



**Food and Agriculture
Organization of the
United Nations**



Module 5

Create project files (PRMs) and run simulations

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(2023)

Context

- You will create project files to run simulations for long time series (89 years).
- You will use the plug-in to run simulations for wheat in two locations (Multan and Badin) under 2 RCPs scenarios (RCP 4.5 and 8.5) for the 2010-2099 period.



Project files
(.PRMs or .PROs)



Output files (daily
or seasonal)



Instruction-AquaCrop plug-in

➤ Paste [this file](#) into AquaCrop plug-in, folder SIMUL

NAME	DATE MODIFIED	TYPE	SIZE
LIST	17/08/2022 10:22	File folder	
OUTP	17/08/2022 10:22	File folder	
PARAM	17/08/2022 10:22	File folder	
SIMUL	22/11/2023 09:25	File folder	
aquacrop	22/11/2023 09:25	Application	1,741 KB
AUTHORS.md	22/11/2023 09:25	MD File	1 KB
LICENSE	22/11/2023 09:25	File	2 KB



Project file scheme

Crop_Location_SowingDate_Irrigation_RCP

Wheat_Badin_1Nov_7d11mm_45

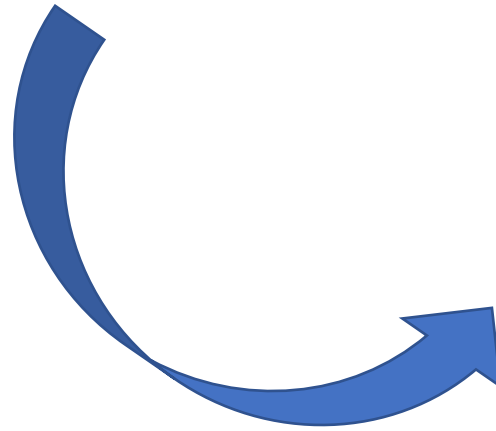
Wheat_Badin_1Nov_7d11mm_85

Wheat_Multan_1Nov_7d13mm_45

Wheat_Multan_1Nov_7d13mm_85

1) Download the DATA folder from GitHub (if you have already downloaded the whole repo, simply navigate to material for training sessions/Crop_Module_5/DATA

2) Copy and paste the DATA folder content to your personal DATA folder



CTRL + C - CTRL + V

Personal DATA folder

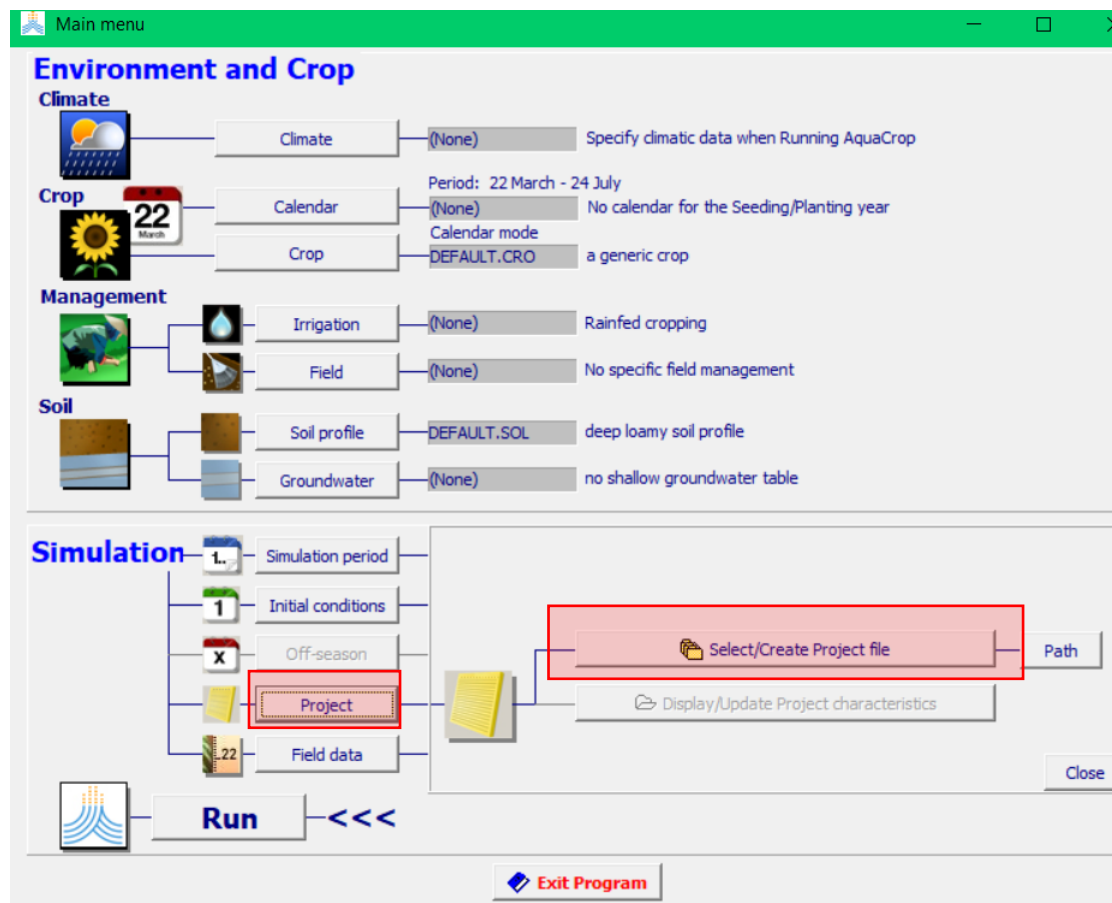
OS (C:) > FAO > Pakistan > GUI_AC71 > AquaCropV71No13102023 > DATA

