

Chapter 2: Step by step procedure for the preparation of WeRise predictions

This chapter navigates you for operating WeRise through stepwise procedure for the preparation of various data (Fig 3). Prior to proceed for WeRise operation, users are required to obtain ORYZA v3 through accessing <http://sites.google.com/a/irri.org/oryza2000/downloads>. (browsed on November 11, 2020).

1. Weather data file

- 1) Obtain weather data from the local station.
- 2) Check all units of parameters in raw data, Solar Radiation should be in KJ/m². If the data for solar radiation expressed in sunshine hours, then the appropriate values of the Ångström parameters should be given, so that the weather system of ORYZA could translate these into the correct data (Table 2).
- 3) Open Weather_quality_template and copy raw data in designated columns for each parameter (Fig 4).
- 4) Check the quality of obtained local weather data.

Date	stat	year	Source	FSE	Day	radiation	min	max	vapor	mean win	precipitation	Tcheck	min	max	RH	rad	precipitat	mean wind	speed
						kJ/m ²	°C	°C	kPa	m/s	mm/d		°C	°C	%	MJ/m ²	mm/d	m/s	
1-Jan-16	99	2016	1	18890	25.4	32.6	3.24	8.0	11.6	7.2	25.4	32.6	62.0	18.9	11.6	8.0			
2-Jan-16	99	2016	2	14860	25.0	32.3	3.17	8.0	0.0	7.3	25.0	32.3	61.5	14.9	0.0	8.0			
3-Jan-16	99	2016	3	21520	25.3	33.9	3.22	7.0	0.0	8.6	25.3	33.9	57.0	21.5	0.0	7.0			
4-Jan-16	99	2016	4	12230	25.7	31.9	3.30	4.0	6.8	6.2	25.7	31.9	59.0	12.2	6.8	4.0			
5-Jan-16	99	2016	5	14410	26.0	31.9	3.36	6.0	1.6	5.8	26.0	31.9	62.5	14.4	1.6	6.0			
6-Jan-16	99	2016	6	21230	24.8	33.6	3.13	6.0	0.0	8.8	24.8	33.6	57.5	21.2	0.0	6.0			
7-Jan-16	99	2016	7	23860	25.2	34.0	3.21	7.0	0.2	8.8	25.2	34.0	56.5	23.9	0.2	7.0			
8-Jan-16	99	2016	8	24390	25.1	33.3	3.19	6.0	0.2	8.2	25.1	33.3	57.0	24.4	0.2	6.0			
9-Jan-16	99	2016	9	18940	26.6	32.9	3.48	6.0	0.0	6.3	26.6	32.9	57.5	18.9	0.0	6.0			
10-Jan-16	99	2016	10	19150	25.5	33.7	3.26	6.0	0.0	8.2	25.5	33.7	57.5	19.2	0.0	6.0			
11-Jan-16	99	2016	11	19780	25.3	33.1	3.22	5.0	0.0	7.8	25.3	33.1	57.0	19.8	0.0	5.0			
12-Jan-16	99	2016	12	10710	25.4	31.2	3.24	6.0	6.6	5.8	25.4	31.2	64.0	10.7	6.6	6.0			
13-Jan-16	99	2016	13	20130	25.0	33.0	3.17	9.0	21.4	8.0	25.0	33.0	63.0	20.1	21.4	9.0			
14-Jan-16	99	2016	14	18410	24.8	33.4	3.13	6.0	7.6	8.6	24.8	33.4	59.5	18.4	7.6	6.0			
15-Jan-16	99	2016	15	12390	24.2	32.4	3.02	10.0	27.8	8.2	24.2	32.4	63.0	12.4	27.8	10.0			
16-Jan-16	99	2016	16	20390	25.1	33.8	3.19	5.0	0.0	8.7	25.1	33.8	58.5	20.2	0.0	5.0			
17-Jan-16	99	2016	17	20390	25.1	33.8	3.19	5.0	0.0	8.7	25.1	33.8	58.5	20.2	0.0	5.0			
18-Jan-16	99	2016	18	20390	25.1	33.8	3.19	5.0	0.0	8.7	25.1	33.8	58.5	20.2	0.0	5.0			
19-Jan-16	99	2016	19	20390	25.1	33.8	3.19	5.0	0.0	8.7	25.1	33.8	58.5	20.2	0.0	5.0			
20-Jan-16	99	2016	20	20390	25.1	33.8	3.19	5.0	0.0	8.7	25.1	33.8	58.5	20.2	0.0	5.0			
21-Jan-16	99	2016	21	20390	25.1	33.8	3.19	5.0	0.0	8.7	25.1	33.8	58.5	20.2	0.0	5.0			
22-Jan-16	99	2016	22	20390	25.1	33.8	3.19	5.0	0.0	8.7	25.1	33.8	58.5	20.2	0.0	5.0			
23-Jan-16	99	2016	23	20390	25.1	33.8	3.19	5.0	0.0	8.7	25.1	33.8	58.5	20.2	0.0	5.0			
24-Jan-16	99	2016	24	20390	25.1	33.8	3.19	5.0	0.0	8.7	25.1	33.8	58.5	20.2	0.0	5.0			
25-Jan-16	99	2016	25	9230	23.5	29.6	2.90	8.0	0.0	6.1	23.5	29.6	67.5	9.2	0.0	8.0			
26-Jan-16	99	2016	26	16170	24.6	31.6	3.09	5.0	0.0	7.0	24.6	31.6	64.0	16.2	0.0	5.0			
27-Jan-16	99	2016	27	16600	25.5	31.4	3.26	7.0	0.8	5.9	25.5	31.4	66.5	16.6	0.8	7.0			
28-Jan-16	99	2016	28	15650	25.2	30.9	3.21	6.0	0.2	5.7	25.2	30.9	65.5	15.7	0.2	6.0			
29-Jan-16	99	2016	29	22700	25.6	32.9	3.28	8.0	3.2	7.3	25.6	32.9	61.5	22.7	3.2	8.0			
30-Jan-16	99	2016	30	12520	25.7	30.5	3.30	8.0	0.0	4.8	25.7	30.5	65.5	12.5	0.0	8.0			
31-Jan-16	99	2016	31	8940	25.7	30.5	3.30	7.0	8.8	4.8	25.7	30.5	66.5	8.9	8.8	7.0			
1-Feb-16	99	2016	32	12700	24.2	31.1	3.02	12.0	21.2	6.9	24.2	31.1	67.0	12.7	21.2	12.0			
2-Feb-16	99	2016	33	6400	24.3	27.9	3.04	8.0	11.0	3.6	24.3	27.9	71.0	6.4	11.0	8.0			
3-Feb-16	99	2016	34	14860	24.5	31.8	3.07	6.0	0.2	7.3	24.5	31.8	62.5	14.9	0.2	6.0			
4-Feb-16	99	2016	35	11550	25.4	31.9	3.24	9.0	5.6	6.5	25.4	31.9	67.5	11.6	5.6	9.0			
5-Feb-16	99	2016	36	12830	25.2	31.7	3.21	7.0	2.6	6.5	25.2	31.7	67.0	12.8	2.6	7.0			
6-Feb-16	99	2016	37	16110	24.1	31.7	3.00	6.0	11.8	7.6	24.1	31.7	67.5	16.1	11.8	6.0			
7-Feb-16	99	2016	38	18420	24.6	30.6	3.08	10.0	13.4	6.0	24.6	30.6	70.0	18.4	13.4	10.0			

Fig 4. Weather_quality_template

Table 2. Indicative values for the empirical constants a and b in the Ångström formula, for broad ecological regions used by the Food and Agriculture Organization (FAO 1979).

<u>Zones</u>	<u>aA</u>	<u>bA</u>
Cold temperature	0.18	0.55
Dry tropical	0.25	0.45
Humid tropical	0.29	0.45

Source: Frère M, Popov GF. 1979. Agrometeorological crop monitoring and forecasting. Plant Production Protection Paper 17. Rome: Food and Agricultural Organization, 64 pp.

- 5) Save the file as Weather_1_country_station_year (for example, Weather_1_PH_Price_2019.xlsx).
- 6) Open prn_convert_template.xlsm.

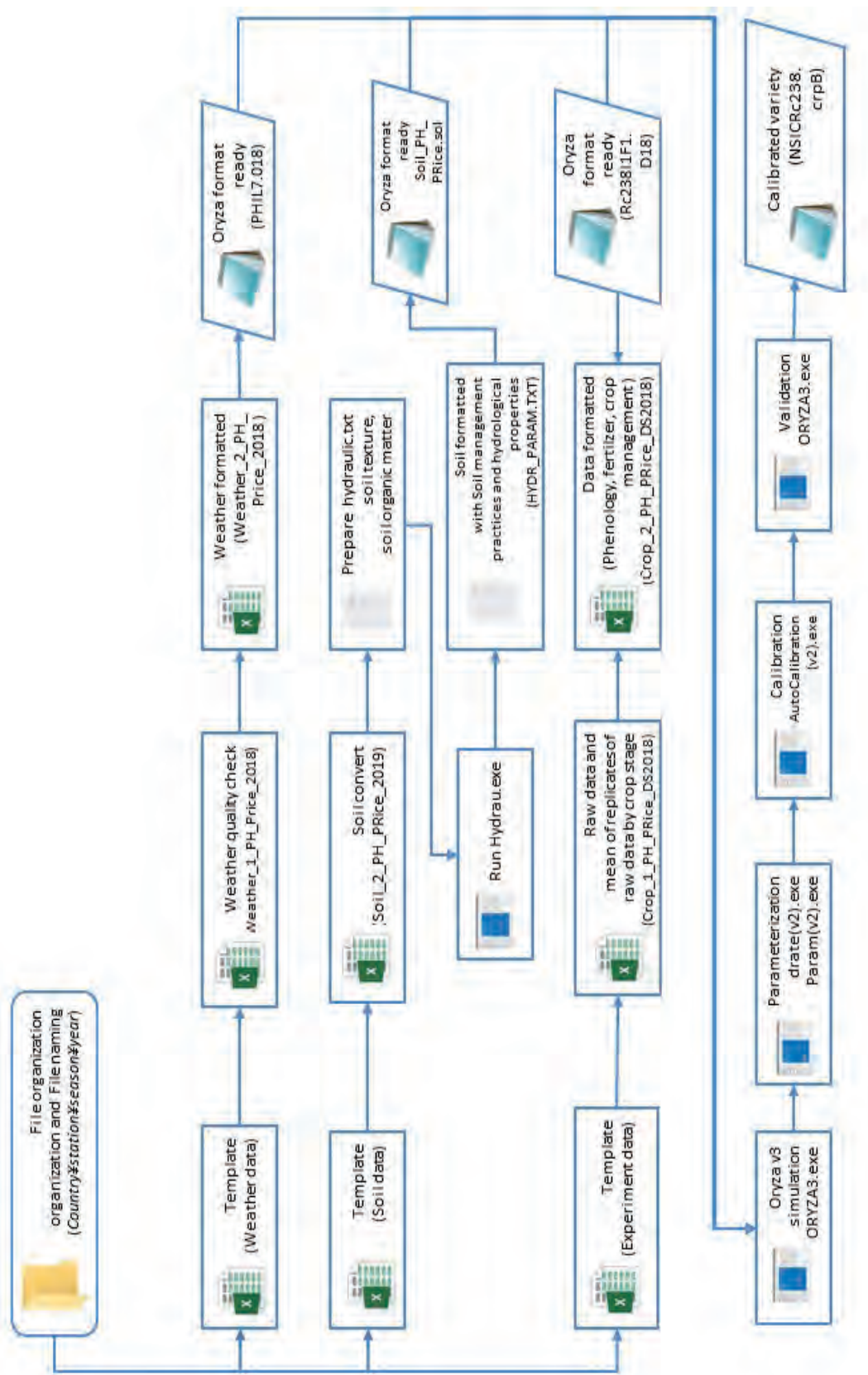


Fig 3. Flowchart of stepwise data preparation

8) Copy raw data (cell range [A10:I375]) from Weather_1_PH_Price_2019.xlsx

	A	B	C	D	E	F	G	H	I	J
1	stat	year	Source	FSE (new)	NOTE: -99 or (99)= MISSING DATA					
2			Day	radiation	min	max	vapor	mean win	precipitation	
3					temperat	temperat	pressure	speed		
4				hr	°C	°C	kPa	m/s	mm/d	
5										
6			min	0.0	16.0	23.6	1.82	1.0	0.0	
7			max	11.9	26.2	37.7	3.40	18.0	215.9	
8			avera	7.5	22.9	31.9	2.80	2.7	2406.5	
9										
10	5	2015	1	4.7	21.7	27.8	2.60	5.0	0.0	
11	5	2015	2	9.6	21.1	27.5	2.50	6.0	0.0	
12	5	2015	3	10.1	21.5	28.5	2.56	4.0	0.0	
13	5	2015	4	10.1	21.8	30.0	2.61	4.0	0.0	
14	5	2015	5	10.2	21.5	30.8	2.56	5.0	0.0	
15	5	2015	6	10.0	21.8	31.0	2.61	4.0	0.0	
16	5	2015	7	4.2	21.7	30.0	2.60	3.0	0.0	
17	5	2015	8	8.1	21.2	28.3	2.52	2.0	0.0	
18	5	2015	9	10.0	21.1	28.0	2.50	4.0	0.0	
19	5	2015	10	9.8	20.0	27.8	2.34	5.0	0.0	
20	5	2015	11	10.0	20.3	28.5	2.38	4.0	0.0	
21	5	2015	12	9.9	21.4	28.7	2.55	4.0	0.0	
22	5	2015	13	8.9	21.5	28.8	2.56	5.0	0.0	
23	5	2015	14	8.1	21.0	30.8	2.49	4.0	0.0	
24	5	2015	15	9.4	22.0	32.0	2.64	3.0	0.0	
25	5	2015	16	9.6	21.9	28.8	2.63	3.0	0.0	
26	5	2015	17	2.1	20.2	28.3	2.37	4.0	0.0	
27	5	2015	18	0.0	19.3	26.0	2.24	4.0	14.4	
28	5	2015	19	4.1	21.8	28.3	2.61	2.0	0.0	
29	5	2015	20	7.3	22.4	30.5	2.71	2.0	0.0	
30	5	2015	21	7.1	21.6	30.4	2.58	2.0	0.0	
31	5	2015	22	9.0	21.8	29.7	2.61	2.0	0.0	
32	5	2015	23	5.6	20.6	27.0	2.43	5.0	0.0	

Copy data range
[A10:I374 and 375 if
leap year].

Fig 7. Excel sheet in Weather_1_PH_2019.xlsx

9) Click on “Paste new data” button.

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Instruction:

1. Click on “Clear previous data”. Data on cell range (A11:I375) will be cleared.
2. Copy raw data from source XLS file.
3. Click on “Paste new data” button. The new range is now in place.
4. Paste to the destination PRN file.

Data will be automatically be formatted

Fig 8. prn_convert_template after “Paste new data”.

- 10) Click on “Copy formatted data” button.
- 11) Open PRN template file from subfolder year.
- 12) Paste to the destination PRN file. Solar radiation is expressed as sunshine duration in this example.
- 13) Save as file with filename format as Country.station code.year (for example PHIL5.015)

```

1 *****
2 * Station Name: CLSU, Philippines
3 * Year       : 2015
4 * Authors    : IRRI-Japan Project
5 *
6 * Source(s)  : PAGASA
7 *
8 * Comments   : Vapor pressure was estimated using minimum temperature;
9 *              -99 = missing data
10 *
11 * Longitude: 120.90000  Latitude: 15.70000  Altitude: 76.00
12 *
13 * Column    Daily Value
14 * 1         Station number
15 * 2         Year
16 * 3         Day
17 * 4         irradiance             hr
18 * 5         minimum temperature    °C
19 * 6         maximum temperature    °C
20 * 7         vapor pressure          kPa
21 * 8         mean wind speed         m/s
22 * 9         precipitation            mm/d
23 *****
24 120.90000 15.70000 76.00 0.29 0.42
25

```

Paste data in the highlighted area, rename the file and save file as PHIL5.015

Fig 9. Sample of PRN template file.

2. Soil data file

- 1) Obtain soil data from the lab analysis.
- 2) Compile soil data in RAW DATA in soil_convert_template.xlsx.

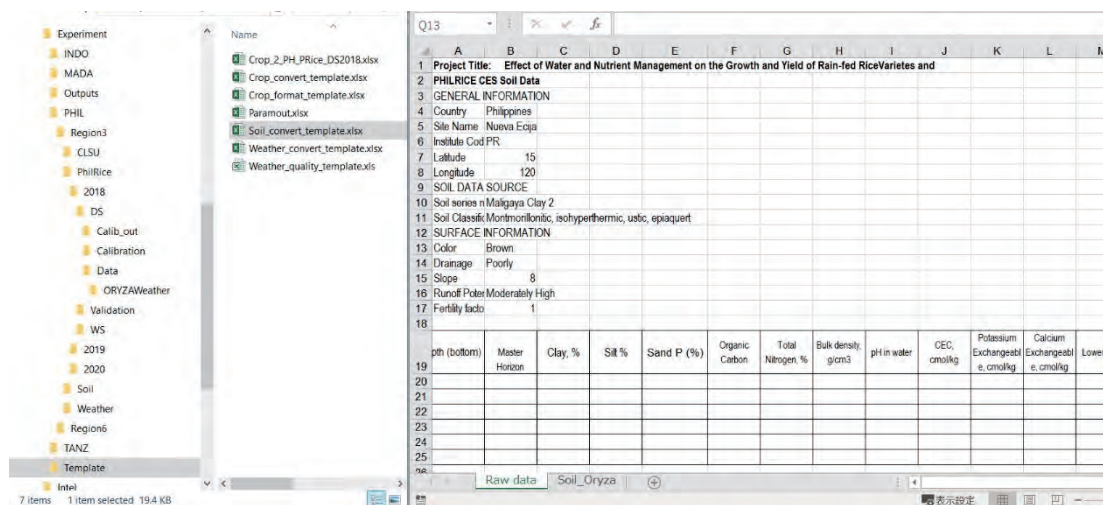


Fig 10. Soil_convert_template

- 3) Soil data in Soil_ORYZA will be automatically filled up as soon as raw data is inputted.
- 4) Soil information for ORYZA will be formatted in Soil_Oryza tab.

