



The Search for a Site

- In 2005, Drs. Nik Grunwald and Jennifer Parke proposed a project to develop a “mock nursery” at which studies on *Phytophthora ramorum* could be completed.
- The site had to be located in an area where sudden oak death already occurs.
- Numerous locations in California were considered over the last four years, but none worked out.

We looked in Sonoma County...

We looked in Monterey County...

We looked in Alameda County...

Still looking in Alameda County...



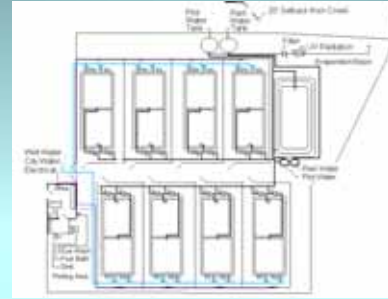
Farm Bill Funds Research Site!

- Susan Frankel leads Dominican University of California to us....

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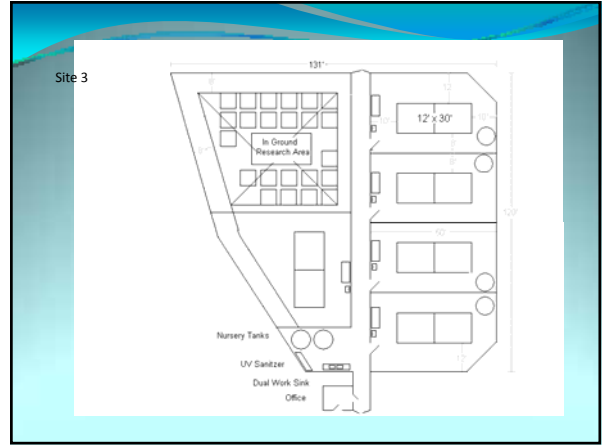
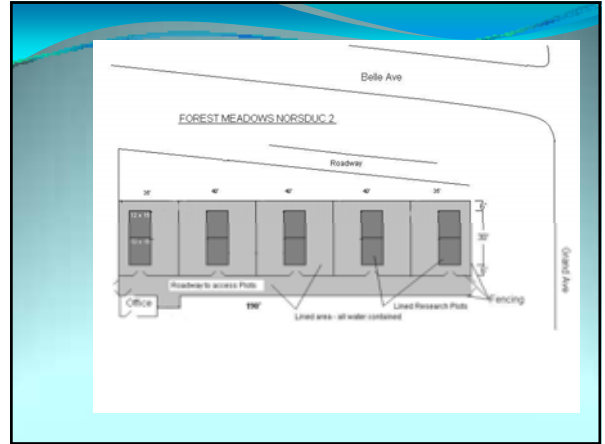



Thanks to Michael Henkes for turning our dreams into reality!




Site Construction: Nov. 10, 2009

Site 1 with plants



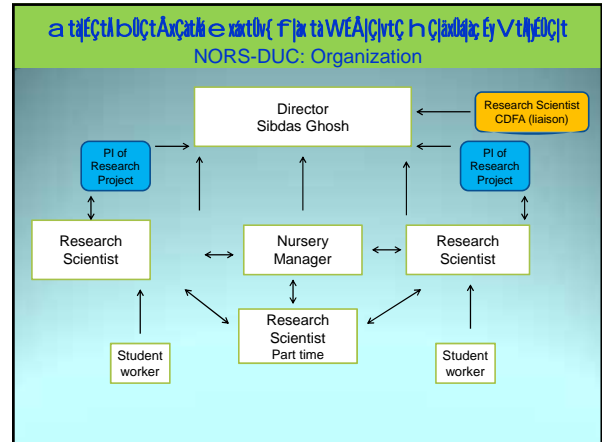


Summary of Monitoring



- Environmental monitoring is useful for assessing disease potential
- No *P. ramorum* was detected on sentinels at Forest Meadows Site 1 or has been detected at Site 2
- Other fungi were detected causing similar symptoms to *P. ramorum*

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NORS-DUC: Projects 2011-2012

Stopping the spread

- Use of Trichoderma to Remediate *Phytophthora ramorum*-Infested Soil; T. Widmer and N. Shishkoff
- Solarization to Eliminate *Phytophthora ramorum* from Nursery Beds; J.L. Parke