Nome	Ultima modifica	Tipo	Dimensione
1stNov.CAL	20/11/2023 15:26	File CAL	1 KB
Badin_RCP45.CLI	29/11/2023 10:56	File CLI	1 KB
Badin_RCP85.CLI	29/11/2023 10:57	File CLI	1 KB
Multan_RCP45.CLI	29/11/2023 10:58	File CLI	1 KB
Multan_RCP85.CLI	29/11/2023 10:59	File CLI	1 KB
RCP4-5.CO2	21/10/2022 16:02	File CO2	3 KB
RCP8-5.CO2	21/10/2022 16:02	File CO2	3 KB
wheatpakistan.CRO	24/11/2023 15:17	File CRO	7 KB
Badin_7d11mm.IRR	01/12/2023 17:55	File IRR	1 KB
Multan_7d13mm.IRR	01/12/2023 17:58	File IRR	1 KB
Bad85.PLU	08/11/2023 12:41	File PLU	386 KB
Badin_RCP45.PLU	20/11/2023 18:14	File PLU	386 KB
Multan_RCP45.PLU	21/11/2023 17:26	File PLU	386 KB
Multan_RCP85.PLU	21/11/2023 17:28	File PLU	386 KB
ClayLoam_Multan.SOL	21/11/2023 17:33	File SOL	1 KB
Loam_Badin.SOL	20/11/2023 18:43	File SOL	1 KB
Pakistan.SW0	24/11/2023 14:28	File SW0	1 KB
Bad85.Tnx	08/11/2023 12:41	File TNX	707 KB
Badin_RCP45.Tnx	20/11/2023 18:14	File TNX	707 KB
Multan_RCP45.Tnx	21/11/2023 17:26	File TNX	707 KB
Multan_RCP85.Tnx	21/11/2023 17:28	File TNX	707 KB
Bad85.ETo	08/11/2023 12:41	WPS Spreadsheets...	386 KB
Badin_RCP45.ETo	20/11/2023 18:14	WPS Spreadsheets...	386 KB
Multan_RCP45.ETo	21/11/2023 17:26	WPS Spreadsheets...	386 KB
Multan_RCP85.ETo	21/11/2023 17:28	WPS Spreadsheets...	386 KB

1) Open AquaCrop

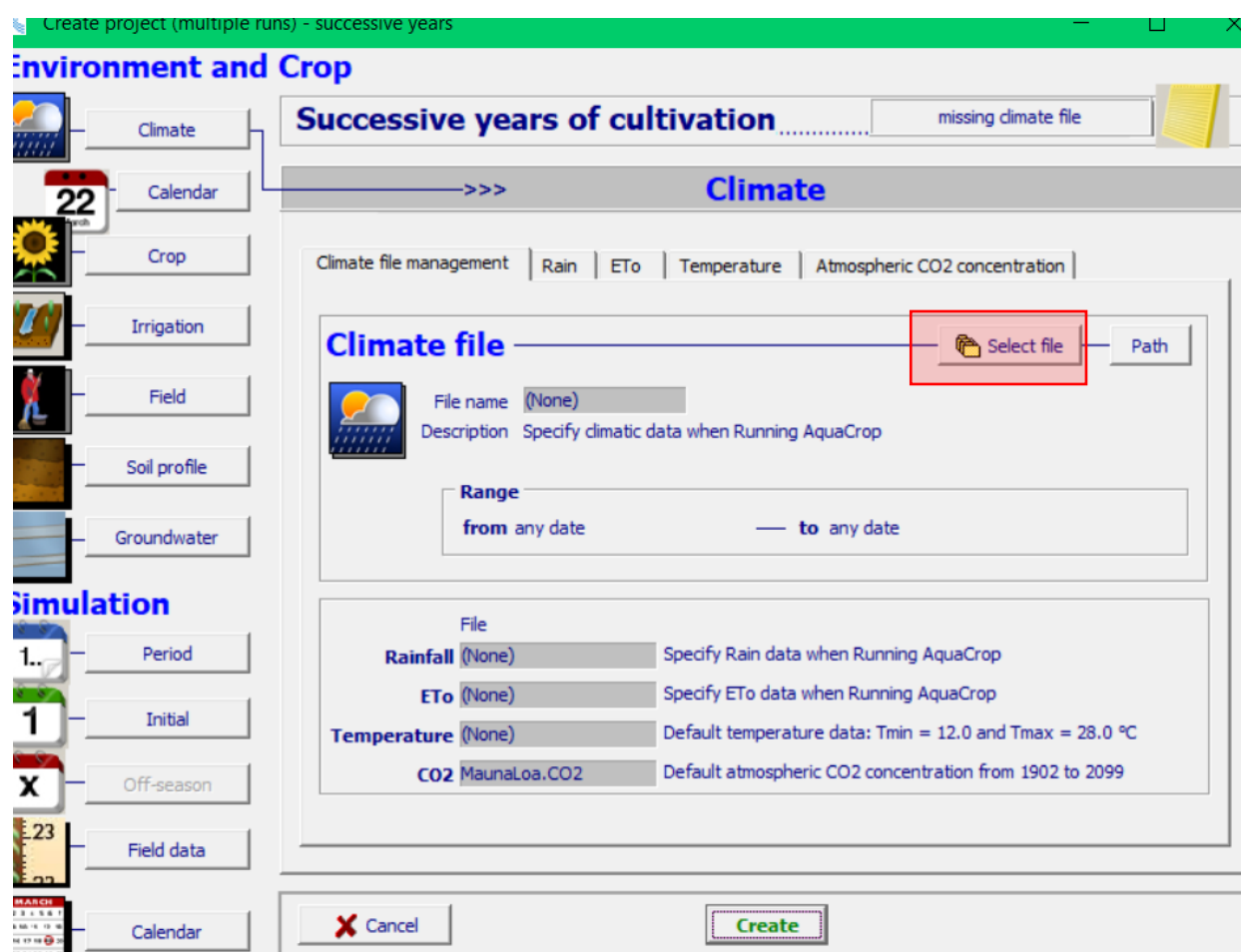
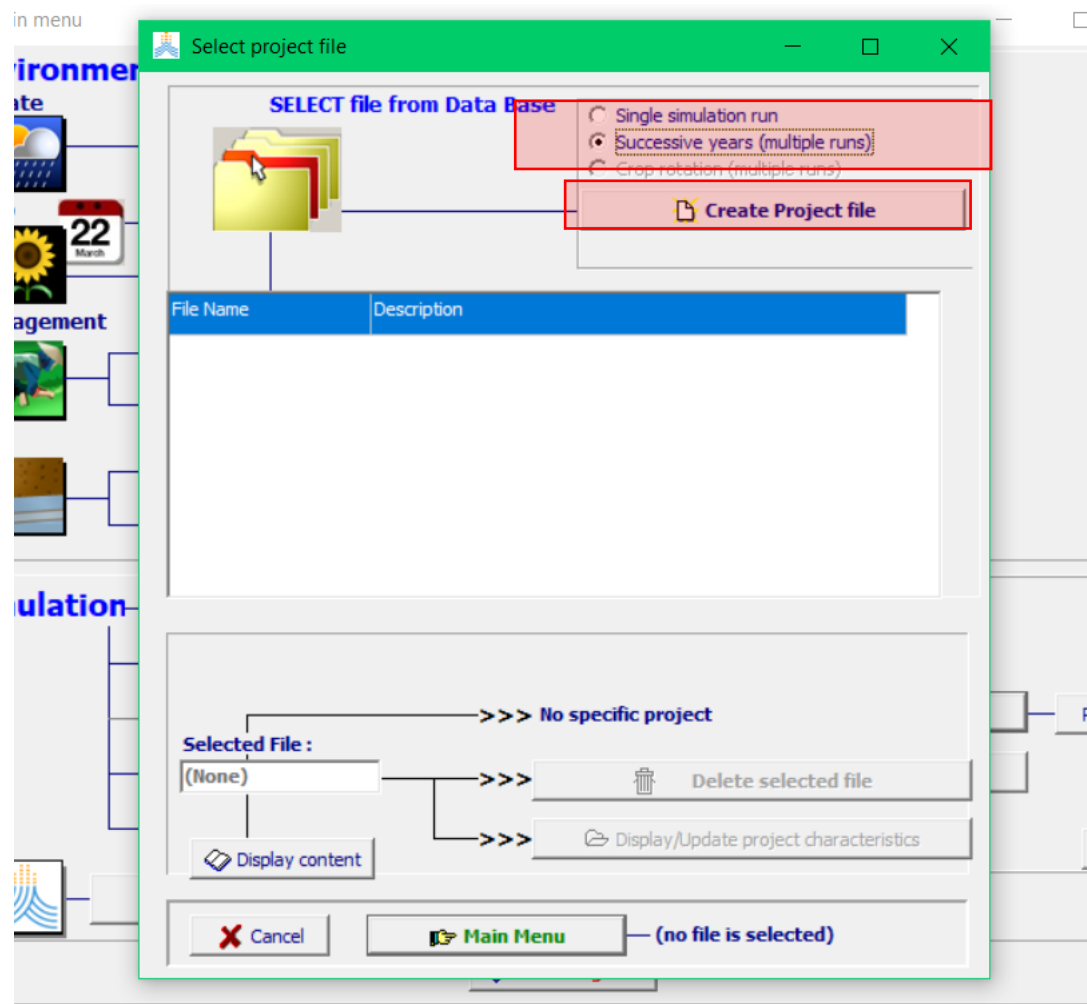
2) Select “Project”