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
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37																		
38																		
39																		
40																		
41																		
42																		
43																		

Layer upper (m)	Layer Bottom (m)	Clay (%)	Sand (%)	SOM (%)	Organic C	Total Nitrogen n (%)	BD (g/cm3)
1 0.00	0.18	75.2	5.4	2.8	1.52	0.11	1.31
2 0.18	0.27	80.3	4.7	1.3	0.73	0.04	1.25
3 0.27	0.53	78.8	4.5	0.8	0.48	0.03	1.29
4 0.53	0.94	78.4	4.1	0.7	0.43	0.04	1.30
5 0.94	1.22	78.4	0.2	0.6	0.48	0.05	1.30
6 1.22	1.50	71.0	5.5	0.7	0.43	0.03	1.36

TKL	Clay	Sand	SOM	SOC	SON	BD	WCST	WCFC	WCWP	WCAD	KST	A	B	PWOERN	VGA	VGN	VGL
1 0.18	0.752	0.064	0.02014	3584160.00	259380.00	1.31											
2 0.08	0.803	0.047	0.01255	821250.00	45000.00	1.25											
3 0.26	0.788	0.048	0.00826	1608920.00	100620.00	1.29											
4 0.41	0.784	0.041	0.00740	2281800.00	219300.00	1.30											
5 0.20	0.784	0.002	0.00826	1747200.00	108200.00	1.30											
6 0.20	0.710	0.065	0.00740	1637440.00	114240.00	1.36											

Oryza Format	
NL	0
TKL	0.18 0.09 0.26 0.41 0.28 0.28
CLAYX	0.752 0.803 0.788 0.784 0.784 0.710
SANDX	0.064 0.047 0.048 0.041 0.002 0.065
SOM	0.02014 0.01255 0.00826 0.00740 0.00826 0.00740
SOC	3584160 259380 821250 1608920 2281800 1747200
SON	259380 45000 100620 219300 108200 114240
BD	1.31 1.25 1.29 1.30 1.30 1.36
WCST	0.000 0.000 0.000 0.000 0.000 0.000
WCFC	0.000 0.000 0.000 0.000 0.000 0.000
WCWP	0.000 0.000 0.000 0.000 0.000 0.000
WCAD	0.000 0.000 0.000 0.000 0.000 0.000
KST	0.000 0.000 0.000 0.000 0.000 0.000
A	0.000 0.000 0.000 0.000 0.000 0.000
B	0.000 0.000 0.000 0.000 0.000 0.000
PWOERN	0.000 0.000 0.000 0.000 0.000 0.000
VGA	0.00 0.00 0.00 0.00 0.00 0.00
VGN	0.00 0.00 0.00 0.00 0.00 0.00
VGM	0.000 0.000 0.000 0.000 0.000 0.000
VGL	0.00 0.00 0.00 0.00 0.00 0.00

* for each soil layer (m3 m-3) USE ALWAYS FIELD CAPACITY OR 0.5 TIMES WCST
VGL

Fig 11. Soil data in Soil_ORYZA tab

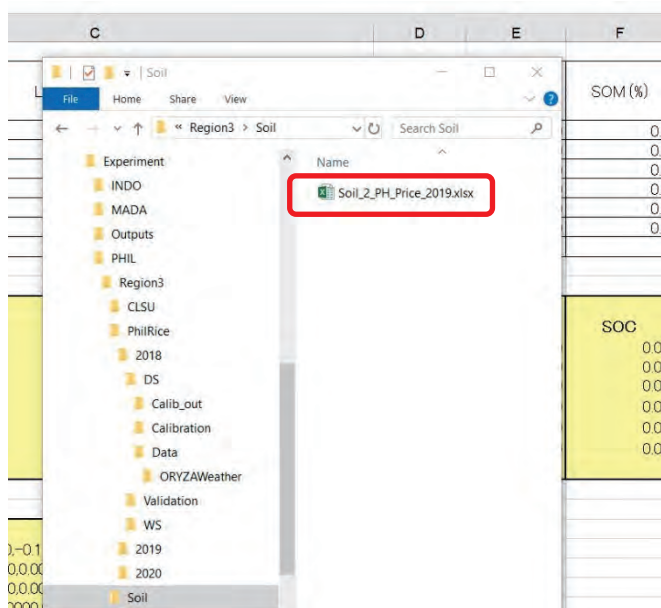


Fig 12. File in Soil folder

- 5) Save the file in **Soil folder (Experiment\PHL\Region 3)** as Soil_country_2_station_year (for ex, Soil_2_PH_Price_2019).
- 6) Open hydraulic.txt.
- 7) Go to previous file (for ex, Soil_2_PH_Price_2019) and copy NL, clay, sand content, SOM from ORYZA format table in Soil_Oryza tab (in Soil_2_PH_Price_2019).

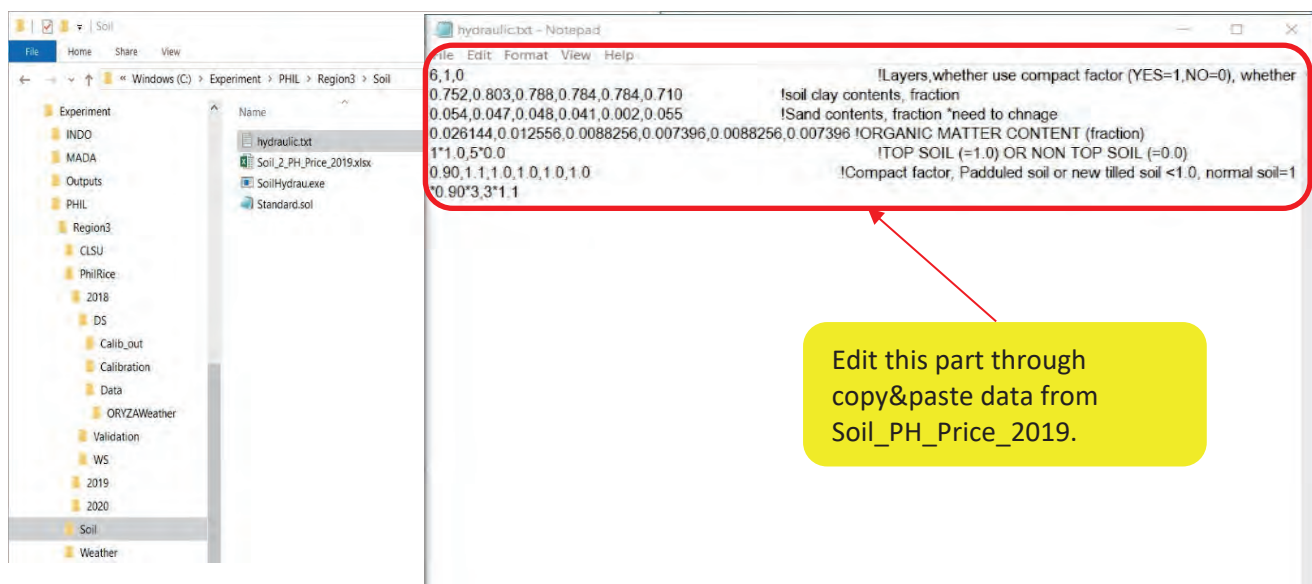


Fig 13. Location of hydraulic.txt file and what to edit in hydraulic.txt

- 8) Save the file as hydraulic_country_station.txt name (for example, hydraulic_PH_Price.txt) in Soil folder.

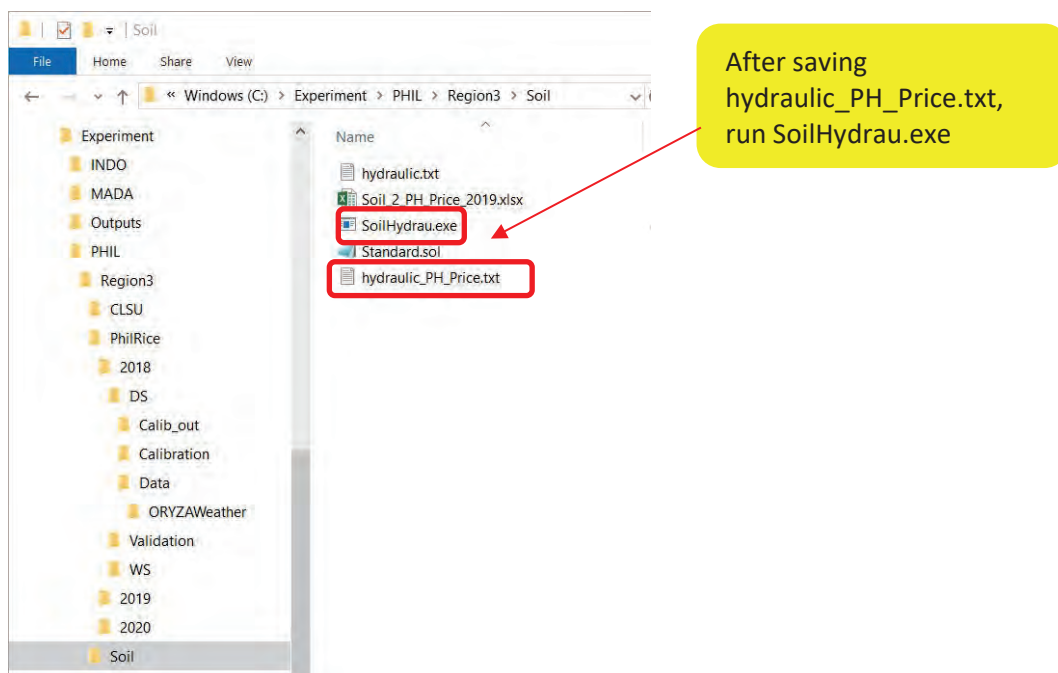


Fig 14. After editing hydraulic.txt, save the file in Soil folder.

9) Run SoilHydrau.exe (Please see Fig 3. in p12)

10) Choose the file we just created (for example, hydraulic_PH_Price.txt) and let SoilHydrau.exe simulates.

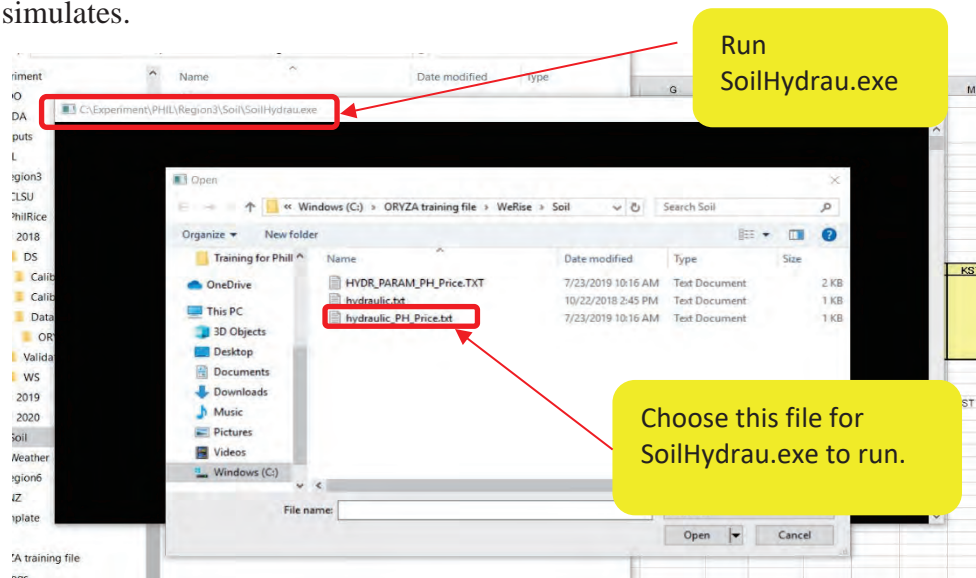


Fig 15. How to run SoilHydrau.exe

11) Go to the Soil folder, rename output as HYDR_PARAM_country_station_soil.txt (for example, HYDR_PARAM_PH_Price.txt).

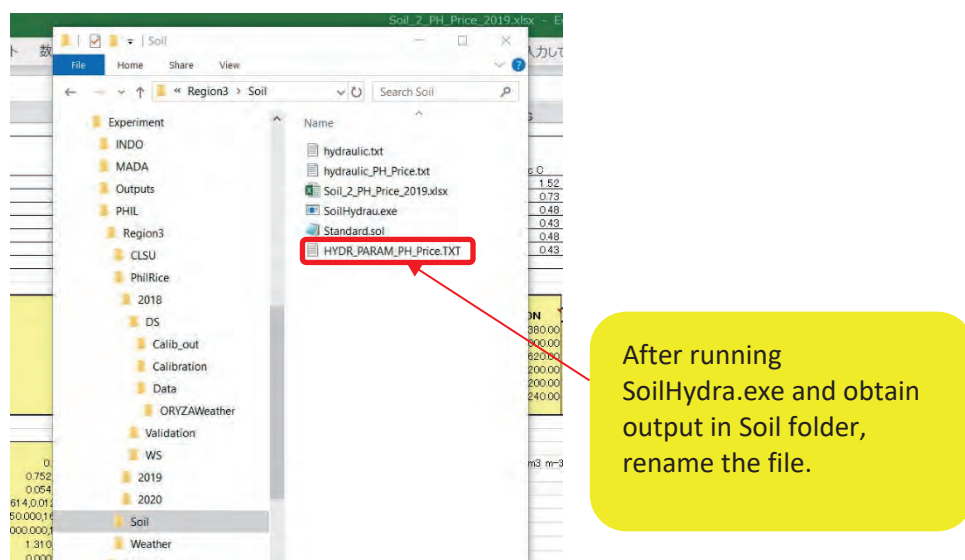


Fig 16. Output of SoilHydrau.exe in Soil folder

12) Open created output files (for example, HYDR_PARAM_PH_Price.txt and Soil_2_PH_Price_2019), copy all variables from HYDR_PARAM_PH_Price.txt to Output from SoilHydrau.exe table in Soil_2_PH_Price_2019.

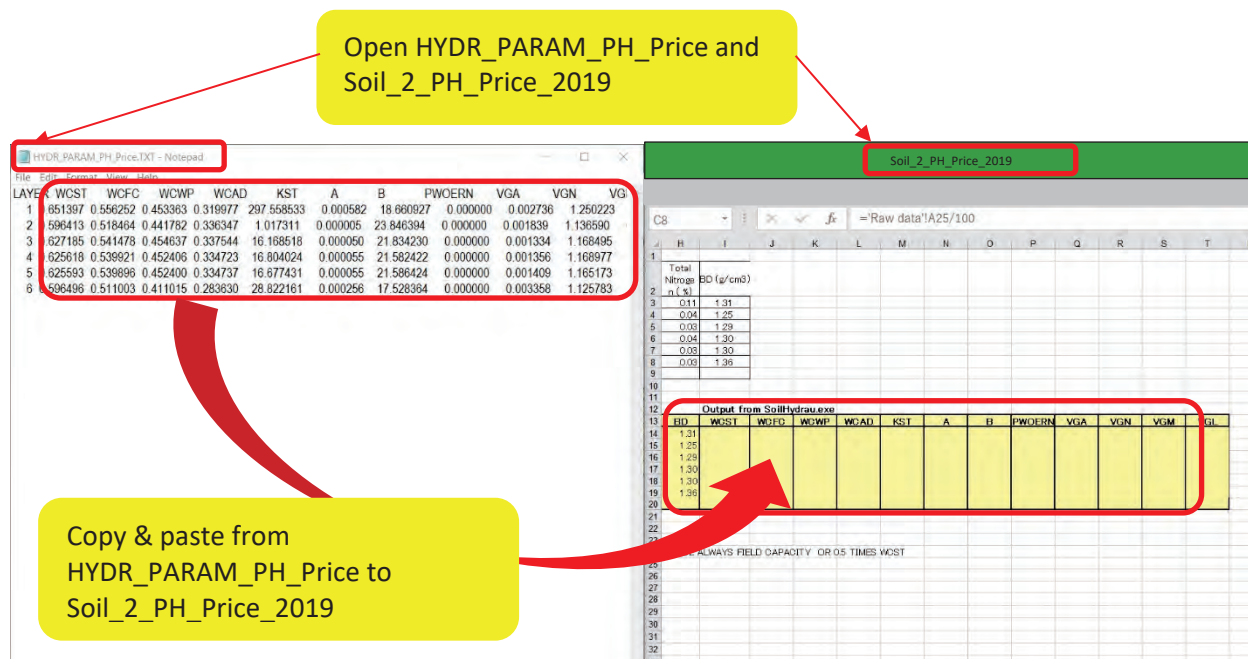


Fig 17. HYDR_PARAM_PH Price.txt (left) and Soil_2_PH_Price_2019 (right)

TIPS: Data in HYDR_PARAM_PH is text format and data for each parameter can't be copied directly in the designated column in excel. Use the convert **Text to Column** wizard to split the text into multiple columns. More details are as follow:

Put cursor at I14 and paste data.

(2) (3)

(1) (4) (5)

(6) & (7) Click Next

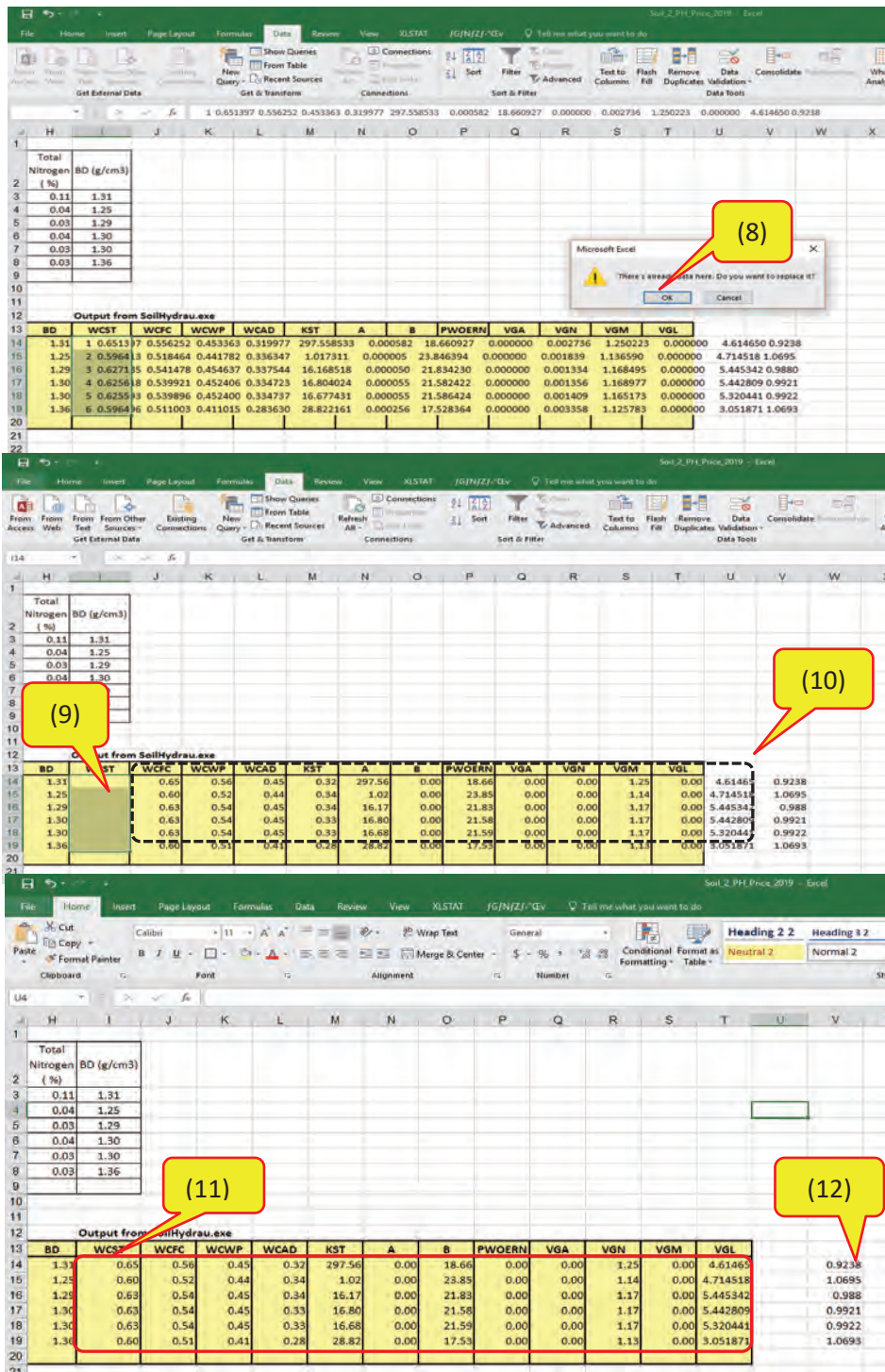
(6) (7)

Output from Solihydra.exe

BD	WCST	WCPC	WCWP	WCAD	KST	A	B	PWOERN	VSA	VGN	VGM	VOL
1.31	1.051197	0.556252	0.453363	0.319977	297.558533	0.000582	18.660927	0.000000	0.002736	1.250223	0.000000	4.614650
1.25	0.596418	0.518464	0.441782	0.336347	1.017311	0.000005	23.846394	0.000000	0.001839	1.136590	0.000000	4.714518
1.29	0.627135	0.541478	0.454637	0.337544	16.168518	0.000050	21.834230	0.000000	0.001334	1.168495	0.000000	5.445342
1.30	0.625618	0.539921	0.452406	0.334723	16.804024	0.000055	21.582422	0.000000	0.001356	1.168977	0.000000	5.442809
1.30	0.625593	0.539896	0.452400	0.334737	16.677431	0.000055	21.586424	0.000000	0.001409	1.165173	0.000000	5.320441
1.36	0.596496	0.511003	0.411015	0.283630	28.822161	0.000256	17.528364	0.000000	0.003358	1.125783	0.000000	3.051871

Fig 18. Step by step for convert text to column

- 13) After pasting data from HYDR_PARAM_PH_Price to Soil_2_PH_Price_2019, highlight I14-I19
- 14) Then open Data in Menu bar and then choose Text to Column icon.
- 15) In Convert Text to Columns Wizard-Step1 of 3, please choose Fixed width and then click Next>.
- 16) In Convert Text to Columns Wizard-Step 2 of 3, please click Next>.
- 17) In Convert Text to Columns Wizard-Step 3 of 3, please click Finish to complete the procedure.



(8) Click OK.

(9) Erase the content from I14-I19.

