Crop Monitoring as an E-agricultural tool in Developing Countries

DATABASES FOR PARAMETERISATION

Reference: ***E-AGRI D34.2***
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DOCUMENT CONTROL

Signatures

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Release	Date	Pages	Description	Editor(s)/Reviewer(s)
1.0	18/07/2013	9	This document refers to the measured data and metadata used for parameterization/calibration as well as the parametes for each combination BioMA corp model (wheat) × group of wheat cultivars.	Roberto Confalonieri / Qinghan Dong

DESCRIPTION

This document provides supporting information (i) for the data and metadata collected during the field experiments carried out in Morocco used to calibrate/parameterize the parameters of the BioMA models CropSyst and WOFOST, and (ii) for the xml files containing the final values of the parameters for each combination BioMA model × group of wheat cultivars.

DATA AND METADATA USED FOR MODEL PARAMETERIZATION/CALIBRATION

Reference files:

- D34.2 Data_and_Metadata_for_Calibration.xlsx

General information

Data and metadata present in the reference file contain observations collected in three experimental sites, under potential and water limited conditions. Data were collected for durum and soft wheat, and for three different varieties within each species.
The database contains all the data collected and all the related metadata that have been used to calibrate and validate the models CropSyst and WOFOST for Durum and Soft wheat (high and low potential varieties) simulations in Morocco, for potential and water limited conditions.

The data were collected by INRA.

The file is organized in four sheets:

- General information (1);
- Agromanagement (2);
- Phenology variables (3);
- Growth variables (4),

each represented by tables designed to maximize the possibility of exploring the data via pivot tables.

The General information sheet contains all the information on the experimental sites, and has seven fields:

- Location code
  - SEA
  - KHZ
  - JHS;
- Location
  - Sidi el Aydi
  - Khemis Zemamra
  - Merchouch;
- Administrative region
  - *Not available for this dataset*;

- Harvest year
  - 2012
  - 2013;
- Variable/parameter
  - Latitude (°)
  - Longitude (°)
  - Note
  - Clay (%)
  - Silt (%)
  - Sand (%)
  - Bulk density (g/cm3)
  - Water retention (0.33)
  - Water retention (1.5);
- Depth (cm)
  - 0-20
  - 20-40
  - 40-60
- Value.

The Agromanagement sheet includes details on fertilization dates, amounts, and on the fertilizer type. It is organized in six fields:

- Location code;
- Harvest year;
- Management event day of the year;
- Management event type;
- Units;
- Amount.

The Phenology variables sheet contains all the phenological observations. It is organized in seven fields:

- Location code;
- Variety;
- Species;
- Phenological stage
  - Sowing
  - Emergence
  - Tillering
  - Stem elongation
  - Flowering
  - Maturity;

- Production level;
- Harvest year;
- Day of the year.

The Growth variables sheet contains all the observations related to crop growth, i.e., biomass accumulation, partitioning of assimilates, leaf area evolution. It is organized in eight fields:

- Location code;
- Harvest year;
- Variety;
- Species;
- Production level;
- Day of the year;
- Variable
    - Plant height (cm)
    - Leaf age
    - Plant density (10^6 ha^{-1})
    - Leaf area index (m^2 m^{-2})
    - Stems dry weight (kg ha^{-1})
    - Leaves dry weight (kg ha^{-1})
    - Ears dry weight (kg ha^{-1})
    - Aboveground biomass (kg ha^{-1})
    - Seed-setting rate (%)
    - Theoretical yield (t ha^{-1});
- Value.

PARAMETES FOR EACH COMBINATION BIOMA CORP MODEL (WHEAT) × GROUP OF WHEAT CULTIVARS

The database of model parameters contains the values of all the parameters of the BioMA models CropSyst and WOFOST, as resulting from the calibration/validation activities performed within WP34 and presented in the deliverables D34.3.

Each of the three xml files contains:

- A general section on the description of the parameter set, including
  - namespace
  - name of the parameter set
  - URL for exploring the ontology on a browser
  - a brief description of the parameter set

  [example: WOFOST parameters for Durum wheat]

```
- <Description>
    <NameSpace>JRC.IPSC.MARS.Crop.CropML_WL.Parameters</NameSpace>
    <TypeName>WOFOST_WL_Parameters</TypeName>
    <URL>http://www.apesimulator.org/OntologyBrowser.aspx</URL>
    <ParameterKey>CropName</ParameterKey>
    <Description>WOFOST Parameters class for water limited
      growth</Description>
  </Description>
```

- A section with the ontology of each parameter (VarInfo), including
  - parameter name
  - parameter description
  - maximum value of the parameter
  - minimum value of the parameter
  - default value for the parameter
  - parameter type
  - parameter units
  - URL for ontology on a browser (not mandatory)

