Introduction

Extreme climate events, narrowing crop diversity and transboundary crop pest and disease (P&D) outbreaks over large geographical regions are jeopardizing food security, with cascading economic, social and environmental impacts. Globally, 30-40% of crop produce is lost to pests and diseases annually, with overall losses in yield far greater in Asia and Africa. This temporal disruption of ecosystem pest and disease distribution and severity combined with the geographical synchronization of pests and beneficial insects calls for new and more urgent ways such as accelerating crop research and developing climate smart agriculture services to tackle challenges that threaten to dislocate livelihoods of farmers, the poor and vulnerable. Lack of preparedness, inadequate knowledge on pest risks and the paucity of timely crop protection advice have hampered progress in this area.

The workshop is being jointly organized by ICRISAT, India (under Department of Science & Technology- Strategic Programmes, Large Initiatives and Coordinated Action Enabler (SPLICE) and Climate Change Programme funded Center of Excellence on Climate Change Research for Plant protection and the University of Agricultural Sciences (UAS), Bengaluru (World Bank-funded ICAR-CAAST Project on Centre for Next Generation Technologies in Adaptive Agriculture). The workshop will walk the participants through climate change scenarios, population modelling, building a pest/disease model, P&D forecasting, simulation modelling, etc, providing them an opportunity to interact with resource persons to roll out the concept as independent research endeavours. This workshop for scientists and students is a mix of lectures and hands-on training specifically targeting pest and disease prediction and simulation modelling as a next generation tool for their timely management and in achieving the Sustainable Development Goals 1, 2 and 13.

Workshop content

- Climate change impacts on P&D and transboundary P&D risks
- Climate variability and climate change projections/scenarios
- Data visualization, P&D simulation and dynamics models
- Statistical and machine learning (ML) applications in P&D forecasting
- Application of APSIM crop simulation system on P&D modelling
- Exposure visits

The training specialists

- Commonwealth Scientific and Industrial Research Organisation (CSIRO), Queensland, Australia
- Council of Scientific and Industrial Research (CSIR)- Fourth Paradigm Institute (CSIR 4PI), Karnataka, India
- Acharya N G Ranga Agricultural University (ANGRAU), Andhra Pradesh, India
- Indian Agricultural Research Institute (IARI), New Delhi, India
- ICAR-Indian Institute of Horticultural Research (IICAR-IIHR), Karnataka, India
- International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, India.

Venue

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru 502 324, Telangana, India.
Workshop schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>9-10.30 hrs</th>
<th>11-12.30 hrs</th>
<th>13.30-15.00 hrs</th>
<th>15.30-16.30 hrs</th>
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<tbody>
<tr>
<td>2 Dec 2019</td>
<td>Inauguration &amp; Group photo</td>
<td><strong>Session 1</strong>: Introduction to APSIM Next Generation</td>
<td>APSIM crop simulation mode (understating the basics)</td>
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<td>3 Dec 2019</td>
<td><strong>Session 2</strong>: Introduction to population modelling</td>
<td><strong>Session 3</strong>: Building a disease model (Tutorial &amp; model design)</td>
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<td>4 Dec 2019</td>
<td><strong>Session 3 continues</strong>: Building a disease model (Tutorial &amp; model design)</td>
<td>Visit to the Center of Excellence on climate change research for plant protection</td>
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<td>5 Dec 2019</td>
<td><strong>Session 4</strong>: Hands-on training – Work on disease model (problem solving)</td>
<td>Visit to the Insect museum and insect rearing lab</td>
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<td>6 Dec 2019</td>
<td><strong>Session 4: continues</strong>: Hands-on training – Work on disease model (problem solving)</td>
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<td>9 Dec 2019</td>
<td><strong>Session 5</strong>: Climate scenarios - Global and regional climate models for climate projections</td>
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<td>10 Dec 2019</td>
<td><strong>Session 6</strong>: Introduction to CLIMEX_DYMEX modelling package</td>
<td>Visit to ICRISAT facilities</td>
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<td>11 Dec 2019</td>
<td><strong>Session 7</strong>: Introduction to mathematical and ML applications in P&amp;D forecasting</td>
<td>Visit to ICRISAT facilities</td>
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<td>12 Dec 2019</td>
<td><strong>Session 7 continues</strong>: Introduction to mathematical and ML applications in P&amp;D forecasting</td>
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<td>13 Dec 2019</td>
<td><strong>Session 8</strong>: Weather-based pest and disease forewarning models</td>
<td>Closing</td>
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Breaks: Tea/coffee - 10:30-11:00 hrs; Lunch - 12:30-13:30 hrs; Tea/coffee - 15:00-15:30 hrs

**Course takeaways**

- A fundamental knowledge of pest and disease modelling
- Conversant with various pest and disease models to guide in building population models and forecast models.
- Improved skills in next generation pest and disease modelling tools and technologies through hands on-training.
- A detailed course guide with lecture materials, tutorials, troubleshooting tips and more to help you get started right away.
Applications
Researchers and practitioners in the area of climate change and pests and diseases keen on learning more about the application of pest simulation systems in pest and disease management may apply to mamta.sharma@cgiar.org and babu_prasanna@rediffmail.com before 20 November 2019, with a copy to n.srilakshmi@cgiar.org and caastngt1d@gmail.com.

Accommodation and Logistics
Participants travel and accommodation cost will be met through the project, if applicable. Accommodation will be provided at the ICRISAT during the training period.

Organisers

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Integrated Crop Management  
Research Program - Asia, ICRISAT, Patancheru, India

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Research Program Director  
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