(10) Drag cursor from J14 to U19 and cut selected area.

(11) Paste cut area to new area of I14 to T19.
(12) is computed Bulk Density that can be copied and paste to H14-H19 if actual data is not available.

Fig 19. Step by step for convert text to column (Continued)

18) Check ORYZA format table in Soil_Oryza tab.

19) Save the file in Soil folder.

20) Open "Standard.sol".

21) Copy parameters in ORYZA format table to standard.sol by following steps:

```
standard.sol - Notepad
File Edit Format View Help
*****
* Data Source : Maligaya Clay 2
* File name   : Munoz.sol
* Soil        : PhilRice, Nueva Ecija
*              (Montmorillonitic, isohyperthermic, ustic, epiaquect)
* Experiment  : Effect of water and nutrient management on
*              the growth of yield of rainfed varieties.
*              Data was given by Juvy Jane Aungon/PhilRice:
*              Filename: PhilRice CES Soil Data.xlsx
*****
```

```
* Give code name of soil data file to match the water balance PADDY:
SCODE = 'PADDY'
```

```
* 1. Various soil and management parameters
```

```
WLOMX = 100. ! Bund height (mm)
NL = 6      ! Number of soil layers (maximum is 10) (-)
TKL = 0.18,0.09,0.26,0.41,0.28,0.28 ! Thickness of each soil layer (m)
ZRTMS = 1.0 ! Maximum rooting depth in the soil (m)
```

```
* 2. Puddling switch: 1=PUDDLED or 0=NON PUDDLED
```

```
SWITPD = 0 ! Non puddled
SWITPD = 1 ! Puddled
```

```
* If PUDDLED, supply parameters for puddled soil
NLPUD = 3 ! Number of puddled soil layers, including the plow sole (-)
! (NLPUD cannot exceed the total number of soil layers NL)
```

```
* Saturated volumetric water content of ripened (previously puddled)
* soil (m3 m-3), for each soil layer:
* WCSTRP = 3*0.52, 3*0.55, 3*0.61, 0.64
WCSTRP = 0.651,0.596,0.627,0.626,0.626,0.596
```

```
* Soil water tension of puddled soil layer at which cracks reach
* break through the plow sole (pF):
PFCR = 6.0
```

```
DPLOWPAN = 0.3 !* The depth of plow pan (m); if it does not appear, it is:
!* if SWITPN = 1, DPLOWPAN = sum(TKL(1:NPLUD))
!* if SWITPN = 0, DPLOWPAN = sum(TKL(1:NL))
```

The information in the box should be edited to describe basic information for the soil used in ORYZA. In case more comments are available, insert a comment with an asterisk.

(1) If actual data is available, this should be edited. Period (.) after the value shouldn't be forgotten/erased.

(2) Copy&paste from ORYZA format in Soil_Oryza tab

(3) Copy&paste from ORYZA format in Soil_Oryza tab. In between values, comma without space should be put (If a space is put after the comma, that causes an error).

(4) Default value.

(5) Choose 1 for transplanting, 2 for direct

(6) Default value.

(7) Copy WCSTRP (WCST) from

(8) & (9) Default value.

```

*-----*
* 3. Groundwater switch: 0=DEEP (i.e., not in profile), 1=DATA
* (supplied), 2=CALCULATE
*-----*

```

(10)

```

*SWITGW = 0 ! Deep groundwater
*SWITGW = 2 ! Calculate groundwater
*SWITGW = 1 ! Groundwater data

```

(11)

```

* If DATA, supply table of groundwater table depth (cm; Y-value)
* as function of calendar day (d; X value):
ZWTB = 1.,200.,
      366.,200.

```

(12)

```

* If CALCULATE, supply the following parameters:
ZWTBI = 200. ! Initial groundwater table depth (cm)
MINGW = 200. ! Minimum groundwater table depth (cm)
MAXGW = 200. ! Maximum groundwater table depth (cm)
ZWA = 1.0 ! Receding rate of groundwater with no recharge (cm d-1)
ZWB = 0.5 ! Sensitivity factor of groundwater recharge (-)

```

(13)

```

*-----*
* 4. Percolation switch
* Value for SWITVP cannot be 1 (CALCULATE) for non-puddled soil
*-----*
SWITVP = -1 ! Fixed percolation rate
*SWITVP = 0 ! Percolation as function of the groundwater depth
*SWITVP = 1 ! Calculate percolation
*SWITVP = 2 ! Fixed percolation rate as function of time

* If SWITVP = -1, supply fixed percolation rate (mm d-1):
FIXPERC = 0.0

* If SWITVP = 0, supply table of percolation rate (mm d-1; Y-value)
* as function of water table depth (cm; X value):
*PERTB = 0., 3.,
*       200., 3.

* If SWITVP = 2, give percolation rate (mm/d) as function of calendar day
PTABLE =
1., 1.0, ! First number is calendar day, second is percolation rate)
50., 1.0,
100., 20.0,
366., 20.0

```

(14)

```

*-----*
* 5. Conductivity switch: 0=NO DATA, 1=VAN GENUCHTEN or 2=POWER
OR 3= SPAW function used
*-----*
SWITKH = 0 ! No data
*SWITKH = 2 ! Power
*SWITKH = 1 ! vanGenuchten
*SWITKH = 11 ! Spaw function

```

(15)

```

*-----*
* 6. Water retention switch: 0=DATA; 1=VAN GENUCHTEN. When DATA, data
* have to be supplied for saturation, field capacity,
* wilting point and at air dryness
*-----*
*SWITPF = 0 ! Data
SWITPF = 1 ! van Genuchten
*SWITPF = 11 ! SPAW FUNCTION

```

(10) If data is available, choose "1". If no data is available, choose "2". "0" is for Africa.

(11) This can be a default and actual information. In case of the latter, use sowing and harvest dates to edit ZWTB.

(12) No need to put asterisks.

(13) Default

(14) Default

(15) Default

(16)

```

*-----*
* 7. Soil physical properties, these parameters will be used when model
* runs under actual water or nitrogen condition, or even both. Otherwise
* these parameters will not be used.
*-----*
CLAYX = 0.752,0.803,0.788,0.784,0.784,0.710    !soil clay content, fraction
SANDX = 0.054,0.047,0.048,0.041,0.002,0.055    !soil sand content, fraction
BD = 1.310,1.250,1.290,1.300,1.300,1.360    !soil bulk density (g/cm3)

*Soil organic carbon and nitrogen content in kg C or N/ha
SOC = 3584160.000,821250.000,1609920.000,2291900.000,1747200.000,1637440.000    ! Soil organic C (kg C/ha)
SON = 259380.000,45000.000,100620.000,213200.000,109200.000,114240.000    ! Soil organic N (kg N/ha)

*SNH4X = 2*4.97,3.77,3.13,1.62,0.50,0.05    !soil NH4-N (kg N/ha)
*SNO3X = 2*2.45,0.62,1.52,0.27,0.083,0.0088    !soil NO3-N (kg N/ha)

*FORGANC = 200.0,1000.0,5*0.0    ! Fresh organic carbon (kg C/ha)
*FORGANN = 10.0,100.0,5*0.0    ! Fresh organic nitrogen (kg N/ha)
*FCarboh = 0.54    ! Fraction of carbohydrate in fresh organic matter (-)
*FCellulo = 0.38    ! Fraction of cellulose in fresh organic matter (-)

```

(16) Data from Oryza Format in Soil_Oryza should be copied and pasted.

(17)

```

*-----*
* 8. Soil hydrological properties. Required type of data input *
* according to setting of conductivity and water retention switch *
*-----*
* Saturated hydraulic conductivity, for each soil layer
* (cm d-1) (always required!):
KST = 2*255.850266, 297.858490, 114.549477, 0.789587, 1.244055, 2*74.991531
KST = 297.559,1.017,16.169,16.804,16.677,28.822    !

```

(17)–(20), (22)–(24) Data from Oryza Format in Soil_Oryza should be copied and pasted.

(18)

```

* Saturated volumetric water content, for each soil layer
* (m3 m-3)(always required!):
WCST = 2*0.533142, 0.542527, 0.491697, 0.339206, 0.429186, 2*0.481078
WCST = 0.651,0.596,0.627,0.626,0.626,0.596    !:

```

(21)Default

(19)

```

* Van Genuchten parameters, for each soil layer
* (needed if SWITKH = 1 and/or SWITPF = 1):
VGA = 0.00,0.00,0.00,0.00,0.00,0.00    ! a parameter (cm-1)
VGL = 4.61,4.71,5.45,5.44,5.32,3.05    ! l parameter (-)

```

(20)

```

VGN = 1.25,1.14,1.17,1.17,1.17,1.13    ! n parameter (-)
VGR = 6*0.01    ! residual water content (-)

```

(21)

```

* Power function parameters, for each soil layer (-)
* (needed if SWITKH = 2):
*PN = 3*-2.5, 3*-2.5, 2*-2.5, -2.5

```

(22)

```

*!* Volumetric water content at field capacity, for each soil layer
* (m3 m-3)(needed if SWITPF = 0):
WCFC = 0.556,0.518,0.541,0.540,0.540,0.511

```

(23)

```

*!* Volumetric water content at wilting point, for each soil layer
* (m3 m-3) (needed if SWITPF = 0):
WCWP = 0.453,0.442,0.455,0.452,0.452,0.411

```

(24)

```

*!* Volumetric water content at air dryness, for each soil layer
* (m3 m-3) (needed if SWITPF = 0):
WCAD = 0.320,0.336,0.338,0.335,0.335,0.284

```



```

*-----*
* 9. Initialization conditions, and re-initialization
*-----*
WLOI = 0. ! Initial ponded water depth at start of simulation (mm)

(25) * Initial volumetric water content at the start of simulation,
* for each soil layer (m3 m-3): USE ALWAYS FIELD CAPACITY, OR 0.5 TIMES WCST
WCLI = 0.651,0.596,0.627,0.626,0.626,0.596

! Initial ponded water depth at start of simulation (mm)

* Initial ponded water depth and water contents may be reset:
* Ponded water depth: at minimum of WLOI and WLOMX
* Water contents in all soil layers: at saturation value
(26) * For direct-seeded rice, this happens at sowing, for transplanted
* rice, this happens at transplanting
* Re-initialize switch RIWCLI is YES or NO
(27) *RIWCLI = 'NO'
(28) *RIWCLI = 'YES'

*-----*
* 10. Initialization of soil thermal conditions
*-----*
SATAV = 18.0 ! Soil annual average temperature of the first layers
SOILT = 22.0, 17.0, 16.0, 15.0, 14.0, 2*15.0
! Initial soil temperature in each layer
! Have to provide above either one or two of above parameter, otherwise,
! model start the calculation of soil temperature at 0 degree

```

(25) Data from Oryza Format in Soil_Oryza should be copied and pasted.

(26)- (29) Default

```

(29) *-----*
* 11. Observations/measurements
* Switches to force observed water content in water balance
*-----*
!* WCL1_OBS, WCL2_OBS,...WCL10_OBS: Observed soil water contents
* in layer 1, 2, ..., 10. Format: year, day number, water content
* Not obligatory to give data

*WCL1_OBS =
* TO BE FILLED-IN (OPTIONAL)

!* Parameter to set forcing of observed water content yes (2) or no (0)
* during simulation (instead of using simulated values)
*WCL1_FRC = 0 ! No forcing
*WCL1_FRC = 2 ! Forcing

* Table for interpolation of water content between soil layers for
* those layers for which no observations were made: first number is
* the soil layer for which interpolation needs to be done, the second
* is the number of the underlying soil layer, the third is the number
* of the overlying soil layer. No interpolation is performed when all
* three numbers are the same:
WCLINT = 1,1,1,
(30) 2,2,2,
3,3,3,
4,4,4,
5,5,5,
6,6,6

!* MSKPA1_OBS, MSKPA2_OBS,...MSKPA10_OBS: Observed soil water contents
* in layer 1, 2, ..., 10. Format: year, day number, water content
* Not obligatory to give data

```

(30) This corresponds to the numbers of soil layers (in case of 6, WCLINT should be up to 6, for example)

22) After completing all steps, save the file in “Calibration” folder (for example, Soil_PH_Price.sol).

3. Experimental file

- 1) Obtain crop data from field experiment
- 2) Create experimental file by encoding data in excel template file with (Crop_format_template.xlsx).

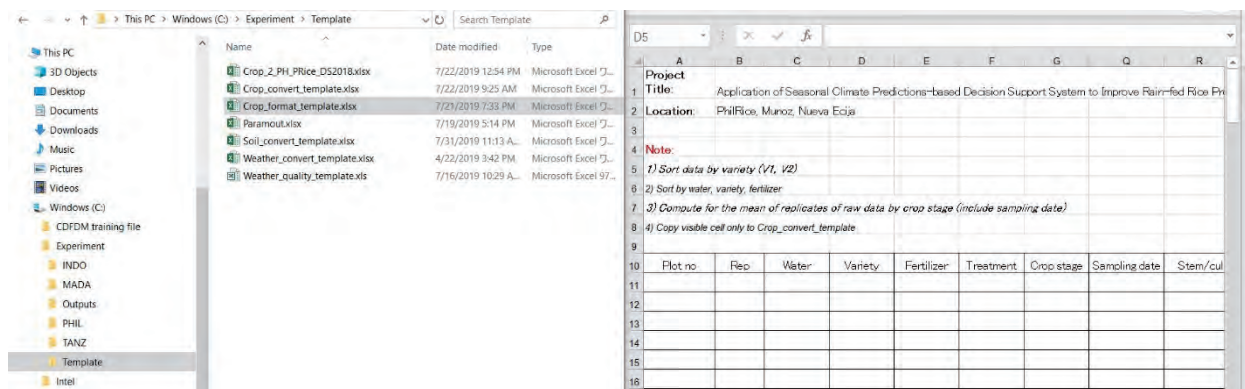


Fig 20. Crop_format_template

- 3) Data file should be named as Crop_1_country_station_seasonyear (ex, Crop_1_PH_Price_DS2018) and save in Data folder. “1” means raw data.

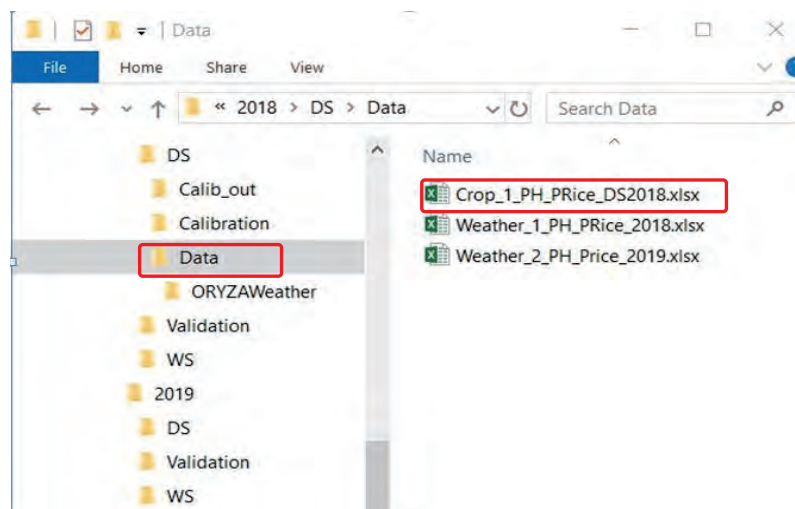


Fig 21. Crop_1_PH_Price_DS2018 saved in Data folder

- 4) After saving the file, open the “SeqBiomass_Ave” tab, highlight Colum G, H, I, J, K, L, M which corresponds to Crop stage, Sampling date, Stem/culm, Gleaves, Dleaves, Panicles, Leaf Area Index.
- 5) Press ctrl+G to open “Go to” window, click “Special” then choose “visible cells only” and click “ok”. To copy the highlighted area in Crop_1_PH_Price_DS2018 to V1 or V2 in Crop_convert_template, press ctrl+C and paste (ctrl+V) in V1 or V2 of Crop_2_PH_Price_DS2018.

Project Title: Application of Seasonal Climate Predictions-based Decision Support System to Improve Rain-fed Rice Production in the Philippines

Location: PhilRice, Munoz, Nueva Ecija

Note:

- Sort data by variety (V1, V2)
- Sort by water, variety, fertilizer
- Compute for the mean of replicates of raw data by crop stage (include sampling date)
- Copy visible cell only to Crop_convert_Template

Plot no	Rep	Water	Variety	Fertilizer	Treatment	Crop stage	Sampling date	Stem/culm	Gleaves	Oleaves	Panicle	LAI
11V1F1	1					28DAT Average	06/Feb/19	238.75	275.83	0.00	0.00	0.00
11V1F1	2					PI Average	28/Feb/19	1762.97	907.86	39.53	0.00	0.00
11V1F1	3					FI Average	20/Mar/19	4250.63	1157.40	283.28	1846.25	0.00
11V1F1	4					GF Average	27/Mar/19	3363.44	1572.97	434.58	3324.74	0.00
11V1F1	5					PM Average	21/Apr/19	2901.82	570.21	670.52	5779.22	0.00
11V1F2	1					28DAT Average	06/Feb/19	257.81	312.50	0.00	0.00	0.00
11V1F2	2					PI Average	28/Feb/19	2010.31	1316.20	34.79	0.00	0.00
11V1F2	3					FI Average	20/Mar/19	5282.97	1753.07	301.20	2023.96	0.00
11V1F2	4					GF Average	27/Mar/19	2931.88	1592.19	328.91	2543.07	0.00
11V1F2	5					PM Average	19/Apr/19	3874.38	967.92	635.57	7214.74	0.00
11V1F3	1					28DAT Average	06/Feb/19	238.33	324.32	0.00	0.00	0.00
11V1F3	2					PI Average	28/Feb/19	2230.94	1622.71	37.24	0.00	0.00
11V1F3	3					FI Average	20/Mar/19	4926.93	1982.87	242.60	2002.14	0.00
11V1F3	4					GF Average	27/Mar/19	2588.18	1595.57	442.71	2046.41	0.00
11V1F3	5					PM Average	21/Apr/19	4271.72	1184.01	741.15	7851.61	0.00
12V1F1	1					28DAT Average	06/Feb/19	166.41	219.74	0.00	0.00	0.00
12V1F1	2					PI Average	28/Feb/19	1062.45	626.35	31.25	0.00	0.00
12V1F1	3					FI Average	20/Mar/19	2888.91	873.85	142.97	961.56	0.00
12V1F1	4					GF Average	27/Mar/19	3331.72	1482.14	317.92	3044.69	0.00
12V1F1	5					PM Average	20/Apr/19	1939.17	440.00	438.58	3600.94	0.00
12V1F2	1					28DAT Average	06/Feb/19	170.42	226.35	0.00	0.00	0.00
12V1F2	2					PI Average	28/Feb/19	1368.91	918.65	27.76	0.00	0.00
12V1F2	3					FI Average	20/Mar/19	3924.32	1277.24	144.01	1444.69	0.00
12V1F2	4					GF Average	27/Mar/19	2943.54	1573.80	430.16	2724.84	0.00
12V1F2	5					PM Average	20/Apr/19	3155.26	732.76	452.86	5598.33	0.00
12V1F3	1					28DAT Average	06/Feb/19	190.00	258.13	0.00	0.00	0.00

Fig 22. “SeqBiomass_Ave” tab in Crop_1_PH_Price_DS2018 and V1 tab.

6) Data in the Variety tab (Rc238, for example) will be automatically completed.

The figure displays two Excel spreadsheets side-by-side. The left spreadsheet is titled 'Crop_convert_Template - Excel' and shows the 'Variety' tab for Rc238. It contains data for various parameters including LAI, WLVG, WLVD, WST, and WSO for different dates (e.g., 8-Jan-00, 26-Feb-19, 20-Mar-19, 27-Mar-19, 21-Apr-19). The right spreadsheet is titled 'Crop_2_PH_Price_DS2018 (2) - Excel' and shows the 'PHENOLOGY' tab for Rc238. It contains data for various parameters including LAI, WLVG, WLVD, WST, and WSO for different dates (e.g., 8-Jan-00, 26-Feb-19, 20-Mar-19, 27-Mar-19, 21-Apr-19).

Fig 23. Completed variety tab (Rc238)

7) Go to the Tab “PHENOLOGY”, and complete the phenology data and other information.