  [example: VarInfo for the WOFOST parameter DailyIncreaseTempSumFunctionOfAverageT_DTSMTB]

```
- <VarInfo name="DailyIncreaseTempSumFunctionOfAverageT_DTSMTB">
    <Description>Daily increase in temperature sum as function of average
      daily temperature (DTSMTB)</Description>
    <MaxValue>60</MaxValue>
    <MinValue>-10</MinValue>
    <DeafaultValue>0</DeafaultValue>
    <Type>double[10,2]</Type>
    <Units>°C; °C-day</Units>
    <URL>http://</URL>
  </VarInfo>
```

- A section with the values (i) of all the parameters for which VarInfo have been provided (ii) for all the groups of varieties for which a parameter set has been calibrated/validated, including:
  - the name of the parameter set
  - a description for the parameter set
  - the parameter name
  - the parameter value

  [example: values for the WOFOST parameter DailyIncreaseTempSumFunctionOfAverageT_DTSMTB]

```
- <KeyValue name="Wheat">
    <Description>e</Description>
   - <Parameter
    name="DailyIncreaseTempSumFunctionOfAverageT_DTSMTB">
      <Value Key="0">0</Value>
      <Value Key="24.5">24.5</Value>
      <Value Key="32">0</Value>
      <Value Key="0">0</Value>
      <Value Key="0">0</Value>
      <Value Key="0">0</Value>
      <Value Key="0">0</Value>
      <Value Key="0">0</Value>
      <Value Key="0">0</Value>
    </Parameter>
```

All the parameter files can be explored, edited, etc. via the application MPE (Models Parameter Editor; http://agsys.cra-cin.it/Tools/MPE/help/) (Figure 1).
MPE is a generic parameter editor, and can be used as a stand alone application or as a GUI (Graphical User's Interface) component, as in BioMA.

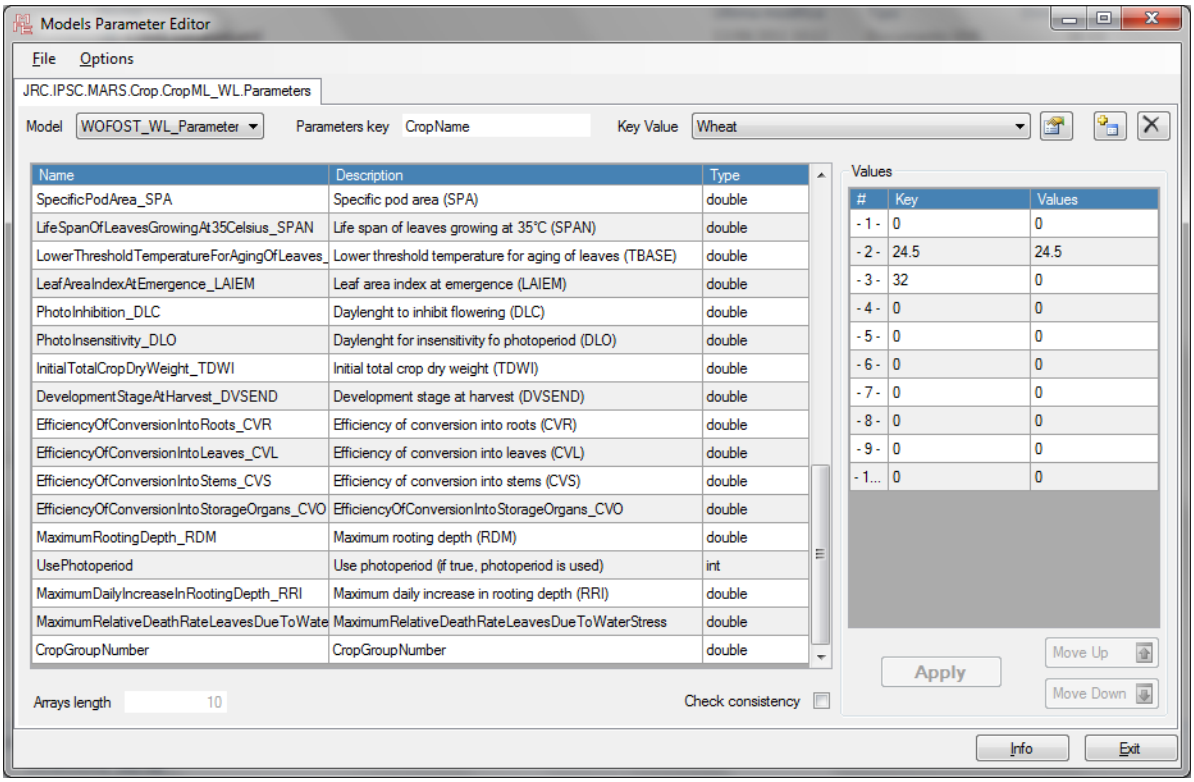

Figure 1. Graphical User's Interface of the MPE (Models Parameter Editor) application.