = 5/26. \**Corynespora cassiicola*. (11-04-101)

Commercial standard:  
Serenade + Kocide

# Conclusion

Rigorous approach to development will deliver biopesticides that have a perfect fit in modern agriculture.

AgraQuest has the most robust pipeline in the industry.

Providing products that meet the safety, efficacy, stability that conventional growers expect but with the benefits of biologicals

