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Agricultural
Research
Service



- Some pathogens we know we need to be concerned about (e.g. Ug99 family).
- Other pathogens are new to science and research is to determine the extent to which we should be concerned (e. g. Powell Butte nematode).

NPDRS Projects in FY 12

- Stem rust wheat - Ug99 (5 projects)
- Asian soybean rust
- Powell Butte cyst nematode; cyst nemas potato
- Laurel wilt avocado
- *Xanthomonas gardnerii* – tomato
- Groundnut ring spot virus – tomato & other veg Florida
- Macrophomina – strawberry California
- Aphanomyces – lentil and other pulses
- Potato spindle tuber viroid – new strains
- Chrysanthemum white rust
- Wheat blast
- Emerging pathogens website
- New species of Fusarium + new species ambrosia beetle

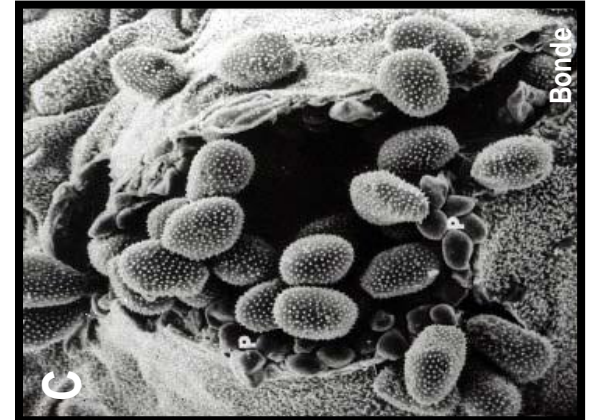
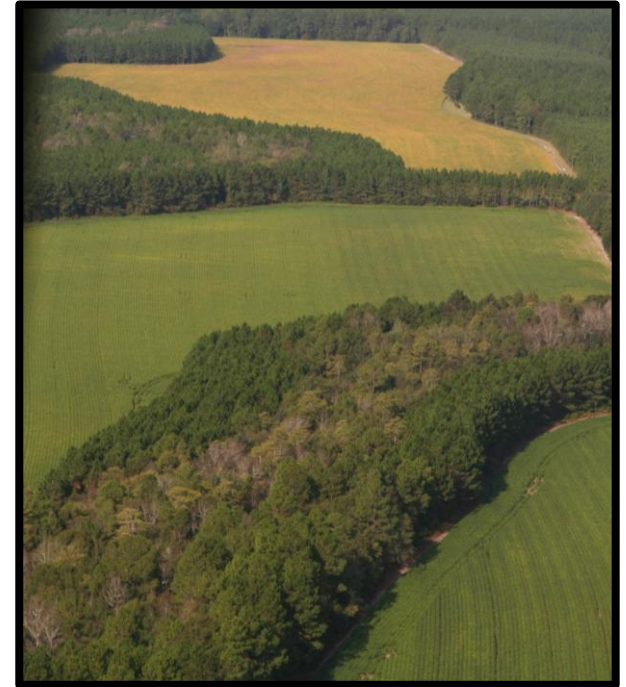
Stem rust of wheat and barley

- Assemble and send seed to Kenya
- Screen wheat landraces from the National Small Grains Collection in Kenya (2509 over last few years)
- Characterize and map resistance; make crosses
- Make information and germplasm available to breeders worldwide



Asian soybean rust

- Causal agent = *Phakopsora pachyrhizi*
- First observed in the continental U.S. in 2004
- *P. pachyrhizi* has a broad host range – infects many legume species
- Under favorable conditions for disease development, yield losses can be severe (e.g. 63% reported in Brazil, 2003)
- U.S. commercial cultivars lack resistance, but resistance genes at six loci have been identified and mapped
- Efforts to determine the molecular mechanisms of resistance are ongoing, with the ultimate goal of producing enhanced germplasm in the future



Powell Butte Nematode

- *Globodera ellingtonae* species novum
- Field and greenhouse trials for pathogenicity and reproduction on potato, and hatching factors (24 potato lines screened)



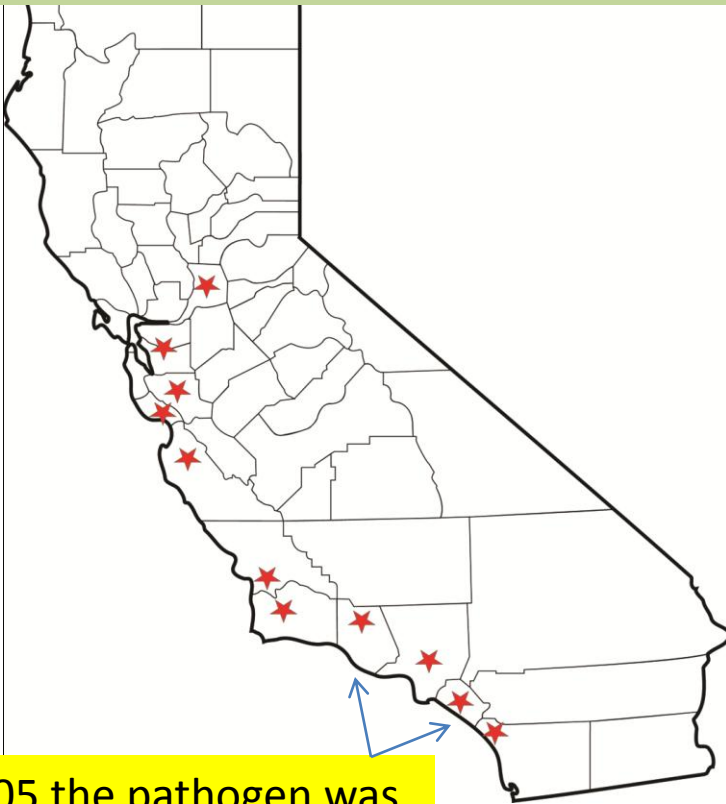
Lures and traps for Redbay Ambrosia Beetle – Vector of Laurel Wilt