The figure displays two Excel spreadsheets side-by-side, continuing the data from Figure 23. The left spreadsheet is titled 'Crop_convert_Template - Excel' and shows the 'Variety' tab for Rc238. It contains data for various parameters including LAI, WLVG, WLVD, WST, and WSO for different dates (e.g., 8-Jan-00, 26-Feb-19, 20-Mar-19, 27-Mar-19, 21-Apr-19). The right spreadsheet is titled 'Crop_2_PH_Price_DS2018 (2) - Excel' and shows the 'PHENOLOGY' tab for Rc238. It contains data for various parameters including LAI, WLVG, WLVD, WST, and WSO for different dates (e.g., 8-Jan-00, 26-Feb-19, 20-Mar-19, 27-Mar-19, 21-Apr-19).

Fig 24. Completed variety tab (Rc238) (continued)

8) Go to the Tab “FERTILIZER” and complete the required information.

Figure 25 shows two side-by-side Excel spreadsheets displaying the 'Fertilizer application' table. The left spreadsheet is for treatment F1 and the right is for treatment F2. Both tables have columns for Date, Dosage, and Rc (Rc238, Rc300, Rc238, Rc300). The data is organized into rows for Basal, Topdress 1, and Topdress 2. The right spreadsheet shows additional data for F2, including Topdress 1 (2/13/2019, 30) and Topdress 2 (2/26/2019, 15).

Fig 25. Completed Fertilizer tab

9) Go to Tab for treatment (I1V1F1, for example).

10) In the Crop management table, some cells (for Cultivar, Sowing data, Seedbed duration, Panicle initiation, Day of flowering, Day of maturity) will be automatically filled out but some other cells (Treatment, Production environment, Method of establishment) should be filled manually.

11) ORYZA input (Yellow highlighted table) will be automatically completed.

12) The fertilizer management table will be automatically completed.

13) Overwrite on Crp_2_PH_Price_DS2018 to save the file.

Figure 26 shows two side-by-side Excel spreadsheets displaying the 'Crop management' table. The table has columns for Date, Cultivar, Sowing data, Seedbed duration, Panicle initiation, Day of flowering, Day of maturity, and ORYZA input. The ORYZA input table is highlighted in yellow. The right spreadsheet shows additional data for F2, including Topdress 1 (2/13/2019, 30) and Topdress 2 (2/26/2019, 15).

Fig 26. ORYZA format in Treatment tab of Crop_2_PH_Price_DS2018

- 14) Open the Experimental file in the Calibration folder and start editing for a selected variety and treatment.
- 15) Rename the file to this format (VarietynameTreatment.Season(first letter only)Year) for example Rc238I1F1.D18.

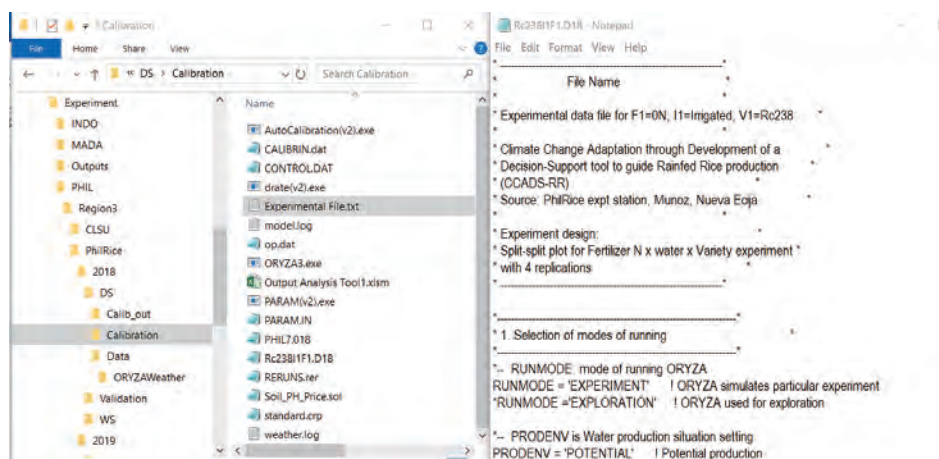


Fig 27. Experimental File

- 16) Modify the header part in the Experimental file which contains the description and location of the experiment.

Note: TAB shouldn't be used to edit Experimental File. Each line with an asterisk (*) is considered as a comment hence it will not be read by the program.

Experimental File.txt - Notepad

File Edit Format View Help

```

*-----*
*
* Experimental File
*
* Experimental data file for F1=0N; I1=Irrigated; V1=Rc238
*
* Climate Change Adaptation through Development of a
* Decision-Support tool to guide Rainfed Rice production
* (CCADS-RR)
*
* Source: PhilRice expt station, Munoz, Nueva Ecija
*
* Experiment design:
* Split-split plot for Fertilizer N x water x Variety experiment
* with 4 replications
*-----*

```

(1) Replace it with the filename used for the file (for example, Rc238I1F1.D18)

(2)- (4) Edit according to the details of field experiment.

* 1. Selection of modes of running *

(5) *-- RUNMODE: mode of running ORYZA
 RUNMODE = 'EXPERIMENT' ! ORYZA simulates particular experiment
 *RUNMODE = 'EXPLORATION' ! ORYZA used for exploration

(5) Choose
 'EXPERIMENT'

(6) *-- PRODENV is Water production situation setting
 PRODENV = 'POTENTIAL' ! Potential production
 *PRODENV = 'WATER BALANCE' ! Production may be water-limited

(6) Choose 'POTENTIAL'
 for irrigated rice; 'WATER
 BALANCE' for rainfed
 rice.

(7) *-- WATBAL is choice of water balance
 * needs only be given when PRODENV = 'WATER BALANCE'
 WATBAL = 'PADDY' ! PADDY water balance (for lowland soils)
 *WATBAL = 'SAHEL' ! SAHEL water balance (for freely draining upland soils)
 *WATBAL = 'SAWAH' ! SAWAH water balance (for lowland or upland soils)
 *WATBAL = 'LOWBAL' ! LOWBAL water balance (for lowland soils)
 *WATBAL = 'SOILPF' ! SOILPF water balance (Soil water tension read from file)

(7) 'PADDY' for
 Southeast Asia; 'SAHEL'
 for Africa.

(8) *-- NITROENV is Nitrogen production situation setting
 *NITROENV = 'POTENTIAL' ! Potential production
 NITROENV = 'NITROGEN BALANCE' ! Production may be nitrogen-limited

(8) Choose 'NITROGEN
 BALANCE'.

(9) *-- ETMOD is method for evapotranspiration calculation:
 ETMOD = 'PENMAN' ! Penman-based (Van Kraalingen& Stol, 1996)
 *ETMOD = 'PRIESTLY TAYLOR' ! Priestly-Taylor ("")
 *ETMOD = 'MAKKINK' ! Makkink (Van Kraalingen&Stol, 1996)

(9) Choose 'PENMAN' if
 you have complete
 weather data set.

(10) * 2. Timer data for simulation *

(11) IYEAR = 2018 ! Start year of simulation (year)*sowing

(11) STTIME = 356. ! Start time (day number)

(12) FINTIM = 1000. ! Finish time (days after start)

(12) DELT = 1. ! Time step (day)

(13)

(10) Put year (please
 DON'T put a period).

(11) Put sowing date in
 Julian date (Please PUT a
 period).

(12) Keep 1000 as
 default (Please PUT a
 period).

(13) Keep 1 as default
 (Please PUT a period).

```

*-----*
* 3. Weather station and climatic data for simulation *
*-----*
WTRDIR = '' ! Directory of weather data
CNTR = 'PHIL' ! Country code
ISTN = 7 ! Station code
*MULTIY = 'YES' ! Whether multiple year weather file is used,
! default is 鮮O or if the variable do not appear.
ANGA = 0.29 ! Angstrom A parameter
ANGB = 0.45 ! Angstrom B parameter
*TMCTB = 0., 0., ! Table for temperature increase
* 366., 0. ! Climatic Change studies

TMINCTB = 0., 0. ! Table for temperature increase for minimum temperature
366., 0. ! It has been used with TMAXCTB

TMAXCTB = 0., 0., ! Table of temperature increase for maximum temperature
366., 0. ! use TMINCTB & TMAXCTB, must disable TMCTB

*CO2A = 0., 375., ! Table for daily CO2 concentration AFTER EMERGENCY
* 1., 400., ! if this table appear, its value will overwrite the value
* 5., 400., ! of CO2 in crop file.
* 6., 720., ! Please pay attention on the CO2 concentration in crop
* 50., 720., ! and experiment files to make them compatible except for
* 51., 375., ! CO2 testing period during crop growth
* 150., 375. ! Note: column one is the DAYS AFTER EMERGENCY

FAOF = 1. ! Multiplying factor for potential evapotranspiration (FAO)
! Value Murty & Tuong

TMPSB = 0. ! Temperature increase in seed-bed due to cover:
! Zero when no cover over seed-bed; 9.5 with seed-bed

```

(14)

(15)

(16)

(17)

(14) Put the path of the folder for weather data (for example, PHIL7.018, C:\Experiment\PHIL\Region3\PhilRice\2018\DS\Calibration)

(15), (16) Put the code for the country and station (for example, PHIL for the Philippines, 7 for Nueva Ecija).

(17) Keep it as default.

(18)

```

*TMCTB = 0.0, 0.0, ! Daily average temperature increment table (oC)
*   366.0, 0.0 ! Column 1: Julian day, Column 2: change value

*TMAXCTB = 0.0, 0.0, ! Daily maximum temperature change,
*   366.0, 0.0 ! either TMCTB or TMAXCTB
               ! Column 1: Julian; Column 2: Increment value (oC)

*TMINCTB = 0.0, 0.0, ! Daily minimum temperature change, use with TMAXCTB
*   366.0, 0.0 ! Column 1: Julian day; Column 2: Increment (oC)

*RADCTB = 0.0, 0.0, ! Total daily radiation change
*   190.0, 0.0, ! Column 1: Julian day; Column 2: change percentage (%)
*   191.0, -5.0,
*   366.0, -5.0

*XFRDIF = 0.0      ! How you count diffusive radiation change?
*           ! 0: no change
*           ! 1: change in percentage based theoretical fraction
*           ! 2: Change with given diffusive radiation fraction

*FRDIFCTB = 0.0, 0.0, ! Diffusive radiation change table if XFRDIF > 0
*   366.0, 0.0 ! Column 1: Julian day; Column 2: change value (% or-)

*CCYEAR = 2008      ! The start year for climate change computation

*FRINCTB = 0.0, 0.0, ! Rainfall change table
*   366.0, 0.0 ! Column 1: Julian day; Column 2: change value (%)

*VAPPCTB = 0.0, 0.0, ! Vapor pressure change table
*   366.0, 0.0 ! Column 1: Julian day; Column 2: change value (% or-)

*WINDCTB = 0.0, 0.0, ! Wind speed change table
*   366.0, 0.0 ! Column 1: Julian day; Column 2: change value (% or-)

```

(18) Keep it as default.

ORYZA input

18	Cultivar	NSIC Rc 238
19	PRODENV	Potential
20	YEAR (Sowing year)	2018
21	STIME (Sowing Julian day)	356
22	ESTAB (Method of establishment)	Transplanting
23	EMD (Emergence Date)	359
24	EMYR (Year of emergence)	2018
25	SBDUR (Seed-bed duration)	18
26	IDOYTR (Transplanting Julian d	9
27	IYRTR (Transplanting year)	2019
28	IDOYPI (Panicle initiation)	51
29	IYRPI (Year of panicle initiation)	2019
30	IDOYFL (Day of flowering)	77
31	IYRFL (Year of flowering)	2019
32	IDOYM (Day of maturity)	98
33	IYRM (Year of maturity)	

Parameters:

- * FRINCTB = 0.0,0.0 ! Rainfall change table
- * 366.0,0.0 ! Column 1: Julian day, Column 2: change value (%)
- * VAPPCTB = 0.0,0.0 ! Vapor pressure change table
- * 366.0,0.0 ! Column 1: Julian day, Column 2: change value (%) or-
- * WINDCTB = 0.0,0.0 ! Wind speed change table
- * 366.0,0.0 ! Column 1: Julian day, Column 2: change value (%) or-
- * 4. Establishment data
- *-- ESTAB is method of establishment: 'TRANSPLANT' or 'DIRECT-SEED'
- ESTAB='TRANSPLANT'
- *ESTAB='DIRECT-SEED'
- * Sowing date December 22 (356), 2018;
- * 50% emergence December 25 (359)
- EMD = 359 ! Day of emergence (either direct, or in seed-bed)
- EMYR = 2018 ! Year of emergence
- SBDUR = 18 ! Seed-bed duration (days between emerging and transplanting)
- * 5. Management param
- NPLH = 2.0 ! Number of plants per hill
- NH = 25.0 ! Number of hills/m2 (20 x 20 cm)
- NPLSB = 1000 ! Number of plants in seed-bed (???)
- NPLDS = 1000 ! Number of plants/m2 direct-seeded
- *-- Initial data at emergence, for either direct-seeding or seed-bed
- Standard data used.
- LAPE = 0.0001 ! Initial leaf area per plant
- DVSI = 0.0 ! Initial development stage
- WLVI = 0.0 ! Initial leaf weight
- WSTI = 0.0 ! Initial stem weight
- WRTI = 0.0 ! Initial stem weight

(19) Copy information from Oryza format to Experimental File 4.

* 4. Establishment data

*-- ESTAB is method of establishment: 'TRANSPLANT' or 'DIRECT-SEED'

(20) ESTAB='TRANSPLANT'

*ESTAB='DIRECT-SEED'

(21) * Sowing date December 22 (356), 2018;

* 50% emergence December 25 (359)

(22) EMD = 359 ! Day of emergence (either direct, or in seed-bed)

EMYR = 2018 ! Year of emergence

(23) SBDUR = 18 ! Seed-bed duration (days between emerging and transplanting)

(20) Change this according to the crop establishment for the experiment.

(21) Edit these informations according to actual information.

(22) Put actual information from the experiment.

(23) Day of emergency is obtained from sowing date + 3 days.

Fig 28. Preparation of Establishment data

(24)

5. Management parameters

NPLH = 2.0 ! Number of plants per hill
 NH = 25.0 ! Number of hills/m² (20 x 20 cm)
 NPLSB = 1000. ! Number of plants in seed-bed (???)
 NPLDS = 165. ! Number of plants/m² direct-seeded

*-- Initial data at emergence, for either direct-seeding or seed-bed

* Standard data used.

LAPE = 0.0001 ! Initial leaf area per plant
 DVSI = 0.0 ! Initial development stage
 WLVGI = 0.0 ! Initial leaf weight
 WSTI = 0.0 ! Initial stem weight
 WRTI = 0.0 ! Initial stem weight
 WSOI = 0.0 ! Initial weight storage organs
 ZRTI = 0.0001 ! Initial root depth (m)

*-- Re-initialization at transplanting (standard data used)

ZRTTR = 0.05 ! Root depth at transplanting (m)

(24) Keep it as default.

* _____ *

* 6. Irrigation parameters

* Need only to be filled-in when PRODENV = 'WATER BALANCE'

* _____ *

* NEW, SEPT 2006:

DVSIMAX = 2.0 ! Development stage after which no more irrigation is applied

* NEW SETTING, 21 MAY 2010

* The determination for switch critical

ICOMBA = 1 ! 1: Use Julian day;

! 2: Use DVS;

! 3: Use mixture of DVS and Julian day,

! but the Julian day is not allowed to be smaller than 2;

! 4: use DAE;

* Combining irrigation management methods table IRMTAB, it must have at least

* two lines, X (Julian day or DVS or DVS+Julian, present the switching day),

* Y (methods in real number)

(25)

IRMTAB = 9.,2.0,

107.,2.0

108.,0.0

116.,0.0

IRMTAB = 9., 2.0,

107.,2.0,

116.,2.0

(25) Replace IRMTAB if running potential production or IRRIGATED. 2nd column should 2.0, put 0.0 if Rainfed or no irrigation

AUTODEPT = -10.0 ! The surface water depth (mm) for determining irrigation

! amount automatically

! Function is disabled when it did not appear or with

! negative number

(26) Choose a suitable SWITIR.

(26)

** FSelect from the following options are available for setting IRMTAB:

SWITIR = 0 ! No irrigation; rainfed

*SWITIR = 1 ! Irrigation supplied as input data

*SWITIR = 2 ! Irrigation at minimum standing soil water depth

*SWITIR = 3 ! Irrigation at minimum soil water potential

*SWITIR = 4 ! Irrigation at minimum soil water content

*SWITIR = 5 ! Irrigation at x days after disappearance of standing water

*SWITIR = 6 ! Irrigation at minimum soil water potential in defined periods

! only

* 7. Nitrogen parameters *

*TWO SOIL C AND N DYNAMICS

(27) NUTRIENT = 'GENERAL SOM' ! USE GENERAL SOIL ORGANIC C AND N MODULE T(! THE NUTRIENT CHANGES

*NUTRIENT = 'FIXED SUPPLY' ! Use fixed mineralization rate with fertilizer ! recovery rate

* Table of recovery fraction of Nitrogen in the soil (-) second column

* versus development stage (DVS) (first column) STANDARD VALUE

(28) RECINIT =

0.0, 0.30,
0.2, 0.35,
0.4, 0.50,
0.8, 0.75,
1.0, 0.75,
2.5, 0.75

(28) Keep it as default if an actual data is not available.

* NO DATA ON SOILSP: THIS 0.8 IS FOR IRRI CONDITIONS IN THE DS.....

(29) SOILSP = 0.8 ! Soil N mineralization rate (kg N/ha/d)

*SOILSP = 0.1 ! Soil N mineralization rate (kg N/ha/d)

* Table of fertilizer rate (kg N/ha) (second column)

* in the seed-bed (!) (first column)

FERTIL =

0., 0.,
27., 0.,
53., 0.,
66., 0.

f ₁ SBDUR (Seed-bed duration)					
	I	J	K	M	N
N (kg)					
te Urea					
		Total N (kg/h	DAS		
				To input file	
		0	27	27,0.	
		0	53	53,0.	
		0	66	66,0.	

(29) Go to Crop_2_PH_Price_DS2018 and copy highlighted area. This is expressed in DAS, not Julian date.

*Fresh organic residue input at land surface if it is applicable

(30) *SORGANC = 1000.0 ! Surface residue carbon input at kg C/ha

*SORGANN = 20.0 ! Surface residue nitrogen input at kg N/ha

(30) Put actual data if it is available to improve the accuracy.

