Coffee Detection, Spatial Assessment and Modeling

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This Talk

1. Modeling coffee agro-ecosystems on Hawaii Island (especially CBB, coffee plants; plus detection)
2. Visualizing spatial data and model results
3. Field collection of data to validate the model
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Two Modeling Tracks

1) We are producing a validated spatial model of coffee agroecosystems on the island. We would like this to serve as a broad background we can ask general questions.

2) We are developing models of a more limited scope to serve as tools to address specific research and management questions.
Detecting Coffee Patches in Hawaii

J. Gaertner, UH
Accuracy Assessment

<table>
<thead>
<tr>
<th>Class</th>
<th>Coffee</th>
<th>Mncnut</th>
<th>Forest</th>
<th>Grass</th>
<th>Mpod</th>
<th>No Veg</th>
<th>Urban</th>
<th>Roads</th>
<th>Total</th>
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</table>
Model Components

- Coffee plants
- CBB populations
- Pathogens/parasites
- Critical inputs:
  - Temperature
  - Solar irradiation
  - Rainfall
  - Management

Acuna et al, PNAS (2011)
J. Gaertner
Plant Model Components
Light interception & photosynthesis per branch and per plant
Effects of temperature
Water and nitrogen acquisition
Photosynthate allocation
Fruiting phenology and dynamics

Insect Model Components
Development
Reproduction and mortality
Migration and emigration
Disease/Management
Model Construction (Hermes)
Quick Results
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Model Interaction (Viewer)
Spatial data viewer
Spatial data viewer
Model Interaction (Model output)
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Area-Wide Field Data

- Data being collected for 7 managed farms, 2 unmanaged and 2 feral sites
- Visit each site every two weeks
- Check:
  - CBB infestation level (in field, plus dissection)
  - Trap catch
  - Plant phenology
  - Weather
  - Management
Progress on Spatial Data – Field
Progress on Spatial Data – Field
Progress on Spatial Data – Field

- Unmanaged/feral sites are matched with managed farms (control)
- Sentinel plants placed in each unmanaged/feral site (2 per site)
Acknowledgements

CBB Modeling Group
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