3) Select “Select/Create Project file”



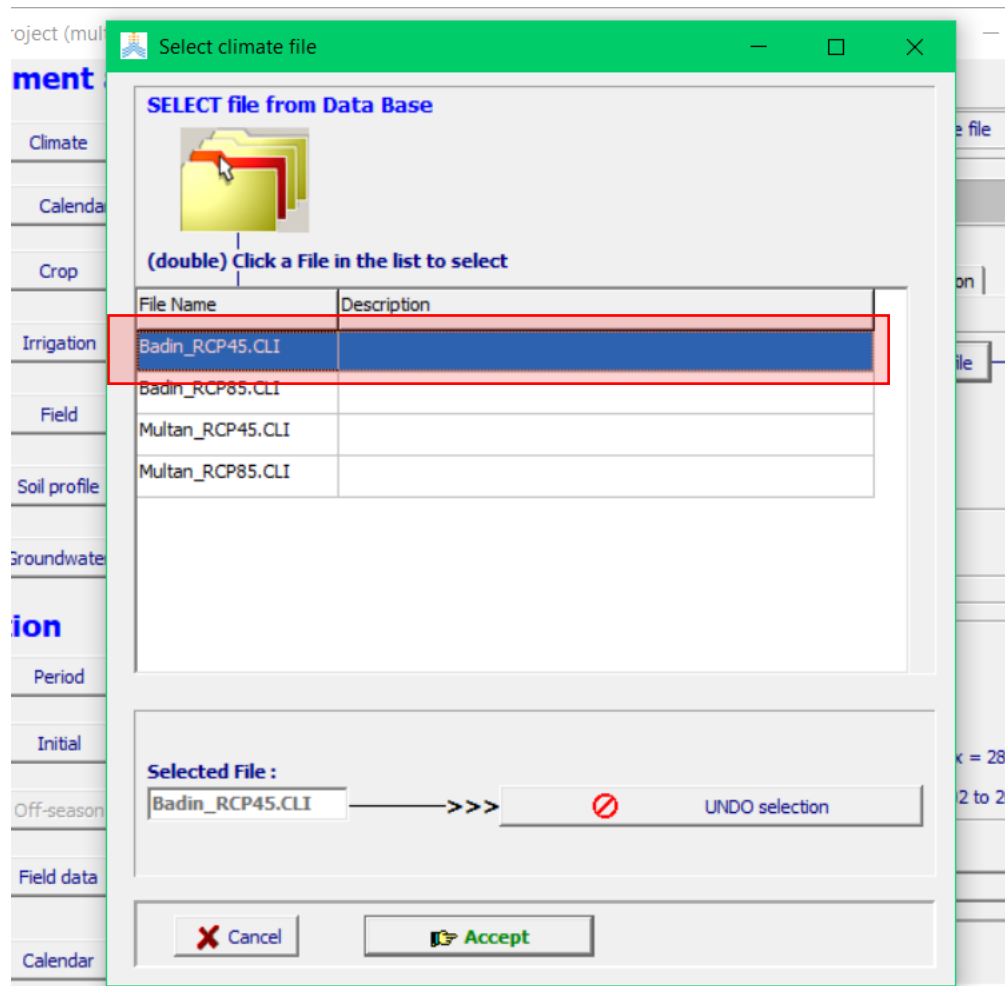
- 1) Select “Successive years (multiple runs)”
- 2) Select “Create Project file”

