Third Citrus Research Forum
Ft. Collins, CO
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- My job as a rookie to citrus and citrus research is to provide my vision for future discussion, along with Dr. George Bruening

  This includes but is not limited to recommendations, opportunities, evaluation of gaps and overlaps, successes, action items etc. An unbiased out-of-the box perspective of your collective research efforts to manage HLB
- My report is interruptible for timely questions, but
  George and I will leave time for comments and discussion at the end

OBSERVATIONS AND COMMENTS

- First of all thanks to Charla Hollingsworth for inviting me – I think
- Second, a thank you to Texas Citrus Mutual on behalf of the Texas Citrus Producers Board for sponsoring me
- Third, we have no citrus in ND, my perspective comes from working on the parallel Liberibacter solanacearum-zebra chip disease of potatoes
- Thus I actually listened to all the talks which were all good; you have discussed this for years
- I had to adjust to a few soft southern accents, and I still don't know whether orchards or groves is the correct term

IN GENERAL

- Lots of innovative research; hard to improve on all your collective brainpower and experience
- Your biggest enemy is time
- I like the focus on nuPsyllid, similar to the mosquito can't transmit disease story; a great vision if you can get it to work
- Lots of emphasis and work on sophisticated molecular and genetic work; I think more practical work needed – traps, scouting, field surveys, controls etc.
- Dormant sprays great example of success
- Does the psyllid overwinter in CA, TX, FL? Do significant numbers of psyllids blow in from Mexico? Has anyone looked at this and monitoring population buildup in MX as an early warning for the US production areas? Is this a gap?
- Opportunities abound for education of the public to help manage HLB; many tried; good work here; effective?

GROWER PANEL

- Public outreach and education being done; good and continue
- Early detection a priority; a quick test during latency/incubation period needed (10-24 months)
- Better traps
- #1 priority a small molecule that will kill Las
- Coordinated control locally; not a research item

OUTCOME GROUP 1: KEEP GROVES PRODUCTIVE (SHORT TERM WORK)

- Surrogate *L. crescens*; has good potential for a research model
- Early detection a grower priority; volatiles, small mRNA's, small proteins, DNA test kit, etc need to field verify; only PCR used for growers and latency biggest issue
- My favorite: Tetracycline application to trees for remission of HLB symptoms
  - Efficacious, try in FL, used for ZC in potato in Guatemala; used in apples, palms
  - Topical or inject
- From industry: Research impact of HLB on consumer acceptance of citrus and juices; does flavor change as incidence goes from 25% to 100% HLB

OUTCOME GROUP 2: SLOW SPREAD OF ACP AND HLB (MID-TERM WORK)

- SPLAT delivery system for chemicals good potential
- CTV delivery system for gene therapy of infected trees or to prevent infection; not transgenic, safe, quick
- Registration of new insecticides?? Standard chemistry or small molecules
- Will need regulatory approval; a problem in CA
- Biological control a priority because if you don't manage homeowner and organic trees you're screwed.
- Organic growers a problem; only control for them is biological control and biocontrol needs high populations to work. Need a biocontrol fungus with spores that can be dispersed and persist until host is present.
- **Out of box ideas**: Investigate honeybee and ants as vectors of biological control
- Color trees blue
- Citrus industry to provide clean citrus trees to homeowners FREE; eliminate inoculum because difficult to eliminate vector; tried?

OUTCOME GROUP 3: KEEP CITRUS FREE OF ACP AND HLB (LONG TERM WORK)

- Screening of transgenics a slow process; 10-24 months from infection to symptoms – need a rapid screening procedure
- Modified Cry BT toxin good goal
- Model systems for transgene screening; lots of good work here
- Gene silencing has good potential
- Mutant psyllids with altered salivary sheath formation good idea
- Lots of molecular work; how will it be applied?

RECOMMENDATIONS TO BALANCE AN ALREADY STRONG WELL THOUGHT OUT PROGRAM

- What about the role of Las as an endophyte in the psyllid? Does it contribute to HLB in any way?
- Continue gene silencing work
- More applied field work needed; lots of good ideas for management by cultural, biological, chemical methods; get 'em out in the field for trials
- Biocontrol good but need better delivery systems
- Psyllid epidemiology; psyllid reservoirs, overwinter in Mexico etc
- I did not see any talk or projects about citrus tissue culture; there has to be somewhere to put the small molecules and constructs the molecular people develop
- Has anyone traced the movement of Las from infection to reappearance in the top of the plant over time to help understand why there is such a long latency? Does it stay in the roots? Sample roots?
- Continue work to culture Las; can you grow on ACP cell cultures?