* 8. Measured data for model calibration and comparison
 * And option to force measured LAI during simulation
 * (instead of using simulated values)

(31)

* Observed phenology: only required if program DRATES is r
 IDOYTR = 9 ! Day of transplanting (give 0 if direct-seeded)
 IYRTR = 2019 ! Year of transplanting (give 0 if direct-seeded)
 IDOYPI = 51 ! Day of panicle initiation (estimated as same
 ! jointing)
 IYRPI = 2019 ! Year of panicle initiation
 IDOYFL = 77 ! Day of flowering
 IYRFL = 2019 ! Year of flowering
 IDOYM = 98 ! Day of maturity (estimated as 7 d before h
 IYRM = 2019 ! Year of maturity

(32)

*! Leaf Area Index (m² leaf / m² ground):

*LAI_OBS =
 *2018.,359.0,0.0,
 *2019.,37.0,0.0000,
 *2019.,59.0,0.0000,
 *2019.,94.0,0.0000,
 *2019.,105.0,0.0000,
 *2019.,112.0,0.0000

17	ORYZA format	
18	Cultivar	NSIC Rc 238
19	POTENTIAL	Potential
20	IYEAR (Sowing year)	2018
21	STTIME (Sowing day)	356
22	ESTAB (Method of establishment)	Transplanting
23	EMD (Emergence Date)	359
24	EMYR (Year of emergence)	2018
25	SBDUR (Seed-bed duration)	18
26	IDOYTR (Transplanting Julian d)	9
27	IYRTR (Transplanting year)	2019
28	IDOYPI (Panicle initiation)	51
29	IYRPI (Year of panicle initiation)	2019
30	IDOYFL (Day of flowering)	77
31	IYRFL (Year of flowering)	2019
32	IDOYM (Day of maturity)	98
33	IYRM (Year of maturity)	2019
34		
35		
36		

	A	B	C	D	E	F	G	H	I	J	K
1		Rc238	RP1		LAI	WL VG	WL VD	WST	WSD	WNGT	
2					m ² /m ²	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	
3											
4	25SAT Average	8-Feb-19			0.00	275.83	0.00	218.75	0.00	514.58	
5	F1 Average	28-Feb-19			0.00	907.86	39.53	1762.97	0.00	2710.36	
6	F2 Average	28-Mar-19			0.00	1167.40	280.78	4250.63	1846.75	7530.55	
7	GF Average	27-Mar-19			0.00	1572.57	434.58	3363.44	3324.74	8695.73	
8	PD Average	21-Apr-19			0.00	570.21	670.25	2981.82	5775.22	9891.77	
9											
10											
11											
12	Emergence Date	25-Dec-18			2018.,359.0,0.0,	2018.,359.0,0.0,	2018.,359.0,0.0,	2018.,359.0,0.0,	2018.,359.0,0.0,	2018.,359.0,0.0,	
13	RP1	8-Feb-19			2019.,37.0,0.0000,	2019.,37.0,0.0000,	2019.,59.0,0.0000,	2019.,94.0,0.0000,	2019.,105.0,0.0000,	2019.,112.0,0.0000,	
14	Panicle Initiation	28-Feb-19			2019.,37.0,0.0000,	2019.,37.0,0.0000,	2019.,59.0,0.0000,	2019.,94.0,0.0000,	2019.,105.0,0.0000,	2019.,112.0,0.0000,	
15	Flowering	28-Mar-19			2019.,79.0,0.0000,	2019.,79.0,0.0000,	2019.,79.0,0.0000,	2019.,79.0,0.0000,	2019.,79.0,0.0000,	2019.,79.0,0.0000,	
16	Grain Filling	27-Mar-19			2019.,79.0,0.0000,	2019.,79.0,0.0000,	2019.,79.0,0.0000,	2019.,79.0,0.0000,	2019.,79.0,0.0000,	2019.,79.0,0.0000,	
17	Physiological Maturity	21-Apr-19			2019.,111.3,0.0000,	2019.,111.3,0.0000,	2019.,111.3,0.0000,	2019.,111.3,0.0000,	2019.,111.3,0.0000,	2019.,111.3,0.0000,	
18											
19											

*-- Parameter to set forcing of observed LAI during simulation

LAI_FRC = 0 ! No forcing

*LAI_FRC = 2 ! Forcing

(33)

* Green leaf dry wt (kg/ha)
 WL VG_OBS =
 2018.,359.0,0.0,
 2019.,37.0,0.0000,
 2019.,59.0,907.8646,
 2019.,79.0,1157.3958
 2019.,86.0,1572.9688
 2019.,111.3,570.2083

(31) Go to Crop_2_PH_Price_DS2018 and copy variables in Oryza format.

(32) Go to variety tab (Rc238) in Crop_2_PH_Price_DS2018 and copy&paste LAI.

(33) Copy data from Crop_2_PH_Price_DS2018

* Dead leaf dry wt (kg/ha)

WLVD_OBS =

2018.,359.0,0.0,
2019.,37.0,0.0000,
2019.,59.0,39.5313,
2019.,79.0,283.2848,
2019.,86.0,44.5833,
2019.,111.3,670.5208

(34)

(34) Copy data from
Crop_2_PH_Price_DS2018

* Stem dry wt (kg/ha)

WST_OBS =

2018.,359.0,0.0,
2019.,37.0,238.7500,
2019.,59.0,1762.9688,
2019.,79.0,4250.6250,
2019.,86.0,3363.4375,
2019.,111.3,2901.8229

* Panicle dry wt (kg/ha)

WSO_OBS =

2018.,359.0,0.0,
2019.,37.0,0.0000,
2019.,59.0,0.0000,
2019.,79.0,1846.2500,
2019.,86.0,3324.7396,
2019.,111.3,5779.2188

* Total dry wt (kg/ha)

WAGT_OBS =

2018.,359.0,0.0,
2019.,37.0,514.5833,
2019.,59.0,2710.3646,
2019.,79.0,7537.5521,
2019.,86.0,8695.7292,
2019.,111.3,9921.7708

T44									
=V1'G35									
	A	B	C	D	E	F	G	H	I
1		Rc208	HP1	LAI	W_VG	W_VD	WST	WSO	WAGT
2				m ² /m ²	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha
3									
4	DDAT Average	6-Feb-19		0.00	275.83	0.00	238.75	0.00	514.58
5	T1 Average	28-Feb-19		0.00	907.86	39.53	1762.97	0.00	2710.36
6	T1 Average	28-Mar-19		0.00	1157.40	283.28	4250.63	1846.25	7537.55
7	DF Average	27-Mar-19		0.00	1572.97	434.58	3363.44	3324.74	8695.73
8	DF Average	21-Apr-19		0.00	670.21	670.52	2901.82	5779.22	9921.77
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									

(35)

```

*! Leaf N (g N/g leaf):
*FNLV_OBS =

*! Leaf N (g N/m2 leaf):
*NFLV_OBS =

*-- Parameter to set forcing of observed NFLV values during simulation
*NFLV_FRC = 0    ! No forcing
*NFLV_FRC = 2    ! Forcing

```

(35) Keep it as default.

(36) Put actual data if it is available to improve the accuracy. If not, keep it as default.

(36)

```

*! Root biomass observation in a layers
*ROOTM1_OBS =
*2008.00, 209.00, 0.00,
*2008.00, 263.00, 663.2

*! Root biomass observed in a year
*TOORM3_OBS =
*2008.00, 209.00, 0.00,
*2008.00, 263.00, 663.2

```

(37) Keep it as default.

(37)

```

*-----
* Additional input for night temperature control experiment, if you have * temperature control
*-----
*ISTEMC = 0 ! WHETHER USE TEMPERATURE CONTROL 0 = NO,
*          ! 1= NIGHT CONTROL, 2=DAY CONTROL, 3=Both Control

*SHOUR = 19. ! Start time for temperature control
*EHOUR = 5.  ! Ending time for temperature control
*The SHOUR and EHOUR define the night time period, it should be SHOUR>EHOUR

*SDAY = 202. ! Julian day temperature control starting
*TSYEAR = 1989.
*EDAY = 303. ! Julian day temperature control ending
*TEYEAR = 1989.
*TTEMPD = 28. ! Target, -999 means net change is used
*TTEMPN = 21. ! Target temperature for nighttime,
*          ! -999 means net change is used
*TCHANG = -999. ! Net change of temperature,
*          ! -999 means target temperature is used
*CONTRM = 2    ! 1 = control the temperature exceed the defined range,
*          ! 2 = constant temperature

```

17) File should be saved in “Calibration folder”.

4. ORYZA parameterization and calibration

The purpose of parameterization is to generate ‘starting values’ for calibration of a certain variety. The final output of parameterization and calibration is the new crop file (calibrated variety).

1. The experimental file from 1st on-station field experiment is used for this section.
2. Check all the files in the Calibration folder. The following should be found in the folder:
Experimental file, soil file, weather file, ORYZA3.exe, CONTROL.DAT, RERUNS.rer, standard.crp, drate(v2).exe, AutoCalibration(v2).exe, PARAM(v2).exe, PARAM.IN, Output Analysis Tool1.xlsm, CALIBRIN.dat

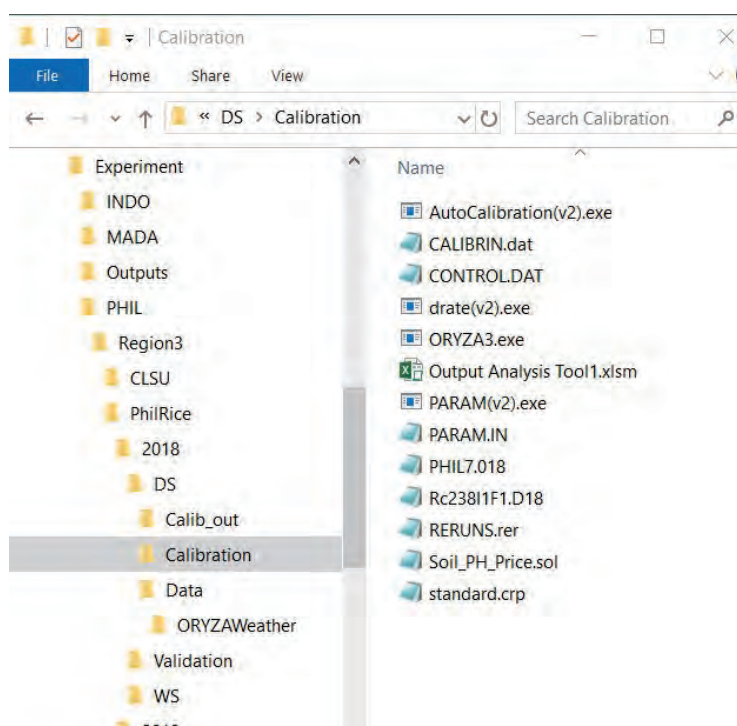


Fig 29. Files in the Calibration folder

3. Open CONTROL.DAT
4. Edit FILEIT, this command corresponds to the experimental data file, in this example Rc238I1F1.D18 is the experimental file.
5. FILEIT should be the RERUNS.rer, FILEI2 should be soil file (PH_Price_Maligaya.sol).
6. Save as it is in the Calibration folder.

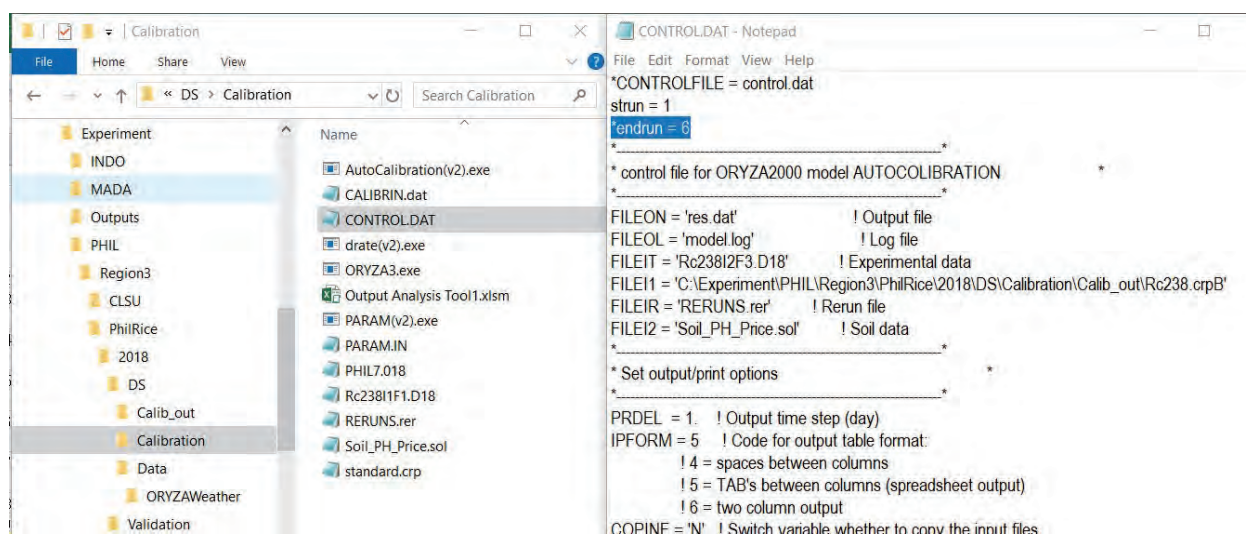


Fig 30. CONTROL.DAT in Calibration folder

7. Open RERUNS.rer and enter all the experimental files as shown in the figure below.

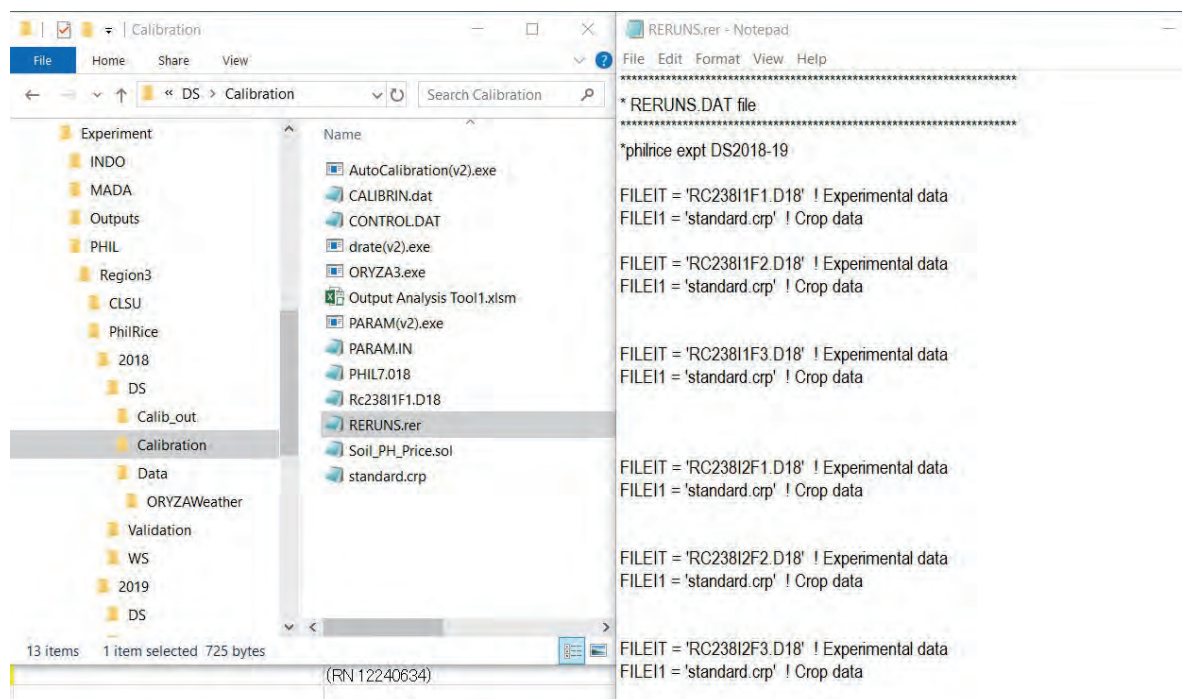


Fig 31. RERUNS.rer in Calibration folder

*RERUNS.RER provides the parameters which are specific for the different treatment and variety being simulated.

8. Save the file in the Calibration folder.
9. Run ORYZA.exe to check if all files are ready for calibration (pre-calibration).
10. If no error occurred, proceed for parameterization by following these steps.
11. Open PARAM.IN and edit as follows;
 FILEOOP, FILEOR, FILEOL, FILEIR are default
 FILEIT='standard .crop'
 FILET1='put treatment file name' (for example, RC238I1F1.D18)
 PRDEL, IPFORM, COPINF, DELTMP, IFLAG use default (no need to change the value)
12. Save the file as it is (PARAM.IN)

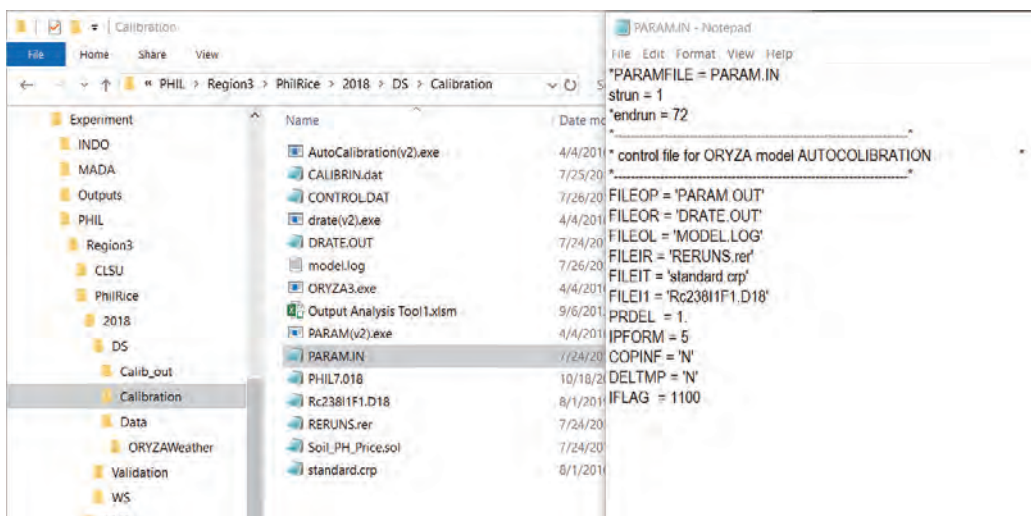


Fig 32. PARAM.IN in Calibration folder

13. Run drate(v2).exe to produce DRATE.OUT (*drate(v2).exe determines the phenology development rate of a given variety).
14. Open DRATE.OUT and RERUNS.rer.
15. Copy DVRJ, DVRI, DVRP, DVRR for each RerunSet to RERUNS.rer (as shown below).
 There are 6 RerunSet in these examples.

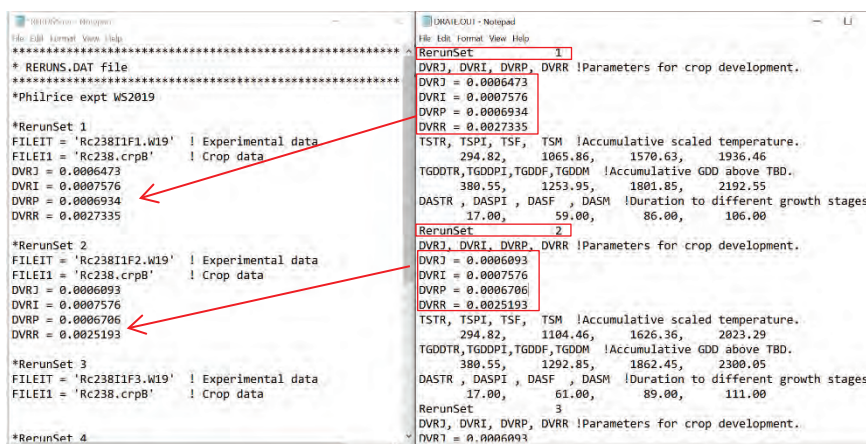


Fig 33. Examples of Rerun file

16. After copying all 6 RerunSet, save the file as RERUNS2.rer.
17. Open PARAM.IN, and edit FILEIR = 'RERUNS2.rer'.
18. Save the file (*PARAM.IN is the control file of parameterization).
19. Run PARAM(v2).exe (*PARAM(v2).exe estimates crop parameters for specific variety based on the observed data from the experiment.)
20. Look for PARAM.OUT and open the file.
21. Open PARAM.OUT.xlsx template. Arrange window as shown below.
22. Look for 'calculated partitioning factors' in PARAM.OUT file.
23. Copy calculated partitioning factors to Original Partitioning Factors table in ParamOUT tab.
24. 'Modified Partitioning Factors' table will be automatically be filled. Follow the instructions in the excel file template in calculating the partitioning factors.

