Advancing Pest and Disease Modeling

February 23-25, 2015
University of Florida – Straughn Professional Development Center
Gainesville, FL USA

Workshop Goal

Advance insect and disease modeling for use in regional and global assessments of crop production, climate change and food security through initiation of model intercomparison and improvement teams

Objectives

1. Summarize recent progress on modeling pests and diseases and approaches for estimating their effects on crop yields and economic impacts
2. Develop teams and strategies for intercomparing crop insect and disease models and approaches for their use in assessing production and economic impacts and adaptation at regional to global scales
3. Identify opportunities for these teams to obtain support
4. Develop plans for publishing a special issue on modeling pests and diseases in a high-impact peer-reviewed journal and identify lead authors for this effort

Day 1 – Monday, February 23rd, 2015

Day 1 Goals:

- **Understanding Modeling Approaches Across Disciplines**

7:30 am: Check-In, Registration, Coffee

Morning Plenary: Introduction, Goals and Challenges

8:00 am: Welcome from the University of Florida

8:15 am: Introductions, Workshop Goals, and Goals for Day 1
Speakers – Jim Jones, Jerry Hatfield, and Mark Rosegrant

8:45 am: Talk 1 – Setting Agenda for Pest and Disease Modeling in AgMIP
Speakers–Perspectives by Mark Rosegrant, Jerry Hatfield, Jim Jones

9:15 am: Talk 2 – Models for crop diseases: Overview of approaches, scales
Speaker-- Serge Savary

9:45 am: Discussion moderated by Jim Jones

10:15 am: Morning Break

10:30 am: Talk 3 – Models for crop insect pests: Overview of approaches, scales
Speaker--Charles Godfray

11:00 am: Talk 4 – Modeling crop losses caused by pests & diseases and management
Speaker--Ken Boote

11:30 am: Discussion moderated by Karen Garrett

12:00 pm: Lunch

Afternoon Plenary: Integrated Modeling Incorporating Crop Pests and Diseases

1:00 pm: Talk 5 – Modeling economics of pest and disease damage and management
Speaker---Mark Rosegrant

1:30 pm: Talk 6 – Integrated modeling of crops, pests, economics: What purposes and approaches?
Speaker--John Antle

2:00 pm: Discussion moderated by Keith Wiebe

2:30 pm: Charge to breakouts introduced by Mauricio Fernandes

2:35 pm: Breakouts (Discipline perspectives on P&D models needed for integrated assessments, MIP teams)

Afternoon break during breakout sessions

5:00 pm: Plenary report back with discussion moderated by Peter Thorburn

5:30 pm: End of plenary session

5:30-7:30pm: Poster reception

Day 2 – Tuesday, February 24th

Morning Plenary: Learning from Past Experiences

8:00 am: Day 2 Goal introduced by Marcello Donatelli

- **Building on what we have learned from past experiences for advancing capabilities**

8:15 am: Talk 7 – Modeling potential effects of climate change on potato late blight
Speaker--Ariena van Bruggen

8:45 am: Talk 8 – Crop insect pest modeling: What have we learned from past efforts?
Speaker--Segenet Kelemu

9:15 am: Discussion moderated by Charles Godfray

9:45 am: Morning break and poster viewing

10:30 am: Talk 9 – Crop modeling incorporating pests and diseases: What have we learned?
Speaker--Mauricio Fernandes

11:00 am: Talk 10 – Incorporating climate change scenarios
Speaker-- Alex Ruane

11:30 am: Talk 11 – Modeling interactions of crops and pests/diseases
Speaker--Marcello Donatelli

12:00pm: Lunch & Poster Viewing

Afternoon Plenary: Toward Integration Across Scales

1:30 pm: Talk 12 – AgMIP Teams for intercomparing and improving models
Speaker– Jim Jones

2:00 pm: Discussion, moderated by John Antle

2:30 pm: Charge to breakouts (Interdisciplinary teams) introduced by Jawoo Koo

2:40 pm: Breakout sessions

Afternoon break during breakout sessions

5:00 pm: Plenary report back with discussion moderated by Alex Ruane

5:30pm: Adjourn

Day 3 – Wednesday, February 25th

Change in venue to Emerson Alumni Hall where the AgMIP Global Workshop will be held

Plenary Session: Roadmap for Advancing the Science Across Disciplines

8:00 Day 3 Goal introduced by Cynthia Rosenzweig:

- **Creating a roadmap for AgMIP pest and disease integrated modeling**

8:15 am: Talk 13 – Next generation crop disease models for integrated assessments; will generic models work?
Speaker-- Roger Magarey

8:45 am: Talk 14 – Next generation crop insect pest models for integrated assessments
Speaker--Jurgen Kroschel

9:15 am: Discussion moderated by Keith Wiebe

9:40 am: Charge to breakout groups introduced by Daniel Wallach

9:45 am: Breakout sessions (Develop target roadmaps for AgMIP P&D modeling teams)

Mid-morning break during breakout sessions

11:00 pm: Plenary report back with discussion moderated by Jim Jones

11:45 pm: Concluding comments
Jim Jones, Jerry Hatfield, Mark Rosegrant, and Cynthia Rosenzweig