- 2) Click on “Select file” to select the CLIMATE file





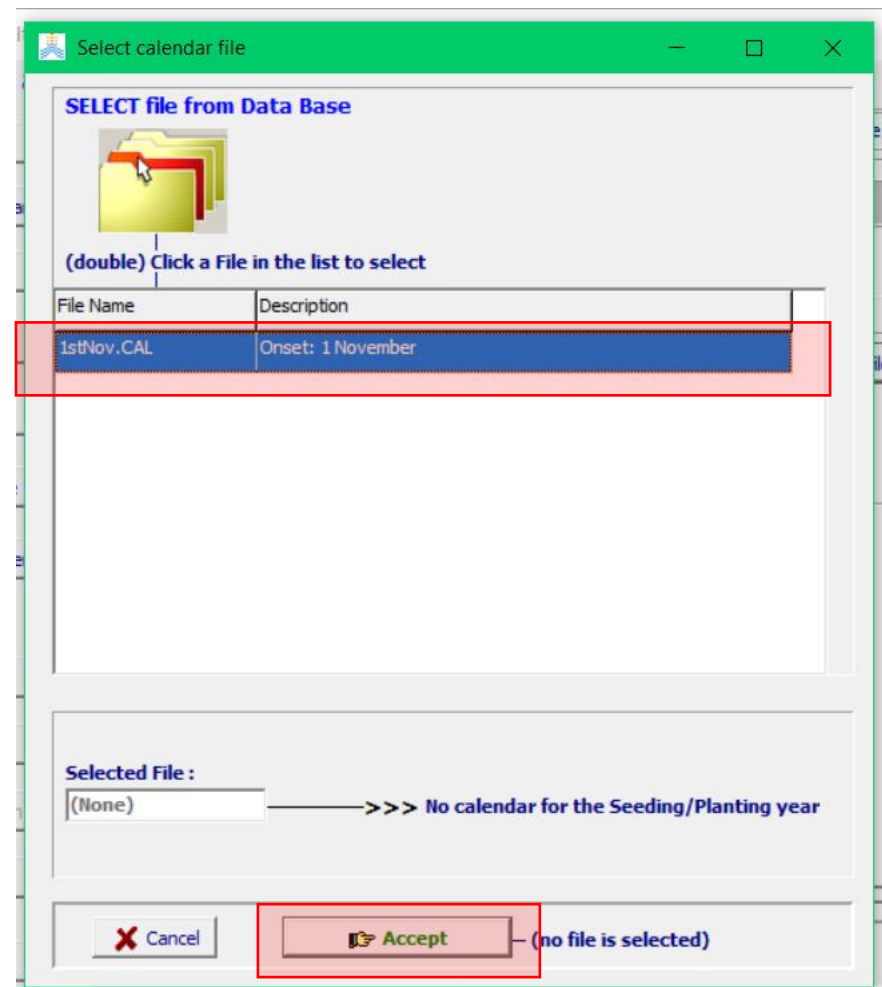
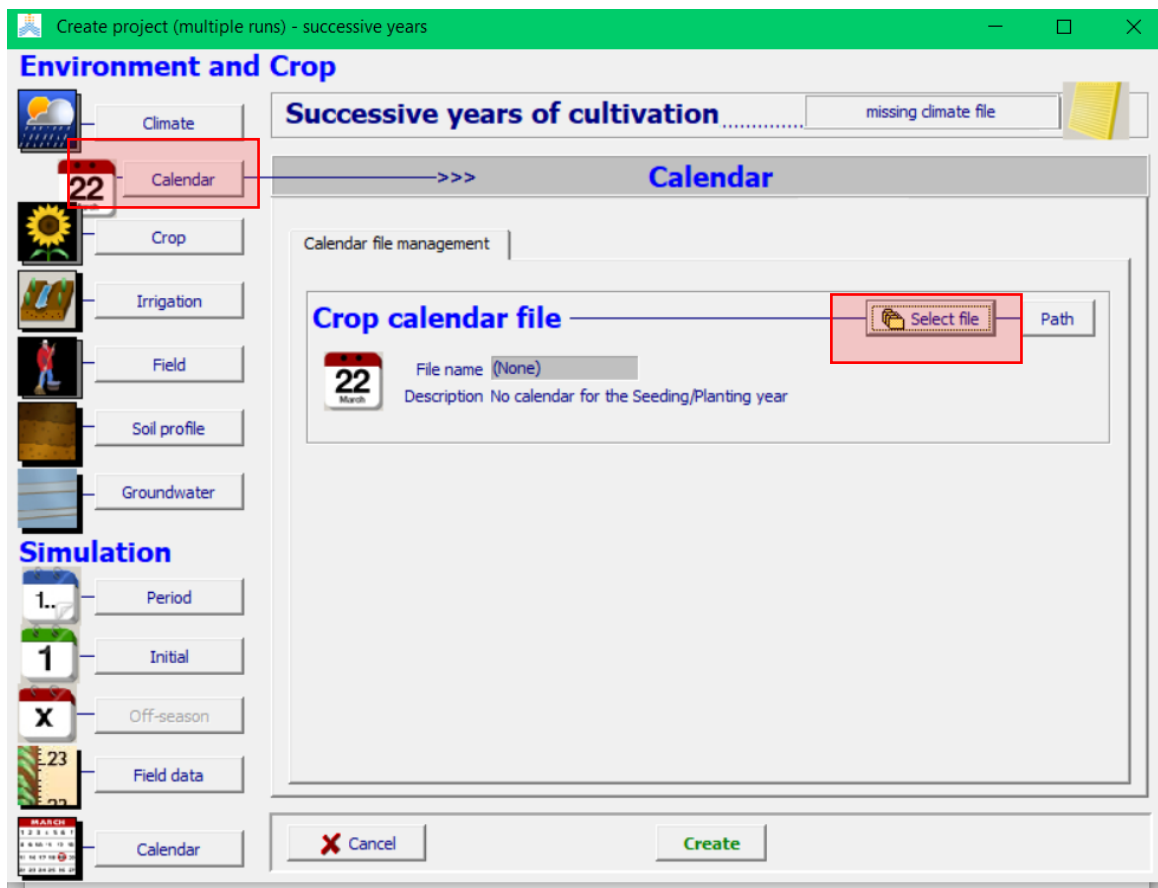
- 1) Select Badin_RCP45
- 2) Click on “Accept”





- 1) Select Calendar
- 2) Click on “Select file”

- 3) Select the 1st of November sowing date
- 4) Click on “Accept”





- 1) Select Crop
- 2) Click on "Select file"

