Setting Agenda for Pest and Disease Modeling in AgMIP
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Yield Gaps

From: M.K. van Ittersum et al.  
Field Crops Research 143 (2013) 4–17

From: D. I. Gustafson et al. (2014)  
International Journal of Agricultural Sustainability
Some Key Questions

• How much of the yield gap of crops is due to pest and disease damage?
• How does this vary over space and time for different crops?
• How can the losses to pests and diseases be avoided or reduced?
• What approaches are needed for specific regions and crops? Globally? How can we estimate benefits of different approaches (e.g., resistant varieties, crop rotations, IPM, chemicals, etc.)?
• What are expected returns on R&D investments for reducing P&D losses (public & private)
• What are the benefits regarding food security, nutrition and health?
• What are the implications on sustainability regarding water, wildlife, other natural resources?
• Many others.
This Workshop

• Agricultural System modeling is needed to help answer those questions
• The questions transcend any single discipline and are, in fact, complex including biological, physical, chemical, and social dimensions
• The questions also implicate both public and private sectors
• When AgMIP was considering this workshop, we immediately agreed that it must aim for transdisciplinary contributions
This Workshop

• Participating disciplines
  – Entomology
  – Plant pathology
  – Climate science
  – Agronomy
  – Biophysical modelers
  – Economist modelers

• Most of us are in the public sector, but several are from the private sector

• We are missing other disciplines (e.g., plant breeding, etc.), so there will be a need for others
This Workshop

• Although we know that any single workshop cannot answer all of these broad questions, we want this first AgMIP P&D workshop to lay the foundation for advancing the science toward answers and to help mobilize experts to take a giant step forward

• We were pleased at the response; most of our invitations were accepted and we had others learn about it and ask to attend

• Here, we have limited the topics to pests and diseases of crops as well as crop responses, climate interactions and socio-economic implications
This Workshop

• You will hear from each of these disciplines with their perspectives on pest and diseases modeling approaches and interactions among disciplines
• You will hear about methods used at different scales and levels of complexity
• One of our objectives this week is to develop teams and strategies for intercomparing crop insect and disease models and approaches for their use in assessing production, economic impacts and adaptation at different scales
This Workshop

• Prior to coming to this workshop, we had suggestions from several participants on forming teams to compare different models and approaches for modeling P&D and their impacts on crops
  – Blight MIIP
  – Wheat FHB Disease MIP
  – Crop Health Modeling MIP
  – Economic Modeling of P&D Impacts

• You may have other suggestions for MIPs (e.g., for maize of other major crops and their pests and diseases)