AgPractices & Domains

An Integrative System of Information and Modelling for Recommendations Domains of Agricultural Best Management Practices and Technologies
General principles and application of crop model for climate adaptation

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Outline

- General principles
  - Crop model and crop modelling
  - Data required for evaluation and application
- AgPractices&Domains : modelling application
  - Objectives
  - Approach
A Model is a simplified representation of a system which is composed of elements that are interrelated.

Modelling is the science of the representation of a system.

Crop modelling is the discipline of development and use of model in Crop/Ag science.

Crop Model is an application, a computer program or software compiling mathematical equations describing processes and interaction of different elements of a cropping system.
✓ Integration of available knowledge of the system: scientific theories that can be empirical and mechanistic
✓ Robust assumptions on the elements of the system considered: simple, accurate and useful
✓ Boundaries defined for domain of application

Adapted from ORYZA model representation (Bouman et al., 2001)
Principles in crop modelling: Steps for applied research

• **Model application:**
  • “All models are wrong but some are useful” George E. P. Box
  • A Model has to be only used within its domain of validity and not beyond its foundation
  • Best practices in modelling require to carry out proper and adequate Calibration and Validation protocol before the use of scenarios analysis and extrapolation.

- **Decision making in management:**
  e.g. what to grow, when to sow, what to apply when to apply ...
- **Understanding the system**
  e.g. Variability in the Environments, Varieties performance, Drivers of Yield variability
- **Prediction of near and far future change**
  e.g. Yield forecasting, Climate change

(Adapted from Jones, 1992)
Principles in crop modelling: Data process

INPUTS
- Weather
- Soil
- Variety
- Management

System
- Sub-systems

OUTPUTS
- Yield
- Productivity
- Efficiency

Soil
Crop modelling a data intensive research tool

<table>
<thead>
<tr>
<th>#</th>
<th>Data</th>
<th>Ideal data (High)</th>
<th>Adequate data (Acceptable)</th>
<th>Usable data (Uncertain)</th>
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<tbody>
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<td>Nursery density</td>
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<td>Field density</td>
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<tr>
<td>3</td>
<td>Sowing date</td>
<td>√</td>
<td>√</td>
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<td>Planting date</td>
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<td>√</td>
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<td>5</td>
<td>Daily radiation/sunshine</td>
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<td>√</td>
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<td>6</td>
<td>Maximum temperature</td>
<td>√ on-site</td>
<td>√ on-site</td>
<td>√</td>
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<td>Minimum temperature</td>
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<td>√ on-site</td>
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<td>Vapor pressure</td>
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<td>PI, FL, PM</td>
<td>FL, PM</td>
<td>PM</td>
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<td>Biomass accumulation</td>
<td>&gt;3 measurements, component</td>
<td>1 measurement, component</td>
<td>Final, total</td>
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<td>N uptake</td>
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<td>Harvest index</td>
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<td>Soil texture</td>
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<td>Fertilizer application</td>
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<td>Pest &amp; disease control</td>
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<tr>
<td>26</td>
<td>Nutrient deficiency</td>
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</table>

(Adapted from Li et al., 2015)
AgPractices&Domains a platform for researcher to access inputs/outputs for modelling as researcher tool

**INPUTS**

- Weather
- Soil
- Variety
- Management

Field trials protocol and management record

1. **Weather station located at the field station**
2. **Silo data base**
3. **Soil sampling at the field trial**
4. **Literature and expert consultation**
5. **Crop monitoring and plant sampling at the field trial**
AgPractices & Domains Objectives

- Capacity building of Agricultural researchers in the country targets in data management and use for crop modelling
- Facilitating the access of modelling data for Ag researchers
- Improving the adoption of adaptative technologies to climate variability
AgPractices&Domains a platform for researcher to access inputs/outputs for modelling as researcher tool
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**INPUTS**
- Weather
- Soil
- Variety
- Management

**OUTPUTS**
- Yield potential
- Drought Risk
- Disease risk
- Sowing date
AgPractices & Domains highlights

- Platform facilitating the use of crop modelling for agricultural research.

- Platform allowing access to outputs from crop model set within its domain of validation.

- Platform bridging practical research questions for cropping system management
  - For risk associated to climate variability including biotic and abiotic stresses
  - For site specific adaptation options with spatially explicit system evaluation
Questions?

Find out more:

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