- 3) Select the "WheatPakistan" file
- 4) Click on "Accept"

Create project (multiple runs) - successive years


Environment and Crop

Climate | Calendar | **Crop** | Irrigation | Field | Soil profile | Groundwater

Successive years of cultivation missing climate file

File management

Crop file

 File name: DEFAULT.CRO | Given length of growing period (days): 125
Description: a generic crop

Onset of growing period

As specified in calendar file | start at year: 2010

Cancel | Create

Select crop file

SELECT file from Data Base

(double) Click a File in the list to select

File Name	Description
wheatpakistan.CRO	wheatpakistancalibration

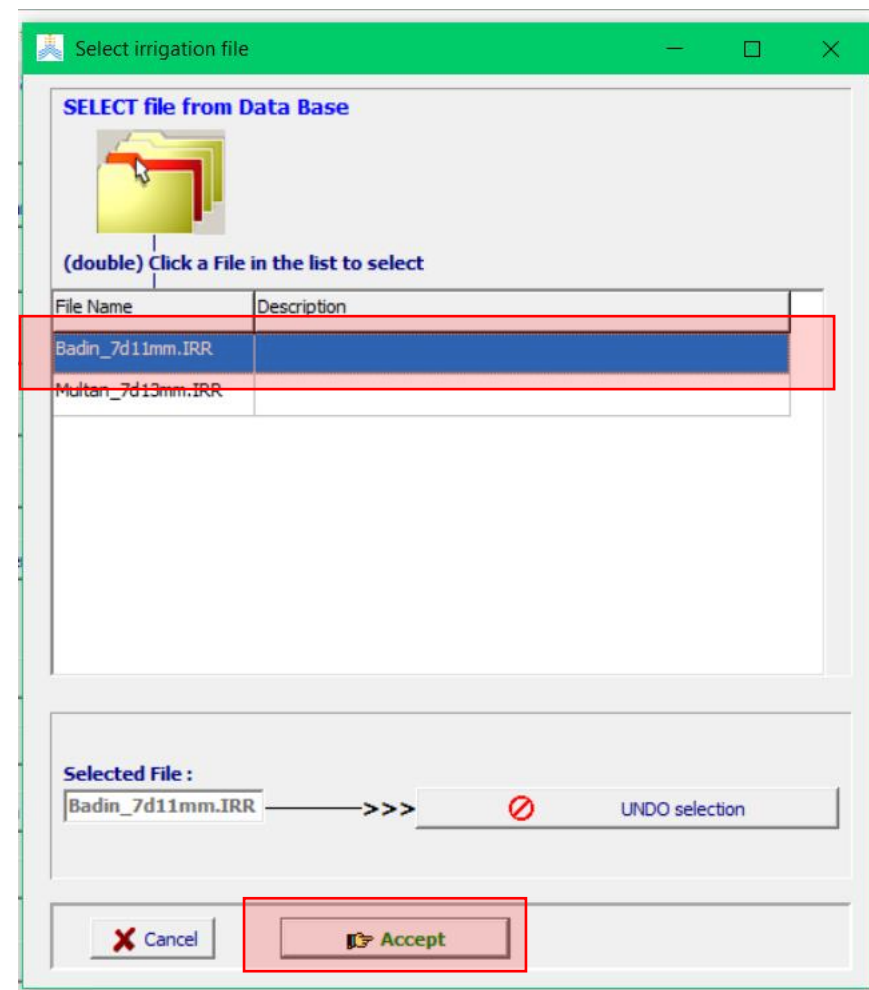
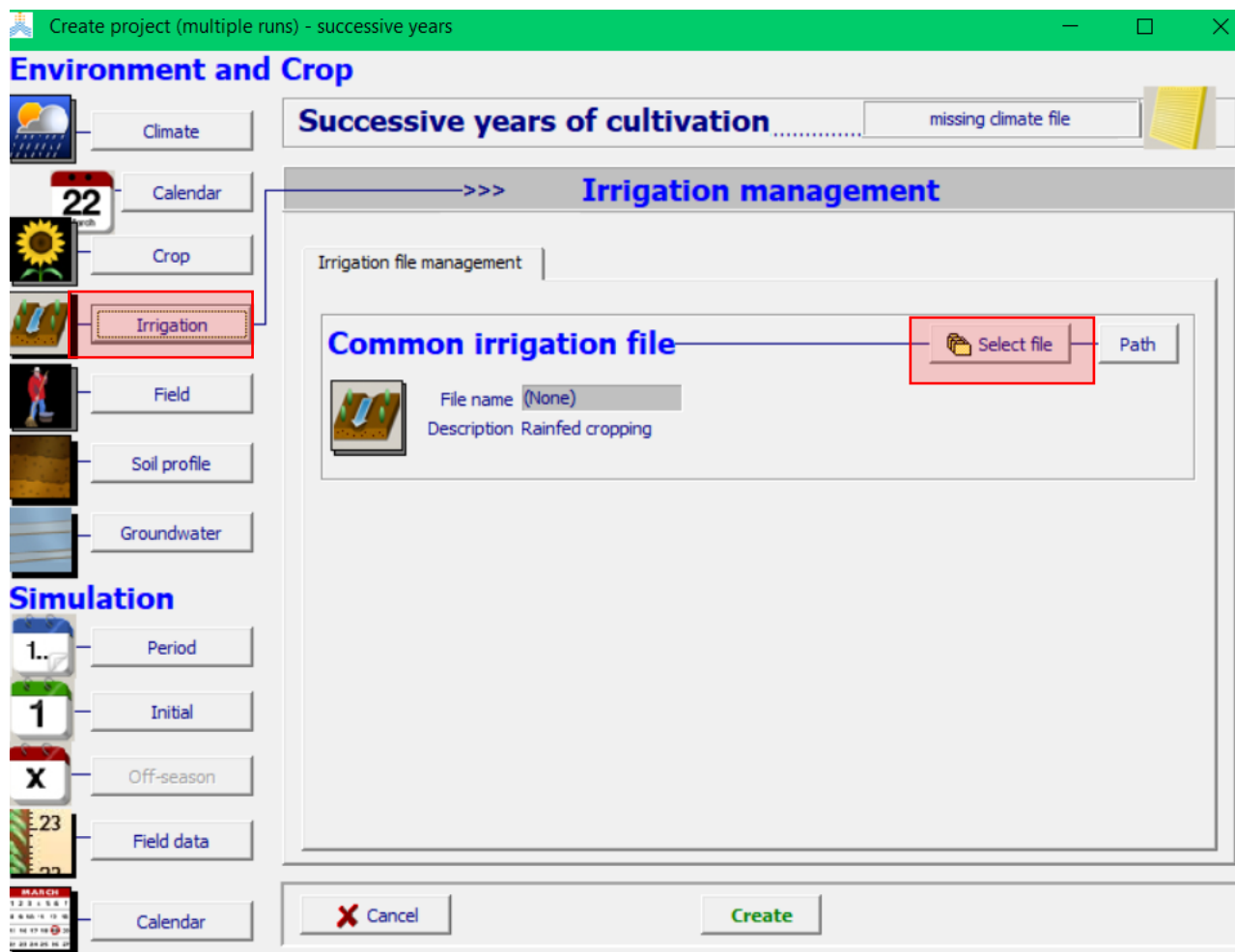
Selected File : wheatpakistan.CRO