Cubeb oil was identified in field tests as a new attractant for RAB that is longer lasting than lure used currently



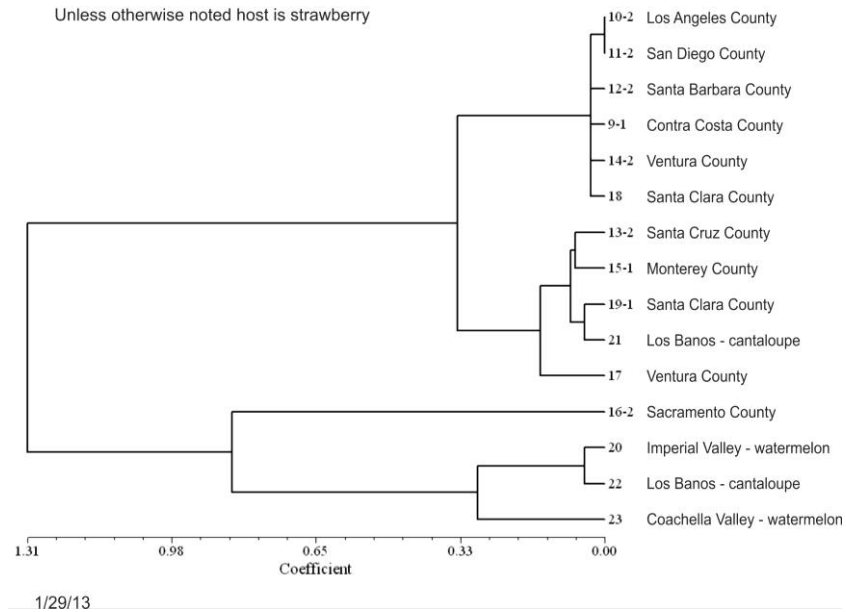
Macrophomina

Distribution of *Macrophomina phaseolina* in the major strawberry production districts



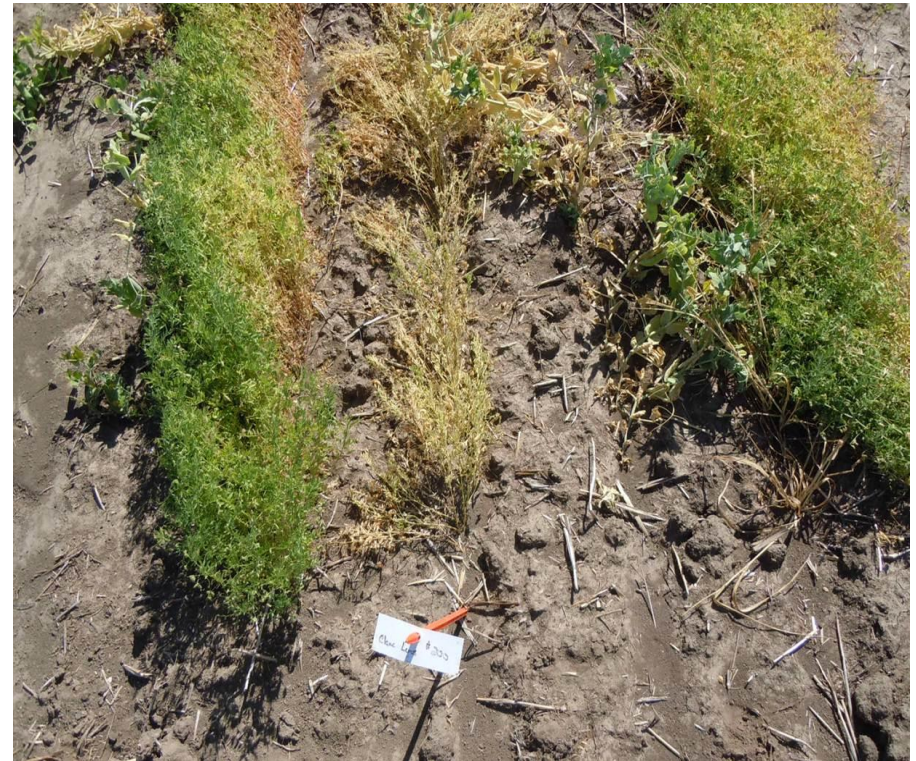
In 2005 the pathogen was present only in Ventura and Orange County

SSR analysis for 65 markers



Aphanomyces on lentil and other pulses

- Screened commercial cultivars, accessions and wild relatives for resistance to *Aphanomyces*





Healthy tomato



PSTVd tomato

Chrysanthemum White Rust

cDNA library sequencing for protein discovery and
diagnostics development



Transcriptome sequencing of
germinating *Puccinia horiana*



- Unique proteins were characterized
- Recombinant peptides & proteins generated
- Polyclonal antibodies are being tested for diagnostics

Wheat Blast



- Field trials in Paraguay
- Whole genome sequencing of *M. oryzae* isolates and gene expression

New Fusarium – New Ambrosia Beetle



New challenges

- Apple proliferation phytoplasma
- Grapevine-associated red blotch virus
- Downy mildew impatiens



Potato Mop Top Virus on Yukon Gold