12:00 pm: Adjourn

Breakout Sessions

1. Monday afternoon: **Discipline perspectives on P&D models needed for integrated assessments, MIP teams**

   Goals: Disciplinary breakouts to discuss the need for P&D model integration with climate, crop, and economic assessments of impacts and adoption of alternative management systems and to discuss the main approaches that could be used to make advances by teams focusing on several P&D that are important internationally

   Suggested Breakouts with Suggested Leaders and Rapporteurs:

   a. Economic Modeling (Mark Rosegrant – Leader; John Antle – Rapporteur)
   b. Crop Modeling (Ken Boote – Leader; Peter Thorburn – Rapporteur)
   c. Climate (Alex Ruane – Leader; Jeff Andresen – Rapporteur)
   d. Insect Modeling (Charles Godfray – Leader; Sanford Eigenbrode – Rapporteur)
   e. Plant Disease Modeling (Karen Garrett – Leader; Mauricio Fernandez – Rapporteur)

   Questions to guide discussions in each disciplinary breakout:

   a. For what purposes should P&D models be used in assessments of impacts (e.g., considering food security climate impacts, etc.) and adaptation (i.e., including genetic resistance, crop rotation, agrochemicals, cultural practices, etc.)?
   b. What models are needed and what approaches should be considered to ensure engagement of your discipline?
   c. What are major pests and diseases that would be good candidates for model intercomparison and improvement teams to work on?
   d. How should the MIP teams be organized? Are disciplinary-oriented MIP teams needed (e.g., similar to existing crop-specific, livestock, and economic modeling teams? Should

   Outcomes from this breakout: recommended insects, diseases, and approaches for guiding new MIP teams, and the suggested roles of different disciplines

   a. Tuesday afternoon: **Building P&D MIP teams to advance the science**

   Goals: to start building specific AgMIP teams that will work toward advancing capabilities in modeling crop P&D for use in integrated assessments and adaptation research. This includes the

identification of specific insects and diseases with their associated crops and scientists from different disciplines who are working with those P&D and crops.

Breakout composition: Interdisciplinary, but with likely different members in each breakout. The composition will be determined by the choice(s) of insects or diseases to study, the crops they attack, and the approaches that they intend to use. There could also be teams that are more disciplinary oriented depending on interests and Monday breakout sessions.

Suggested Breakouts with Suggested Leaders and Rapporteurs:

a. BlightMIP: potato late blight model intercomparison and improvement project (Karen Garrett – Leader; Greg Forbes – Rapporteur)
b. Wheat disease MIP (Mauricio Fernandes – Leader; S. Asseng – Rapporteur)
c. Maize or rice or soybean insect pest MIP (Robin Taylor – Leader; Rick Hellmich – Rapporteur)
d. Economic methodology for integrating P&D MIP (Mark Rosegrant – Leader; Liz Marshall – Rapporteur)
e. Crop modeling approaches for integrating P&D information/models to estimate yield loss (Marcello Donatelli – Leader; Peter Thorburn – Rapporteur)
f. Publication planning for journal special issue
g. Other?

Number of breakouts: Depends on first breakouts, but potentially 4-6, with 10-15 participants in each, focusing on specific insects, diseases and crops, with linkages to climate and economics..

Questions to guide discussions in each breakout:

a. Who are the modelers of the target insect or disease, and what is the nature of their collaboration now, if any.
b. Who are the modelers of crops that are damaged by insects or diseases, and who might be interested in model intercomparisons of insects/diseases and damage to the crop?
c. What approach is suggested for including P&D damage to crops and yield losses in economic models and how climate affects that? Note, there may be interest in more than one aspect of the study, for example how to integrate damage simulated by insects or diseases into economic models at regional or global scales.
d. What are the recommendations to the workshop regarding formation of one or more teams based on what is learned in the breakout discussions?

Outcomes from this breakout: preliminary plans to form one or more AgMIP P&D MIP teams, with specific insect, disease, crop, economic, and climate researchers who are interested in contributing to these studies.

2. Wednesday morning: **Develop target roadmaps for AgMIP P&D MIP teams**

Goals: to develop a tentative plan of work for each AgMIP P&D model intercomparison and improvement team identified during last two days

Breakout composition: Interdisciplinary with teams ideally having insect or disease modelers, crop modelers, economic modelers and climate scientists contributing to the studies. Continuing teams from Tuesday.

Number of breakouts: Depends on recommendations from second breakouts, but potentially 4 or more, with up to 12-15 participants in each.

Suggested Breakouts with Suggested Leaders and Rapporteurs:

To be determined in prior breakout sessions.

Questions to guide discussions in each breakout:

a. What are the goals (crop, pest/disease, economics, climate) of each team?
b. Who are the co-leaders of each team?
c. What are the steps needed to implement this new activity?
d. What potential data sources can be identified for this activity?
e. What do you envision as potential funding sources for this effort?
f. What is the thinking about what is needed to form the core AgMIP effort to support this initiative?
g. What timetable do you envision and what outputs will the team aim for?

Outcomes from this breakout: Concrete plans for moving forward with several new AgMIP teams working on P&D modeling.