Cancel | Accept



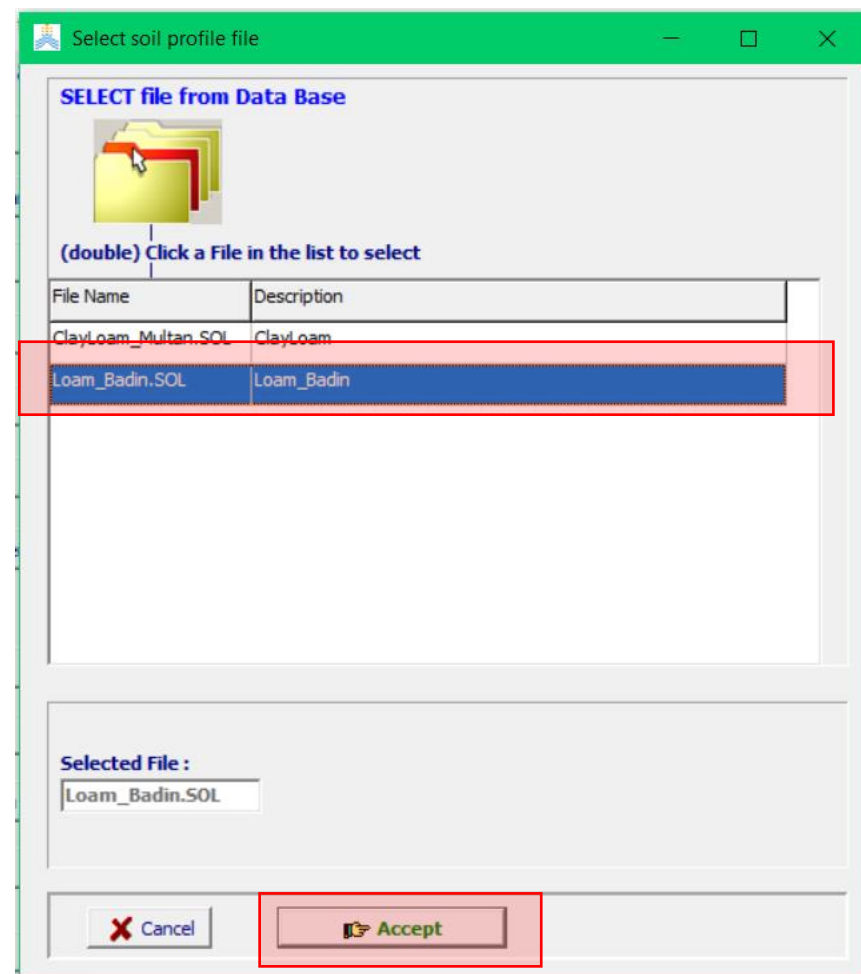
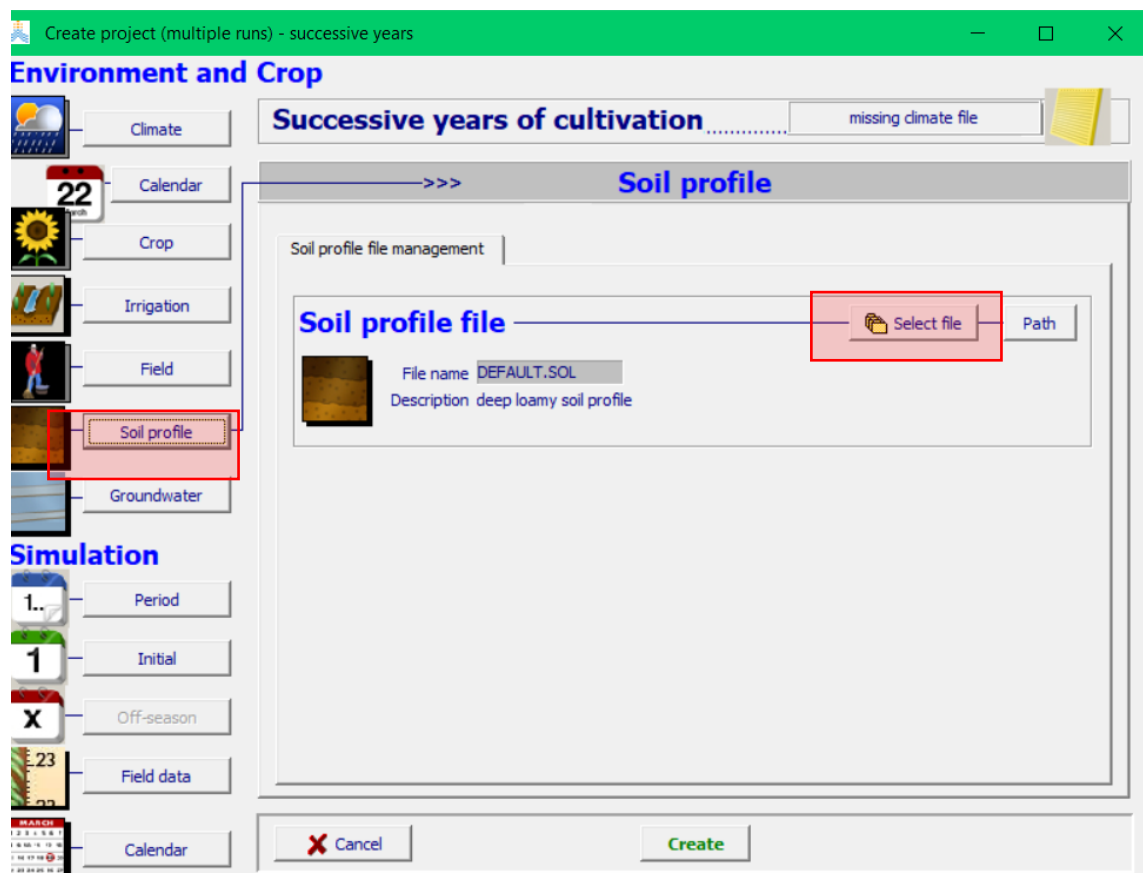
- 1) Select Irrigation
- 2) Click on “Select file”