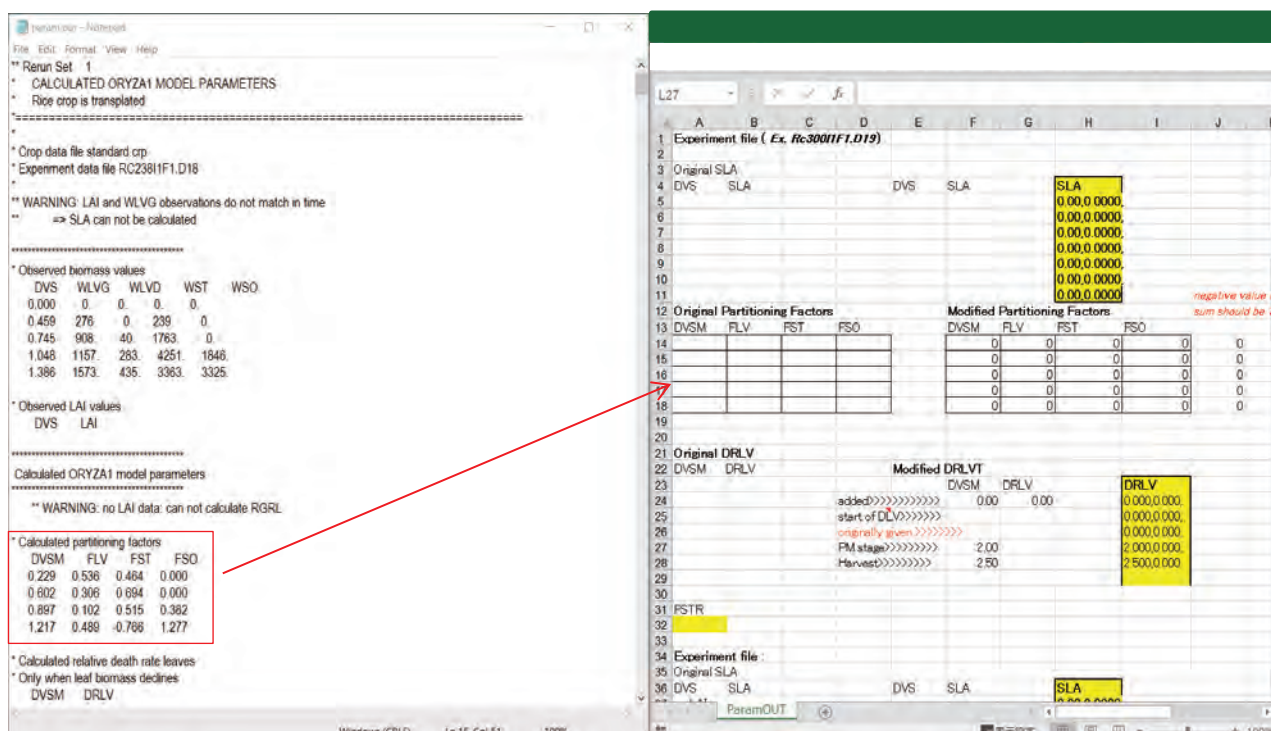


Fig 34. Copy calculated partitioning factors to Original Partitioning Factors table in ParamOUT tab

25. Calculated relative death rate leaves (DVSM, DRLV) and calculated fraction stem reserves should be copied to Original DRLV table in the excel template (If no value is shown in param.out, leave DVSM and DRLV blank).
26. Check Modified DRLV table.
27. The first row (row 23 in the figure below) in Modified DRLV table should be 0 for DVSM and DRLV.
28. 2nd row (row 24 in the figure below), copy DVS in **observed biomass values** in PARAM.OUT, look for column WLVD (dead leaves) if the value is not 0, get the corresponding value in DVS column (it means plants have started to have dead leaves). Copy DVS value to Modified DRLV in Paramout.xlsx. DRLV should be 0.

	A	B	C	D	E	F	G	H	I	J
17						2.5	1	0	0	
18										
19										
20	Original DRLV									
21	DVSM	DRLV								
22	1.376	0.033								
23										
24										
25										
26										
27										
28										
29										
30	FSTR									
31	0.306									
32										
33										
34										

Fig 35. Explanation for the excel file template

* Observed biomass values				
DVS	WL VG	WL VD	WST	WSO
0.000	0.	0.	0.	0.
0.433	375.	0.	325.	0.
0.694	1117.	30.	1871.	0.
0.992	4696.	616.	1252.	1775.
1.761	3270.	394.	1299.	1981.

Fig 36. Observed biomass values in PARAM.OUT

29. Continue editing the Paramout.xlsx . Copy FSTR from PARAM.OUT to the excel template.
30. Continue the same steps from 21) to 29) for other treatments.

[illegible]

Fig 37. Copy calculated partitioning factors to Original Partitioning Factors table in ParamOUT tab for other treatments

31. Save the file as Paramout_variety.xlsx (for example, Paramout_Rc238.xlsx) in the Calibration folder after filling out all the tables.

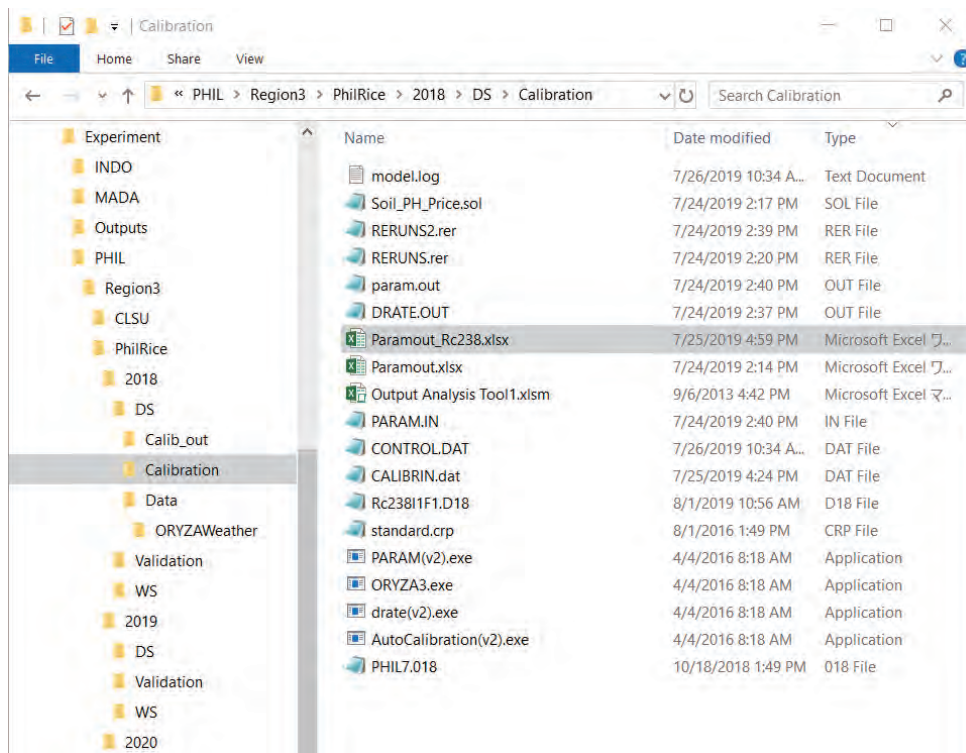


Fig 38. Saved file of Paramout for designated variety (Rc238) in calibration folder

32. Open RERUNS2.rer, open standard.crp, then go to “6. Growth parameters”. Find FSTR, FLVTB, FSTTB, FSOTB, DRLVT from standard.crp and insert them in designated space in RERUNS2.rer as follows.

(1) Open RERUNS2.rer

(2) Open RERUNS2.rer

(3) Copy FETR, FLVTB, FSTTB, FSOTB, DRLVT into this space.

(4) RERUNS2.rer with added

```

*-----
* 6. Growth parameters
*-----
FSTR = 0.20      ! Fraction of carbohydrates allocated to stems that
                  ! is stored as reserves (-)
TCLSTR = 10.     ! Time coefficient for loss of stem reserves (1 d-1)
SPGF = 64900.    ! Spikelet growth factor (no kg-1)
WGRMX = 0.0000249 ! Maximum individual grain weight (kg grain-1)

* Partitioning tables
* Table of fraction total dry matter partitioned to the shoot (-)
* as a function of development stage (-; X value):
FSTTB = 0.00, 0.50,
        0.43, 0.75,
        1.00, 1.00,
        2.50, 1.00

* Table of fraction shoot dry matter partitioned to the stem (-)
* as a function of development stage (-; X value):
FLVTB = 0.00, 0.40,
        0.188, 0.4000,
        0.450, 0.4975,
        0.648, 0.1420,
        1.121, 0.0383,
        2.500, 0.0000

* Table of fraction shoot dry matter partitioned to the root (-)
* as a function of development stage (-; X value):
FRTTB = 0.00, 0.600,
        0.188, 0.6000,
        0.450, 0.5025,
        0.648, 0.5602,
        1.121, 0.0295,
        2.500, 0.0000

* Table of fraction shoot dry matter partitioned to the leaf (-)
* as a function of development stage (-; X value):
FSOTB = 0.00, 0.00,
        0.188, 0.0000,
        0.450, 0.0000,
        0.648, 0.2978,
        1.121, 0.9322,
        2.500, 1.0000

* Table of leaf death coefficient
* as a function of development stage (-; X value):
DRLVT = 0.000, 0.000,
        0.375, 0.000,
        1.121, 0.032,
        2.000, 0.032,
        2.500, 0.032

*****
* RERUNS.DAT file
*****
*philrice expt DS2018-19

FILEIT = 'RC23811F1.D18' ! Experimental data
FILEI1 = 'standard.crp'  ! Crop data
DVRJ = 0.0007117
DVR1 = 0.0007576
DVRP = 0.0007959
DVRR = 0.0028556

FILEIT = 'RC23811F2.D18'
FILEI1 = 'standard.crp'
DVRJ = 0.0007117
DVR1 = 0.0007576
DVRP = 0.0007959
DVRR = 0.0028556

FILEIT = 'RC23811F3.D18'
FILEI1 = 'standard.crp'
DVRJ = 0.0007117
DVR1 = 0.0007576
DVRP = 0.0007959
DVRR = 0.0028556

FILEIT = 'RC23812F1.D18'
FILEI1 = 'standard.crp'
DVRJ = 0.0007117
DVR1 = 0.0007576
DVRP = 0.0007959
DVRR = 0.0028556

FILEIT = 'RC23812F2.D18'
FILEI1 = 'standard.crp'
DVRJ = 0.0006044
DVR1 = 0.0007576
DVRP = 0.0010297
DVRR = 0.0026020

FILEIT = 'RC23812F3.D18'
FILEI1 = 'standard.crp'
DVRJ = 0.0007117
DVR1 = 0.0007576

FSTR = 0.20
FLVTB = 0.00, 0.40,
        0.188, 0.4000,
        0.450, 0.4975,
        0.648, 0.1420,
        1.121, 0.0383,
        2.500, 0.0000

FSTTB = 0.00, 0.600,
        0.188, 0.6000,
        0.450, 0.5025,
        0.648, 0.5602,
        1.121, 0.0295,
        2.500, 0.0000

FSOTB = 0.00, 0.00,
        0.188, 0.0000,
        0.450, 0.0000,
        0.648, 0.2978,
        1.121, 0.9322,
        2.500, 1.0000

DRLVT = 0.000, 0.000,
        0.375, 0.000,
        1.121, 0.032,
        2.000, 0.032,
        2.500, 0.032

```

Fig 39. Editing RERUNS2.rer through standard.crop

33. After copying all variables, open Paramout_Rc238.xlsx and copy the value of FSTR to RERUNS2.rer.
34. Continue the same steps for other treatments to complete RERUNS2.rer.

Paramout_Rc238.xlsx

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
7									0.00,0.0000,						
8									0.00,0.0000,						
9									0.00,0.0000,						
10									0.00,0.0000,						
11									0.00,0.0000,						
12	Original Partitioning Modified Partitioning sum of squares														
13	DVSM	FLPSFSO	DVFLPSFSO												
14	0.229	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.229	0.5360	0.229	0.4640	0.229	0.0000	
15	0.602	0.1	0.0	1.0	0.1	0.0	0.0	0.0	0.602	0.3060	0.602	0.6940	0.602	0.0000	
16	0.897	0.1	0.0	1.0	0.1	0.0	0.0	0.0	0.897	0.1020	0.897	0.5150	0.897	0.3830	
17	1.217	0.0	0.1	1.0	0.0	0.0	0.0	0.0	1.217	0.4890	1.217	0.5110	1.217	0.5110	
18									0.000	0.0000	0.000	0.0000	0.000	0.0000	
19															
20															
21	Original DRLV														
22	DVSM	DRLV													
23	0.897														
24		addrec #							0.000	0.0000					
25		start #							0.745	0.0000					
26		origins 1							0.897	0.0000					
27		FM st #							2.000	0.0000					
28		Harve #							2.500	0.0000					
29															
30															
31	FSTR														
32									0.200						

RERUNS2.rer-Notepad

```

File Edit Format View Help
*****
* RERUNS.DAT file
*****
*philrice expt DS2018-19

FILEIT = 'RC238I1F1.D18' ! Experimental data
FILEI1 = 'standard.crp' ! Crop data
DVRJ = 0.0007117
DVR1 = 0.0007576
DVRP = 0.0007959
DVRR = 0.0028556

FSTR = 0.200

FLVTB = 0.00,0.40,
0.188,0.4000,
0.229,0.5360,
0.450,0.4975,
0.602,0.3060,
0.648,0.1420,
0.897,0.1020,
1.121,0.0383,
2.500,0.0000

FSTTB = 0.00, 0.600,
0.188,0.6000,
0.229,0.6940,
0.450,0.5025,
0.602,0.6940,
0.648,0.5602,
0.897,0.5150,
1.121,0.0295,
2.500,0.0000

FSOTB = 0.00, 0.00,
0.188,0.0000,
0.229,0.0000,
0.450,0.0000,
0.602,0.0000,
0.648,0.2978,
0.897,0.3830,
1.121,0.9322,
2.500,1.0000

DRLVT = 0.000,0.000,
0.375,0.000,
0.745,0.000,
0.897,0.000,
1.121,0.032,
2.000,0.032,
2.500,0.000
  
```

(1) Open Paramout_Rc238 and copy the values in FLVTB column.

(2) Insert the values of in FLVTB column in between the values shown in RERUNS.dat file.

(3) New set of values for FLVTB in RERUNS.dat file.

Fig 40. Editing RERUNS2.rer through Paramout_Rc238.

35. After inputting all growth parameters, save the file as RERUNScalib.rer in the Calibration folder.

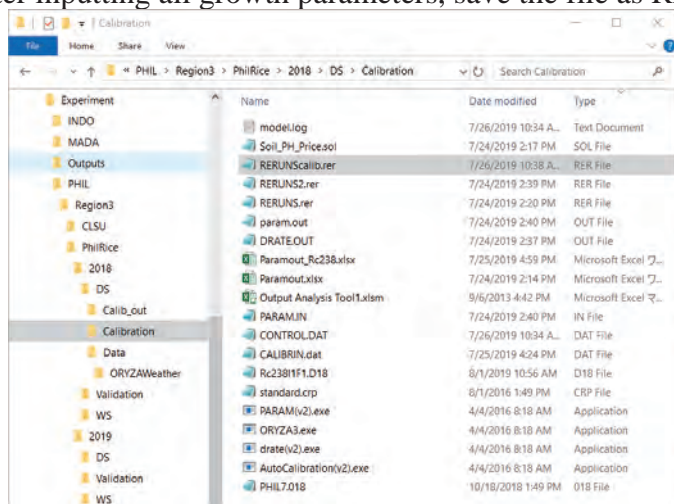


Fig 41. Saved RERUNScalib.rer in the Calibration folder

36. Create new folder named as Calib_out.

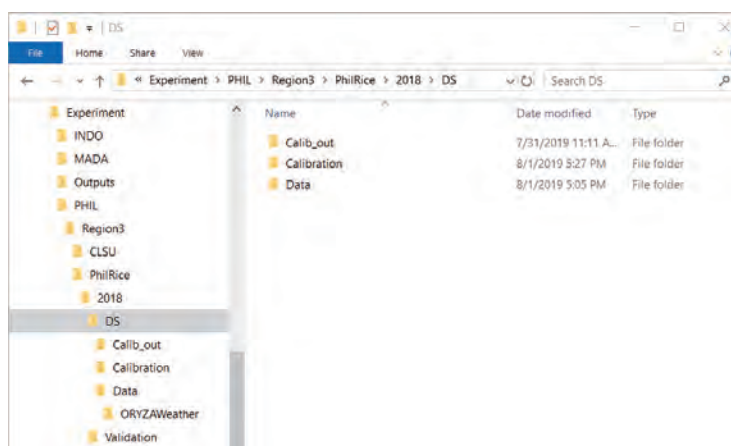


Fig 42. Calib_out folder

37. Open CALIBRIN.dat (*CALIBRIN.dat serves as the control file for the calibration).

38. Edit the information of 1. Input files and 2. Calibration parameter controls

- ✓ FILEON='directory\Calib_out'
- ✓ FILEOL=' directory \Calib_out\'
- ✓ FILEIR=' directory \rerunscalib.rer'
- ✓ FILEIT=' directory \Rc238I1F1.D18'
- ✓ FILEI1=' directory \standard.crp'
- ✓ FILEI2=' directory\Soil_PH_Price.sol'

* write the path name for each files and the output folder for the **Calib_out**

**do not use spaces in creating a folder name, use underscore instead if needed.

Like for example, Calib_out not Calib out for space will cause an error.

39. Edit the information in 2. Calibration Parameter Controls (change the path of OUTFOLDER into Calib_out, Rc238.crp for OUTCROP, no need to change for OUTSOIL, ORYZA3.exe for ORYZA)
- ✓ RERUNS=7000, INRERUNS=6, USEREFER='YES'
 - ✓ Put asterisk to USEREFER (*USEREFER)
 - ✓ OUTFOLDER='directly\Calib_out\'
 - ✓ OUTCROP='Experimental file (for example, 'Rc238.crp')
 - ✓ OUTSOIL is 'c_soil.sol' (default)
 - ✓ ORYZA='directly\ORYZA3.exe'

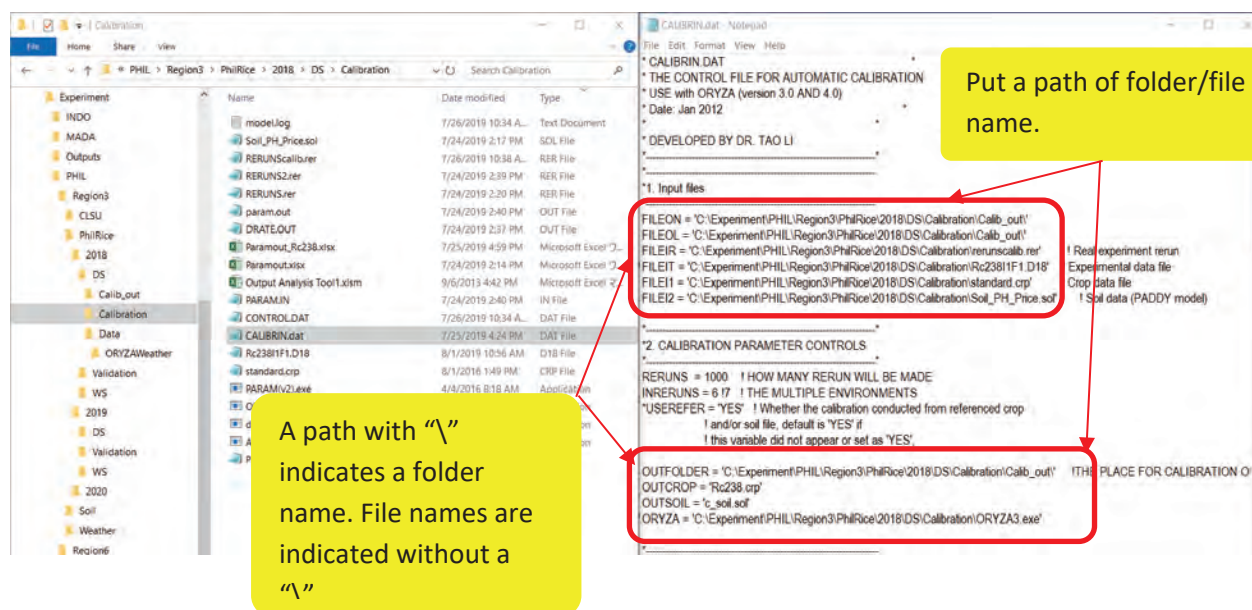


Fig 43. Editing the information in 2. Calibration Parameter Controls

40. No need to change any content from 3 to 8.
 41. Save as it is (CALIBRIN.dat).
 42. Rename the file CONTROL.DAT (for example, xCONTROL.DAT).