Symptomless Hosts and Root infections


- The Risk of Asymptomatic *Phytophthora ramorum* Infection on Fungicide-Treated Rhododendron; G. Chastagner and M. Elliott
- Risk of Root-to-Root Spread of *Phytophthora ramorum* in Ornamental Production Nurseries; G. Chastagner, M. Elliott, S. Tjosvold and N. Shishkoff
- Episodic Abiotic Stress and Ramorum Blight in Nursery Ornamentals: Impacts on Symptom Expression and Chemical Management of *Phytophthora ramorum* in Rhododendron; R.M. Bostock

Repeat/Recurrent Nurseries

- Development and application of an epidemiological framework for management of *Phytophthora ramorum* on Rhododendron in nursery settings; N.J. Grunwald, J.L. Parke and C.D. Gilligan

Buffers and Fungicides

- Potential Efficacy of a Copper Fungicide for Preventing Establishment and Dissemination of *Phytophthora ramorum* in Ornamental Plant Nurseries S. Jeffers
- Effect of Fungicides and Biocontrol Agents on Sporulation and Persistence of *Phytophthora ramorum* on Nursery Hosts; S. Tjosvold, G. Chastagner and M. Elliott



NORS-DUC: Projects 2012-2013

Stopping the spread

- Determination of *Phytophthora ramorum* threshold inoculum levels in irrigation water needed for infection of nursery hosts

Symptomless Hosts and Root infections

- Ramorum blight in Rhododendron: impact of abiotic stress on root infection, symptom expression and chemical management of *Phytophthora ramorum*
- Risk of root-to-root spread of *Phytophthora ramorum* in ornamental production nurseries

Repeat/Recurrent Nurseries

- A comprehensive study of populations of *Phytophthora ramorum* in plants, soil and water during the course of a year at the NORS-DUC nursery research facility
- Assessment of nursery crops-induced alteration in pathogenicity of *Phytophthora ramorum*

Buffers and Fungicides


- Mitigation of nursery bed contamination by *Phytophthora ramorum* with solarization and biocontrol
- Validating commercial formulation of *Trichoderma asperellum* against *Phytophthora ramorum*-infested soil
- Testing biological control agents for suppression of *Phytophthora ramorum* in potting mixes in a simulated nursery environment

Steaming to remove *P. ramorum* from infested nursery soil

Rationale: *P. ramorum* grows in a temperature range from approx. 4°C to 28°C



Moist heat is a proven method of sterilization and will kill all life stages of *P. ramorum*

Goal: to reach (and keep) a minimum temperature of 50 °C for 30 minutes in the infested soil layer

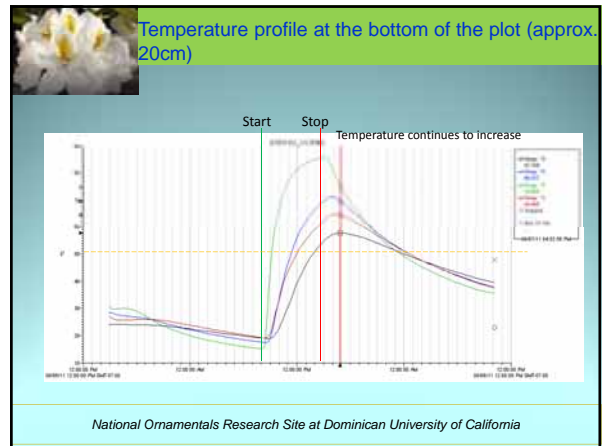


Method

- Steam-Flo Generator
 - Model SF-11, Oil-Fired
 - Non-Highway Trailer
- Employed top down approach to achieve gradient of temperatures (Thomas method)
- Assess effectiveness of different temperatures to achieve thermal death of *P. ramorum*
- *P. ramorum* chlamydospore sand inoculum mixed with potting soil was used as the inoculum and added to the soil in sachets

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NORS-DUC results

- Pre-steam sachets had an average of 29 cfu/cm³
- All 28 Post-steam sachets were *P. ramorum* negative
- After 1 month of 4°C cold treatment, all post-steam samples remained negative

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Conclusions

Steaming works as a mitigation option for *P. ramorum*-infested soils

Development opportunities will focus on delivery methods to optimize treatment timing

Temperature profiles are expected to lend to developing standardized protocols for steaming

Acknowledgements

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