Parameterization

Crop parameterization

The aim of parameterization is to create a crop file based from actual measurements from experiments. Rice parameters from the crop files are modified according to the observed values from the experimental file. Crop parameterization through ORYZA v3.1 is executed in three parts – the DRATES, PARAM, and Auto-calibration.

Preparation of parameterization control file

Prepare the crop, experiment and weather files as described in the steps earlier. Refer to Appendix 7 of Training Handouts for the templates of the input files needed for 'drate1.exe' and 'PARAM.EXE'.

a. Open the template file 'param.in', which is similar to the control file.
b. Modify input and output folder file path and names accordingly.
c. Save it to the folder with the correct file name and file path in the first line of PARAM.IN.

Note: *Make sure that the identifying line, at the first column and first line of the file, is in the proper format:*

***PARAMFILE =**<*file path/ parameterization control file name*>

DRATES: Determination of phenology development rates

The application, 'drate1.exe', is used to determine the phenology development rate of a given variety.

Prerequisites:

a. Supply correct phenological stages in section 8 of experimental file
   i. Julian day and year of transplanting (if transplanted)
   ii. Julian day and year of panicle initiation
   iii. Julian day and year of flowering
   iv. Julian day and year of physiological maturity
b. Standard (or template) crop file
c. Weather file/s

Steps:

a. Make sure to include a copy of the application, 'drate1.exe', to the folder with parameterization control file.
b. Double click the application.
c. Type in the file name of parameterization control file when the DOS prompt appears.
d. Open the drate.out.
e. Use the values of DVRI, DVRI, DVRP, and DVRR from drate.out for the crop file that you are calibrating.

Determination of other crop parameters through PARAM

The application, 'PARAM.EXE', is used to estimate crop parameters such as, assimilate partitioning, specific leaf area, non-structure C&N translocation, etc. Running PARAM.EXE creates "start values" for certain variables in the crop file that needs to be calibrated based on the measured/observed experimental values (i.e. LAI_OBS, WLVG_OBS, WLVS_OBS, WST_OBS, WSO_OBS, WAGT_OBS, NFLV_OBS, FNLV_OBS).

Prerequisites:

a. The sequential observations in section 8 of the experimental file (see Appendix 1 in Training Handouts):
   i) Total above-ground biomass,
   ii) Green and dead leaf biomass,
   iii) Stem biomass,
   iv) Panicle biomass,
   v) Leaf area index, and
   vi) Leaf nitrogen content (if applicable)
b. The measurements for partitioned biomass must be on the same observation dates
c. The same order of observations must be followed.

Steps:

a. Verify that 'PARAM.EXE' is in the folder that contains the parameterization control file (Param.in),
b. Double click the application. A DOS window will appear that would indicate that the application was executed. An output file called "param.out" will be created from this process.
c. Open the output file (param.out). The "param.out" contains some parameters in the crop file whose values were calculated based from the observed values in the experimental file. Commonly, the parameters that can be extracted from param.out are SLATB, the partitioning tables (FLV, FST, FSO) with their corresponding development rates (in crop file, these are FLVTB, FSTTB, and FSOTB), DRLV (DRLVT in crop file), and FSTR, among others.
d. Copy the values of variables listed in the output file into crop file.

Note 1: *For partition parameters, the negative value should be changed to 0.0, and value larger than 1.00 should be changed to 1.0.*

Note 2: *For table variables with DVS for first column, the first row for DVS is 0.0 and last row for DVS is 2.5 should be added as needed.*

Auto-Calibration

This is an iterative process wherein identified parameters in the crop file, driven by the observed measurements in the experimental file, are modified and a new crop file is automatically created.

Prerequisites:

a. Parameterized crop file
b. Experimental file
c. Parameterized soil file (needed for water and/or nitrogen limited conditions)
d. Weather
e. Rerun file (needed for multiple treatments and/or multiple environments)

Steps

a. Open the auto-calibration control file template (CALIBRIN.dat).
b. Modify the input and output folder path and file names accordingly.
c. With reference to the crop file, specify single value (CROPSVN) and table value (CROPTVN) parameters that you need to calibrate. You can begin with the parameters from the PARAM.OUT.
d. The change of values of the identified crop parameters will be computed based on the fractional change set by the user in Section 3 and 4 of CALIBRIN.DAT.
e. Select the preferred method to use for critical value limits and set their values accordingly. Critical value determines the confidence level of your calibration based on the difference of the measured and simulated results of the LAI and biomass partitioning. It can be set either by RMSEn or Modeling Efficiency.
f. Save it to target folder with the file name set by the user.
g. Double click the AutoCalibration application (AutoCalibration(V2).exe).
h. Select the autocalibration control file.
i. Wait for results.

***Notes*:**

a. The variable 'INRERUNS' must set to 0 for calibration with single treatment and environment.
b. You will know that the autocalibration is finished when you see 'OUTCROP' and/or 'OUTSOIL' in the folder where calibration was performed.
c. If there is a suffix 'X' in the output file/s generated, the calibration process produced the best calibrated parameter set possible after reaching the maximum number of iterations; the output does not necessarily meet all required criteria.
d. If there is a suffix 'B' in the output file/s generated, the calibration process produced the best calibrated parameter set possible which cannot be improved further with additional iterations; the output does not necessarily meet all required criteria.