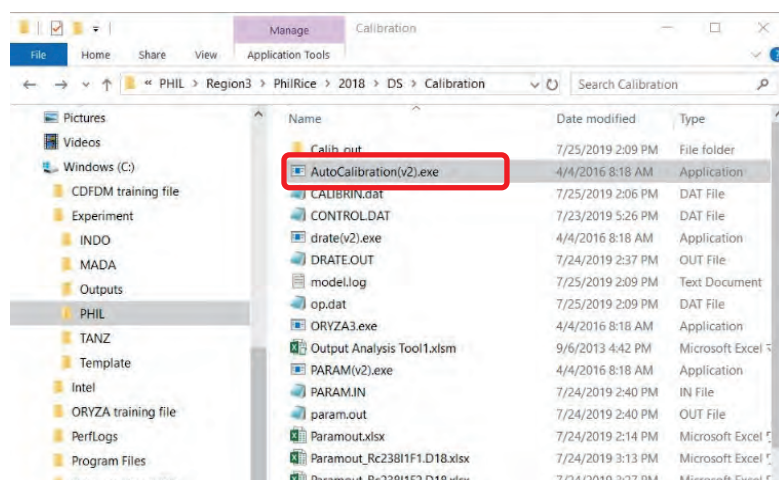


Fig 44. AutoCalibration(V2).exe to proceed for calibration

43. Click AutoCalibration(v2).exe.

44. New window will pop up. Choose CALIBRIN.dat and click open.

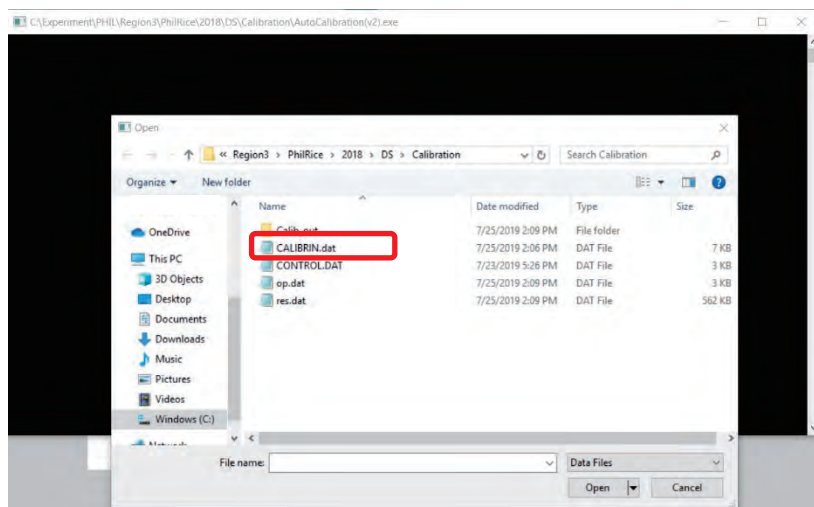


Fig 45. AutoCalibration(V2).exe to proceed for auto-calibration (continued)

45. Open Calib_out folder and look for CLIBRATION_OUT.DAT. Check if the file shows some values other than 0 or if there's an error message.

46. Calibration is successful if the calibrated variety is produced (for example, Rc238.crpB, B means "calibrated") as shown below.

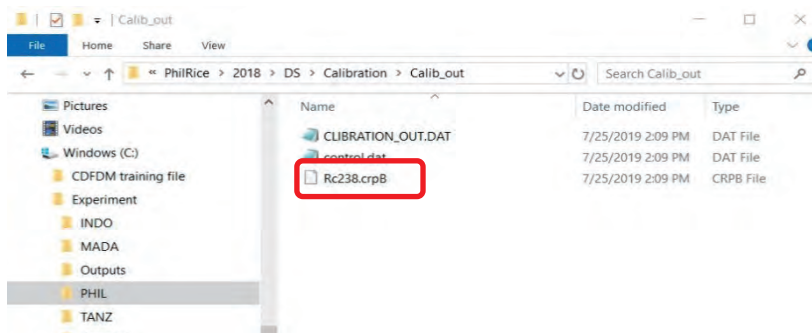


Fig 46. AutoCalibration(V2).exe to proceed for auto-calibration (continued)

47. In our example, **RC238.crpB** is the new crop file (composed of the **variety name** and with an extension of **crpB**). CROP1.CRP will be produced if calibration is not successful.

48. To evaluate the calibrated variety, rename xCOTROL.DAT to CONTROL.DAT in Calibration folder. Replace standard.crp with Rc238.crpB (calibrated variety). For example, FILEI1 = Experiment\PHL\Region 3\2019\DS\Calibration\Calib_out\Rc238.crpB

49. Save the CONTROL.DAT file.

5. Evaluation of calibrated variety

- 1) Run ORYZA.exe.
- 2) After running ORYZA.exe, look for op.dat and res.dat files in the Calibration folder.
- 3) op.dat and res.dat are the results of the calibration using calibrated variety (for example, Rc238.crpB).
- 4) To analyze the calibrated variety. Open Output Analysis Tool1.xlsm.
- 5) Click the Main tab, enable Macro function.
- 6) Change the path for op.dat and res.dat (for example, Experiment\PHL\Region 3\2019\DS\Calibration).
- 7) Click "Analysis" and wait for the results.
- 8) Click the Table tab to check the statistical analysis.
- 9) Check the RSMEn for all runs. The acceptable value is less than 30% and if the value is higher, check each run and identify the treatment which might cause the poor RMSEn result.

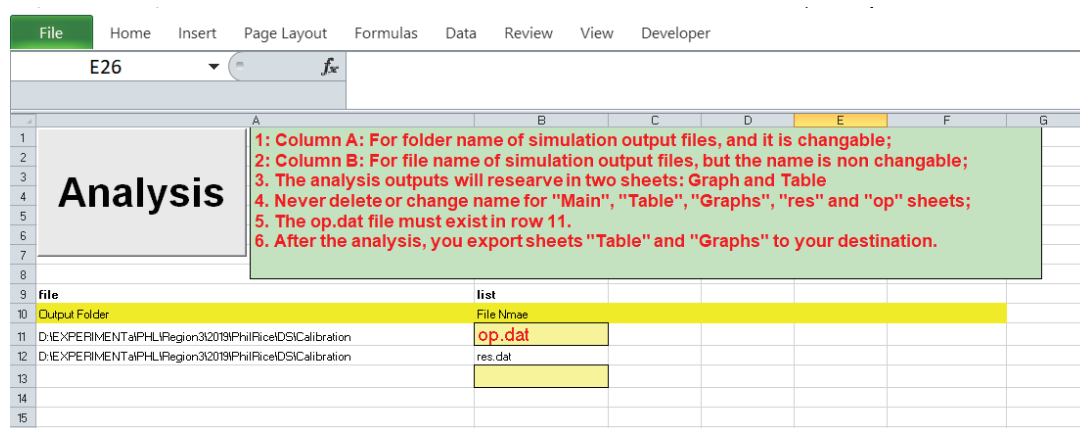


Fig 47. Open Output Analysis Tool1.xlsm to analyze the calibrated variety

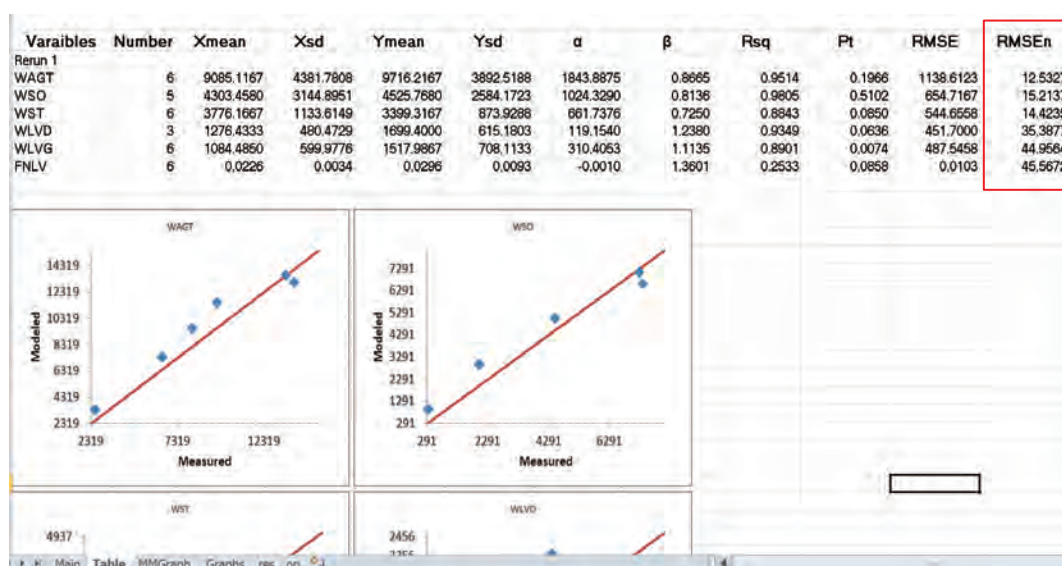


Fig 48. Results of analysis shown through table and graphs

6. Validation of calibrated variety

- 1) Go back to the first step for the Experimental file and prepare the Experimental file based on the new data sets from the new field experiment (results from the 2nd on-station field experiment).
- 2) Save the new experimental file in the Validation folder.
- 3) Go back to the first step for Weather file and prepare the Weather file for a new experiment.
- 4) Save the file in the Validation folder (working folder).
- 5) Check all the needed files in your working folder. The following files should be placed under the Validation folder: Experimental file, soil file, weather file, ①PARAM.IN, ②drate(v2).exe, ③DRATE.OUT, ④ RERUNS.rer, ⑤ CONTROL.DAT, ⑥ ORYZA3.exe, ⑦ Output Analysis Tool1.xlsm).
- 6) Open ①PARAM.IN.
- 7) Edit FILEIT and FILEI1
`FILEIT = 'Rc238.crpB'`
`FILEI1 = 'Rc346I1F1.W18'` (newly created Experimental file, data from WS field experiment.)
- 8) Save the file as it is.
- 9) Run ②drate(v2).exe.
- 10) Open ③DRATE.OUT and copy DVRJ、DVRI, DVRT, DVRP, DVRR for each treatment (RerunSet 1, 2, 3, 4, 5, 6 for example) and paste in ④RERUNS.rer. Save the file as RERUNS2.rer.
- 11) Open ⑤CONTROL.DAT.
- 12) Edit FILEIT, FILEI1, and FILEIR.
`FILEIT = 'Rc238.crpB'`
`FILEI1 = 'Rc346I1F1.W18'` (newly created Experimental file, data from WS field experiment.)
`FILEIR = 'RERUNS2.rer'`
- 13) Save CONTROL.DAT file.
- 14) Run ⑥ORYZA3.exe
- 15) After running ORYZA3.exe, look for op.dat and res.dat files in the Validation folder
- 16) op.dat and res.dat are the results of simulation using the newly calibrated variety.
- 17) Open ⑦Output Analysis Tool1.xlsm.
- 18) Click the Main tab, enable Editing and Macro function
- 19) Change the path for op.dat and res.dat (for example, Experiment\PHL\Region 3\2019\DS\Validation).
- 20) Click “Analysis” and wait for the results.
- 21) Click the Table tab to view the statistical analysis and check the RMSEn results of all reruns.

8. Uploading database in WeRise

WeRise system is managed through the administration section of the website. Here, the administrator has the responsibility to generate and curate the data that are displayed in the public website.

A. Local/Historical weather database

1. Copy the local weather data prepared from \Experiment\PHL\Reg3\Data to \\werise-dss\weather-data\weather_ver3\realtime\PHL\Reg3
2. Open WeRise and go to Admin<Option
3. Select Weather Data. Choose the location to be updated.
4. Click Show files to display the available data

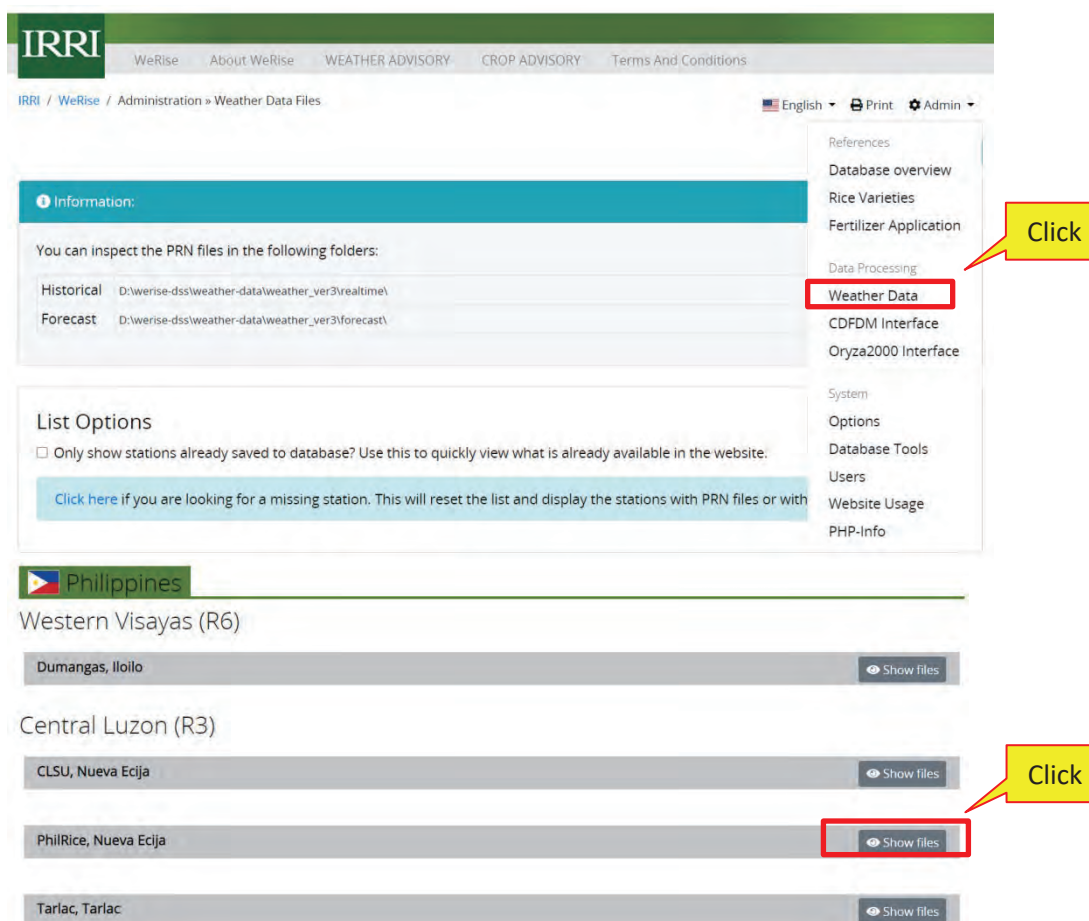


Fig 50. How to upload local weather data in WeRise

Central Luzon (R3)

CLSU, Nueva Ecija Show files

Forecast			...
File	DB	Remarks	...
PHIL5.983 / 1983	673		...
PHIL5.984 / 1984	674		...
PHIL5.985 / 1985	675		...
PHIL5.986 / 1986	676		...
PHIL5.987 / 1987	677		...
PHIL5.988 / 1988	678		...
PHIL5.989 / 1989	679		...
PHIL5.990 / 1990	680		...
PHIL5.991 / 1991	681		...
PHIL5.992 / 1992	682		...
PHIL5.993 / 1993	683		...
PHIL5.994 / 1994	684		...

PHIL5.986 / 1986	676		...
PHIL5.987 / 1987	677		...
PHIL5.988 / 1988	678		...
PHIL5.989 / 1989	679		...
PHIL5.990 / 1990	680		...
PHIL5.991 / 1991	681		...
PHIL5.992 / 1992	682		...
PHIL5.993 / 1993	683		...

Update database
Delete

Click
Click

Fig 51. How to upload local weather data in WeRise (continuation)

5. Click the black box and select Update database.
6. New dialog box will show if the data was saved successfully. Click Back to list.

IRRI / WeRise / Administration » Weather Data Files

Click

◀ Back to List

- PHIL7.999
- r
- 1046

dataset was saved successfully

◀ Back to List

Fig 52. Dialog box after successful upload.

B. Forecast weather database

Sintex-F data will be processed using the bias reduction or *Cumulative Distribution Function-based Downscaling Method* (CDFDM). It is a Fortran program that generates forecast data.

- 1) Check if the Sintex-F data is located in the sintex-f folder.

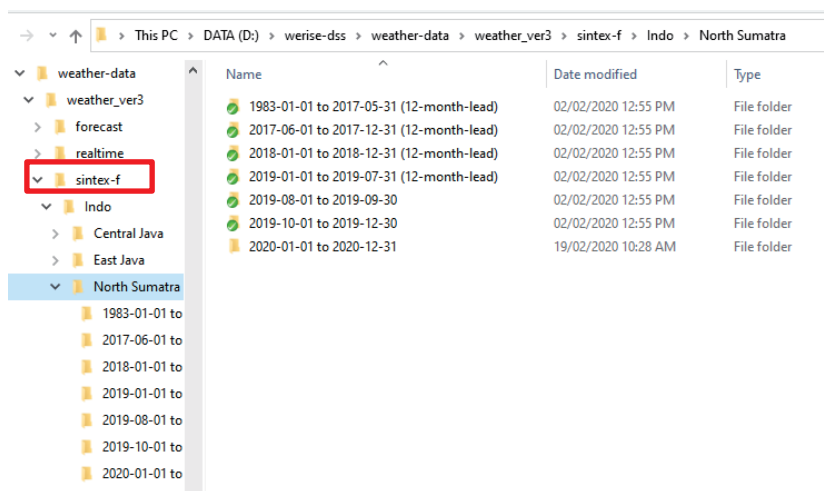


Fig 53. Location of Sintex-F folder in the directory.

- 2) Open WeRise and go to Admin<Option.
- 3) Select CDFDM Interface.

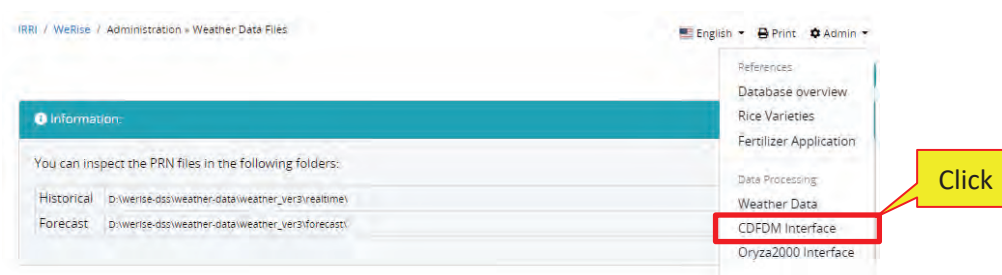


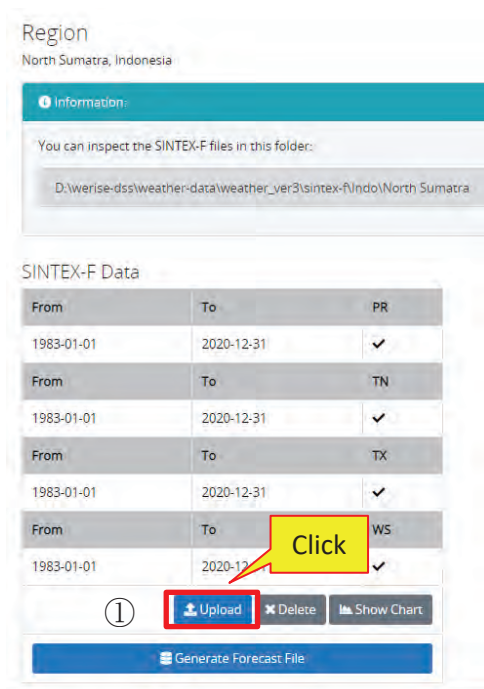
Fig 54. How to upload weather/SINTEX-F data

- 4) List of available SINTEX- F data will be displayed.
- 5) Select the **Region/location** to be processed.



Fig 55. How to upload weather/SINTEX-F data (continued)

- 6) Available year and weather parameters of Sintex-F data will be listed. To generate Forecast file, click Upload. ①



A verification window will appear to make sure that the SINTEX-F files are in the correct folder. Click Upload to continue. ②

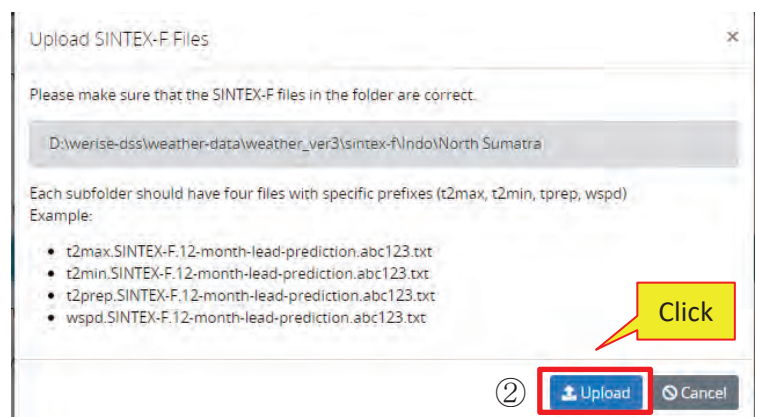


Fig 56. How to upload weather/SINTEX-F data (continued)

- 7) Click Generate File forecast if files was saved successfully.
- 8) Choose Location and click Generate files to run CDFDM program.