- 3) Select Badin_7d11mm.IRR
- 4) Click on “Accept”



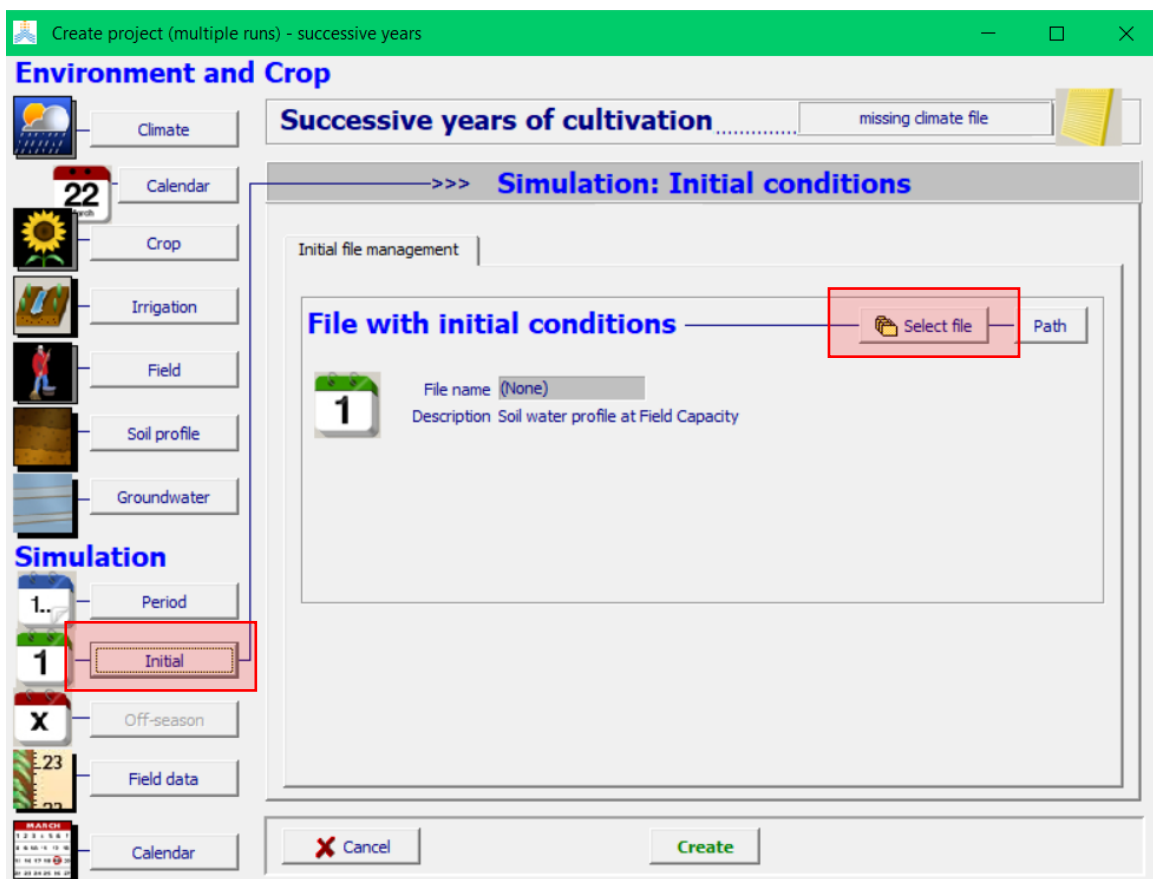
- 1) Select Soil
- 2) Click on "Select file"

- 3) Select Loam_Badin
- 4) Click on "Accept"





- 1) Select “Initial”
- 2) Click on “Select file”



- 3) Select “Pakistan.SW0”
- 4) Click on “Accept”