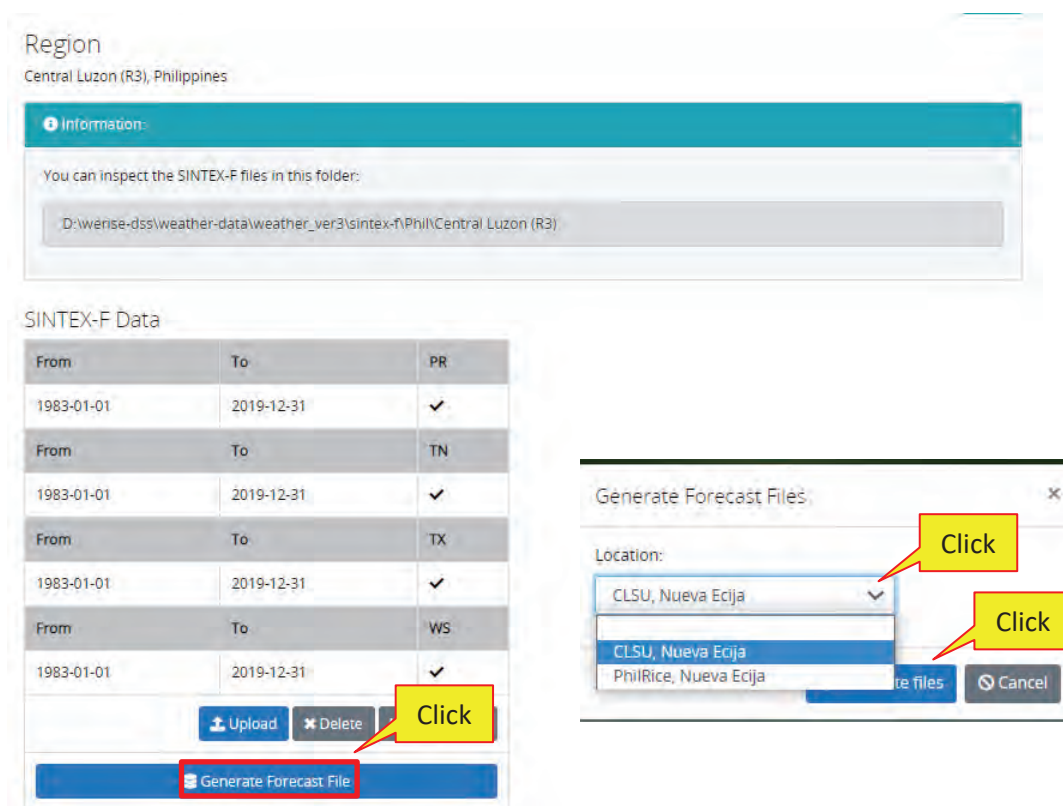


Fig 57. Generating forecast file.

- 9) The system will display run progress while processing the SINTEX-F data.

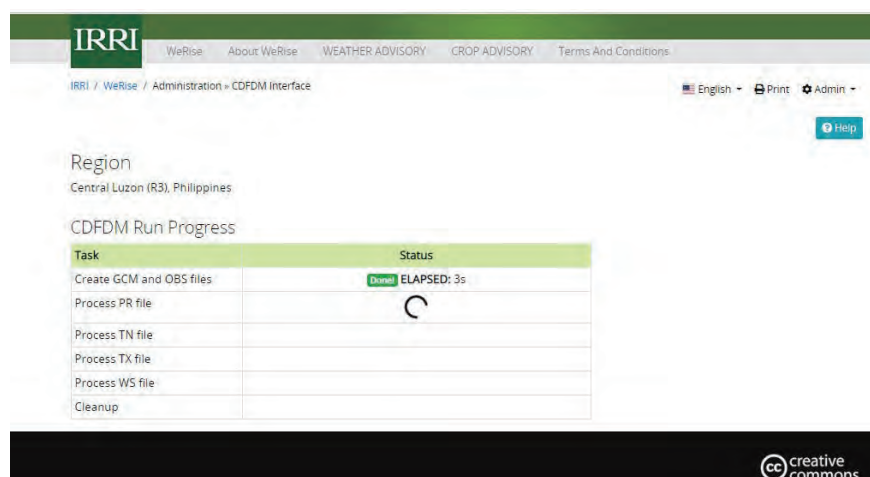


Fig 58. Generating forecast file (continued)

- 10) Enter the Year of data to be processed for example 2019. Click Export if CDFDM data was successfully processed.
- 11) CDFDM output details will be shown. To check the result, click Display data.

Region
Central Luzon (R3), Philippines

CDFDM Run Progress

Task	Status
Create GCM and OBS files	Done! ELAPSED: 4s
Process PR file	Done! ELAPSED: 25s
Process TN file	Done! ELAPSED: 22s
Process TX file	Done! ELAPSED: 23s
Process WS file	Done! ELAPSED: 25s
Cleanup	Done! ELAPSED: 0s

CDFDM data was successfully processed!

Generate Forecast File - STEP 2

Location of historical weather data
Serdang, Deli Serdang

Export Folder Destination
D:\werise-dss\weather-data\weather_ver3\forecast\Indo\INDOWB8.???

Year
2019

OUT file to PRN file conversion variables

pval	-6.200
t1	1.096718000
t2	0.014700150
t3	2.258325000

Export Cancel

Output mapping

Weather PRN	Computed variable
irradiance (kJ/m ²)	rad
minimum temperature (°C)	tn
maximum temperature (°C)	tx
vapor pressure (kPa)	Tmin
mean wind speed (m/s)	ws
precipitation (mm/d)	pr

Forecast for 2019

Display data

Fig 59. Generating forecast file (continued)

*Weather data are stored as files to be used by CDFDM and ORYZA. Forecast data is generated by CDFDM. Once both are available, ORYZA can generate grain yield simulations.

C. Crop database

1. All calibrated varieties should be placed in WeRise-dss\oryza3\rice-variety folder.
2. Add the new calibrated variety, for example NSICRc238.crpB in rice-variety folder.
3. To upload new variety in crop database, open WeRise and go to Admin<Options. Type the name of newly calibrated variety (for example NSICRc238.crpB in the List of variety to use. Press Enter and click Ok.

The screenshot shows the WeRise web application interface. At the top, there is a navigation bar with links: WeRise, About WeRise, WEATHER ADVISORY, CROP ADVISORY, and Terms And Conditions. Below this, a banner image shows a person wearing a traditional rice hat. The main content area is titled 'System » Options'. On the right, a dropdown menu is open, showing options: Database overview, Rice Varieties, Fertilizer Application, Data Processing, Weather Data, CDFDM Interface, Oryza2000 Interface, System, Options (highlighted with a red box and a yellow 'Click' callout), Database Tools, Users, Website Usage, and PHP-Info. Below the menu, there is a table with two columns: Description and Value. The table contains the following rows:

Description	Value
Database	
Database name of Weather and Oryza2000 data	werise_dss_data
Oryza2000	
Version of Oryza2000 to use	ver 3
RERUN STTIME interval to use	1
List of varieties to use in Oryza2000 runs. Example: IR64,J96,IR72.DAT,YTH183.D12	NSICRc238.crpB

Below the table, there is a message box that says 'local.werise says success' with an 'OK' button. A yellow 'Click' callout points to the 'OK' button.

Fig 60. How to upload new crop file (calibrated variety)

4. To run Oryza simulation go to Admin<Options<Oryza2000 Interface.
Choose country and province/district (for example, Central Luzon, Nueva Ecija).
Click Show files.

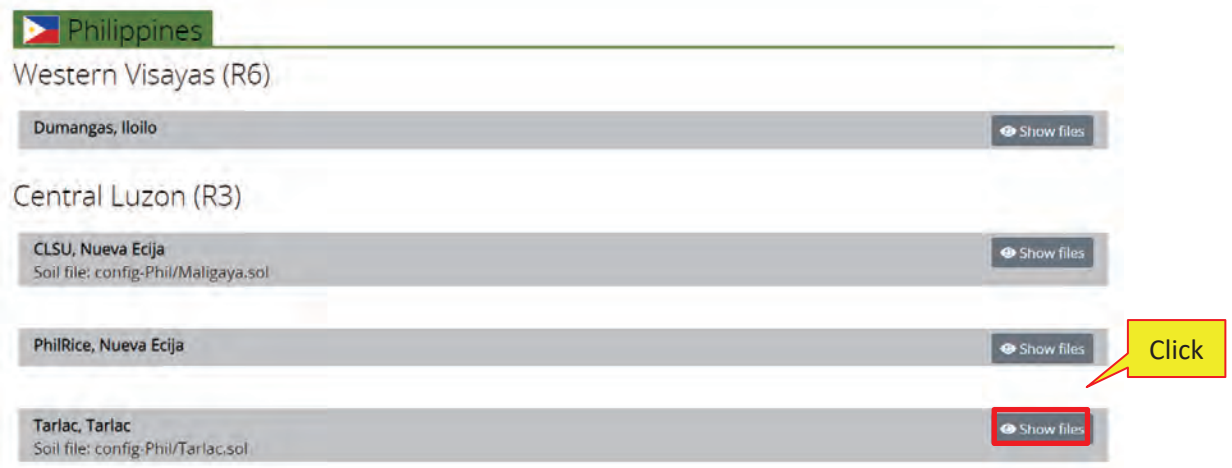


Fig 61. How to upload new crop file (continued)

5. Look for the year to be forecasted. Click Save to database.

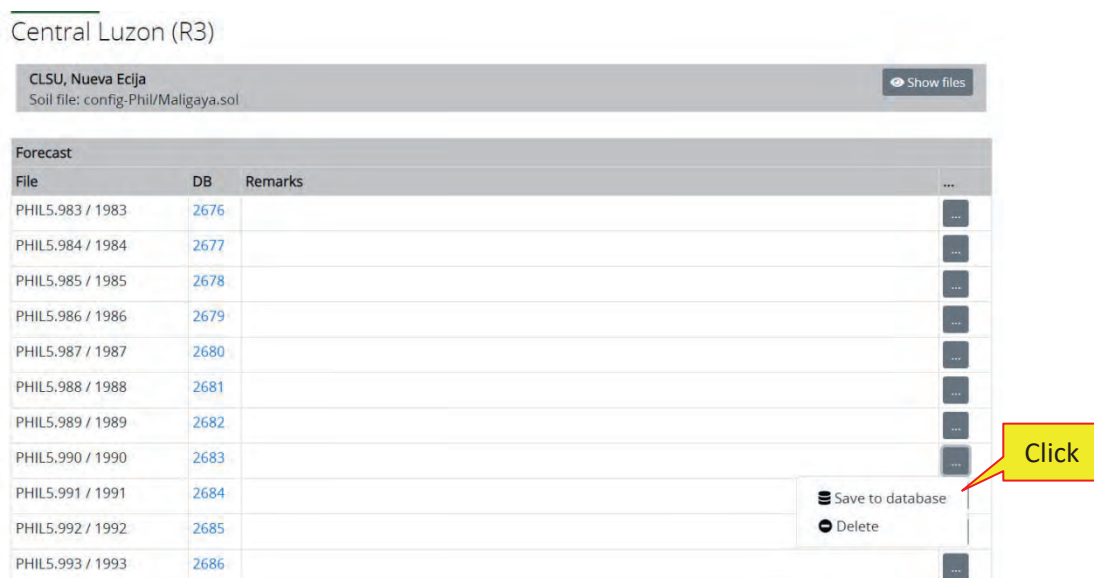


Fig 62. How to upload new crop file (continued)

- Soil file can be edited manually. Enter soil file, click Change Soil File and click Ok. If all the information are correct, Click Start Process to begin the simulation.

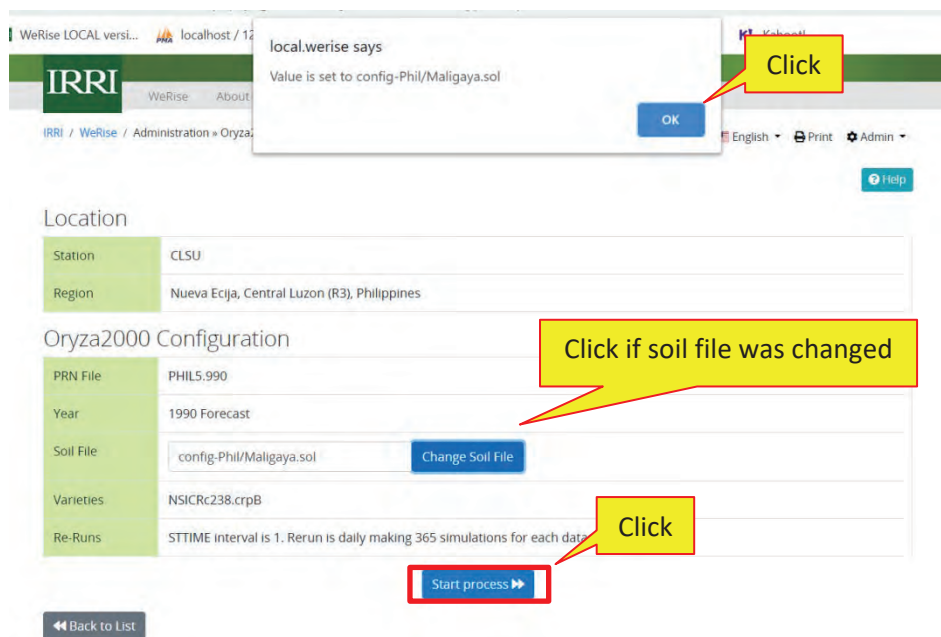


Fig 63. How to upload new crop file (continued)

- Progress bar will be shown when processing the crop data. Wait for the result. The system displays the status when processed successfully. Click here to show the results.

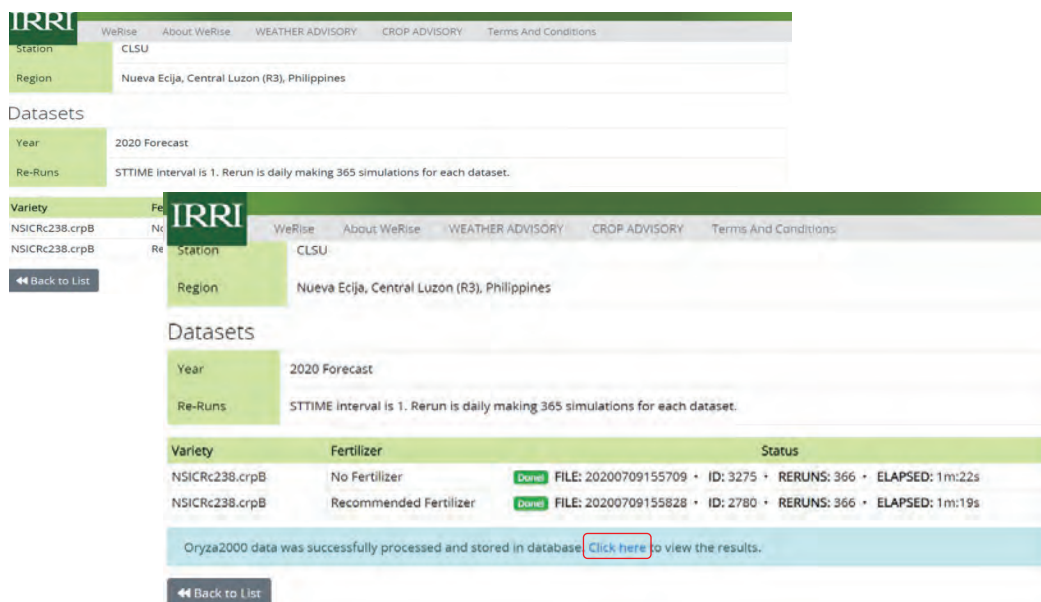


Fig 64. New crop was successfully simulated and stored in the database.

9. Generating WeRise advisories

A. Weather Advisory

To generate Weather prediction, open WeRise, go to WEATHER ADVISORY tab. Select Location, Forecast Year and Weather data parameters to be displayed. (Rainfall, Temperature, Solar Radiation, Vapor pressure, Wind speed). Click Show Advisory to display the prediction.

Dataset

Location: Philippines Nueva Ecija

Year: Forecast 2020

Weather data

☒ Rainfall
☐ Temperature
☐ Solar Radiation
☐ Early morning vapor pressure
☐ Wind Speed

Show Advisory

Advisory

Data is displayed in 10-day period values. Statistical **mean** and **percentile** is computed using historical data. We get the 20th percentile (P20) to determine periods with extremely low values and the 80th percentile (P80) to determine periods with extremely high values of the population.

Rainfall

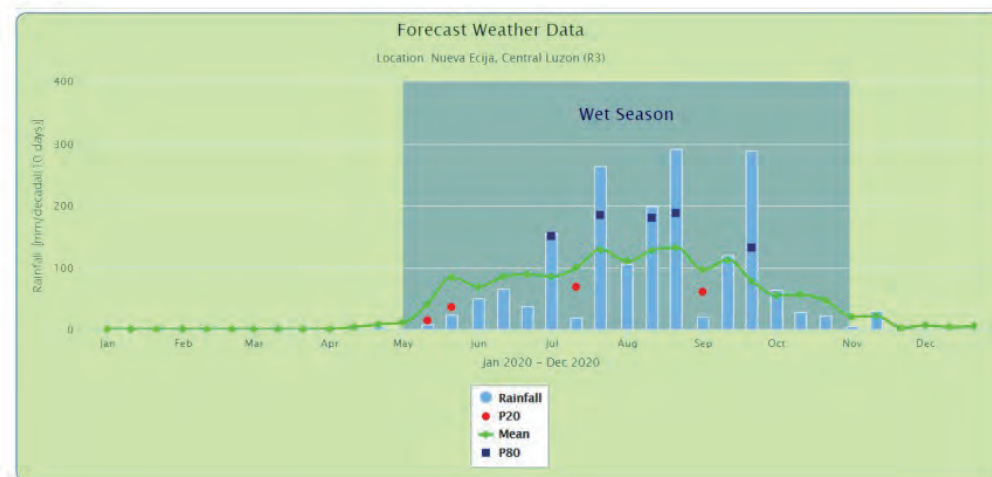


Fig 65. How to generate weather advisory

B. Crop Advisory

Select CROP ADVISORY tab. Choose the Location, Year and Variety combination for first crop and second crop. Click Show Advisory to display the crop prediction.

Crop Advisory

ORYZA version 3 was used to simulate grain yield scenarios. This allows us to predict the optimum crop schedule based on forecasted weather data. From these choices of possible scenarios, you can select the specific crop schedule that suits you best. In addition to that, we will guide you on several aspects to plan your cropping schedule.

Dataset

Location: Philippines Nueva Ecija, Central Luzon (R3)

Year: Forecast 2019

Rice Variety Combination

First crop Variety: NSICRC216

Second crop Variety: NSICRC216

Info on NSICRC216:

- Maturity: 104 days (short maturity)
- Yield Average: 4.92 t/ha
- Yield Potential: 9.70 t/ha

Show Advisory More Options

Optimum sowing dates for two cropping seasons

Below is the list of best schedules based on simulated grain yield values from ORYZA2000. The colored rows are the currently chosen schedule. You can choose an alternate schedule by clicking on the "Choose" button at the right side.

Location: Nueva Ecija, Central Luzon (R3), Philippines

Year: 2019 Forecast

First crop Sowing / Harvest	Second crop Sowing / Harvest	Variety	Rainfall (mm)	Yield (t/ha)	Yield Total (t/ha)
MAR-19 JUL-07		NSICRC216	788.4 above normal	2.62	
	JUL-26 NOV-04	NSICRC216	1529.8 above normal	6.71	9.33 Choose
	JUL-16 OCT-24	NSICRC216	1583.7 above normal	6.69	9.31 Choose
MAR-29 JUL-16		NSICRC216	836.1 above normal	2.45	
	JUL-26 NOV-04	NSICRC216	1529.8 above normal	6.71	9.16 Choose
	JUL-28 NOV-06	NSICRC216	1483.6 above normal	6.51	8.96 Choose

Fig 66. How to generate crop advisory