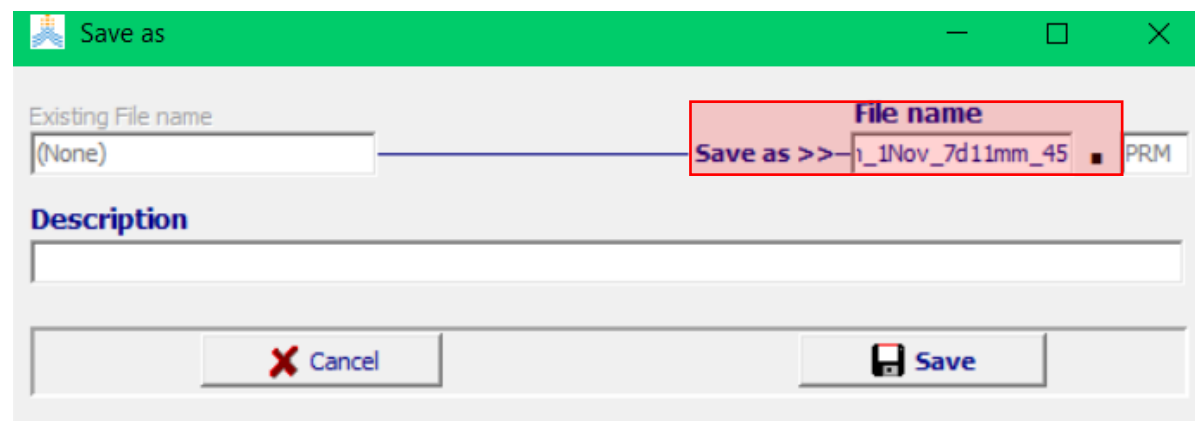
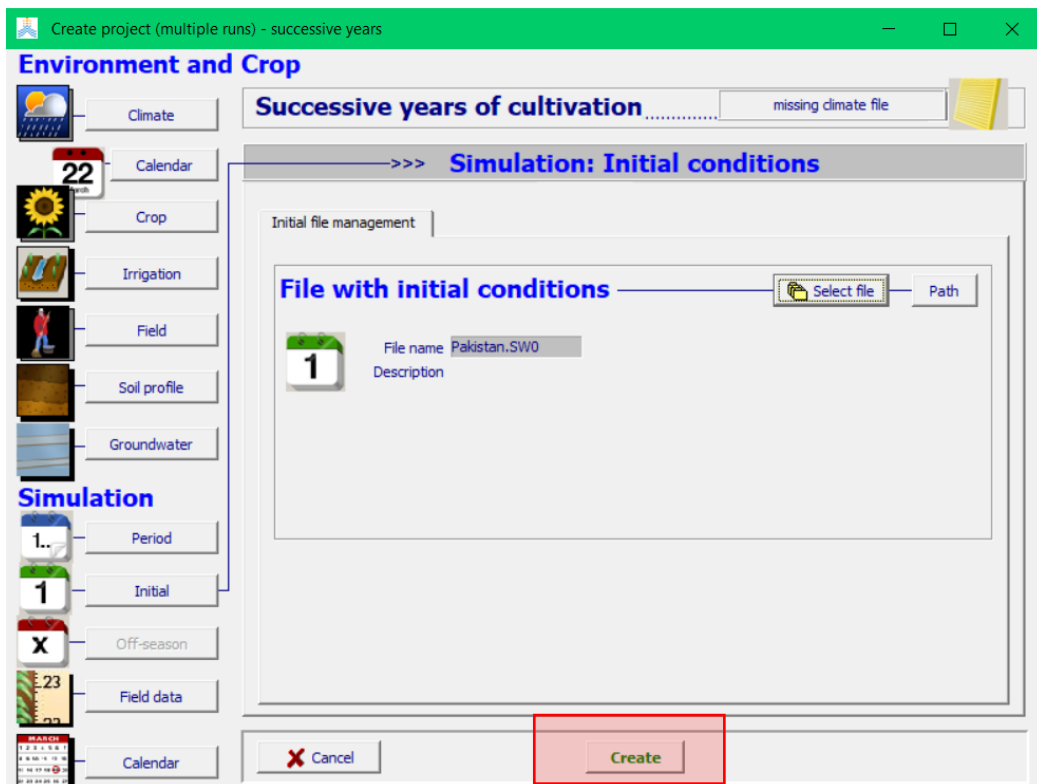


How to create the Project file: Wheat_Badin_1Nov_7d11mm_45

1) Select “Create”

3) Save this file as: **Wheat_Badin_1Nov_7d11mm_45**

4) Click on “Save”





How to create the Project file: **Wheat_Badin_1Nov_7d11mm_85**

Crop_Location_SowingDate_Irrigation_RCP

Wheat_Badin_1Nov_7d11mm_45 ☒

Wheat_Badin_1Nov_7d11mm_85 ☐

Wheat_Multan_1Nov_7d13mm_45 ☐

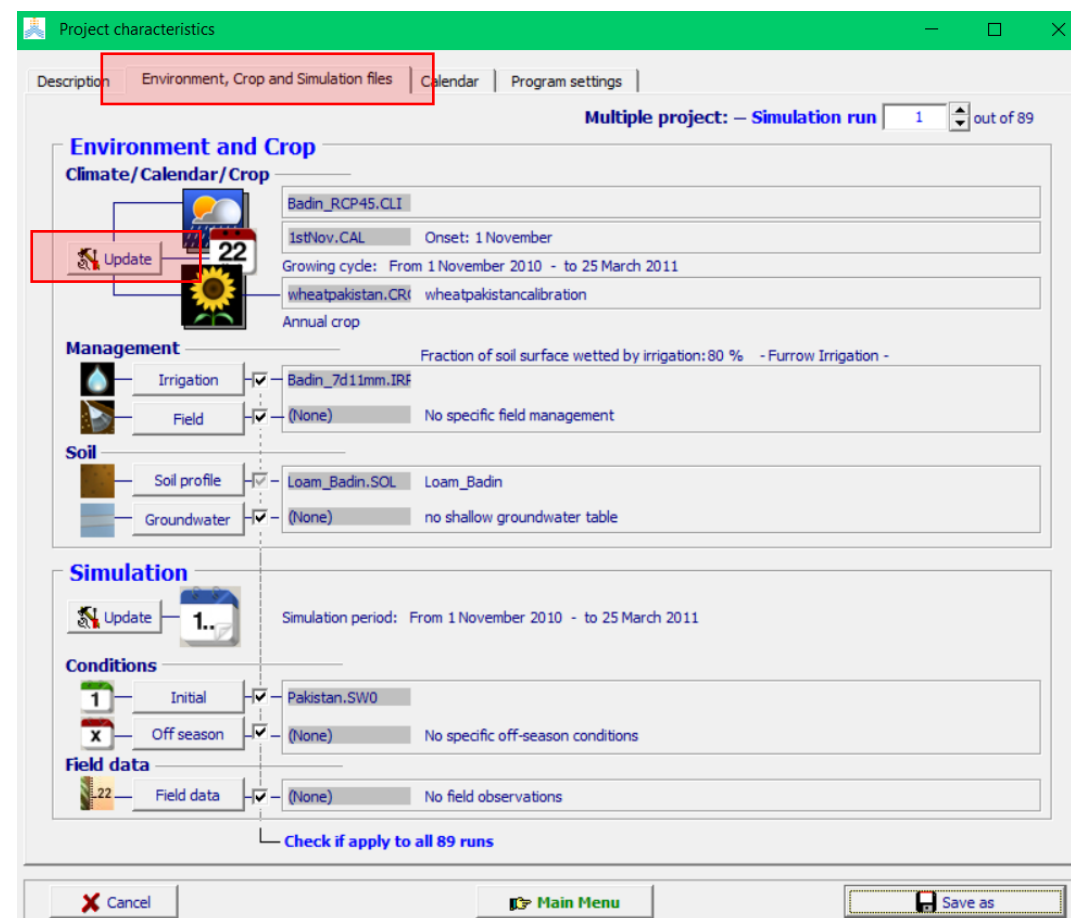
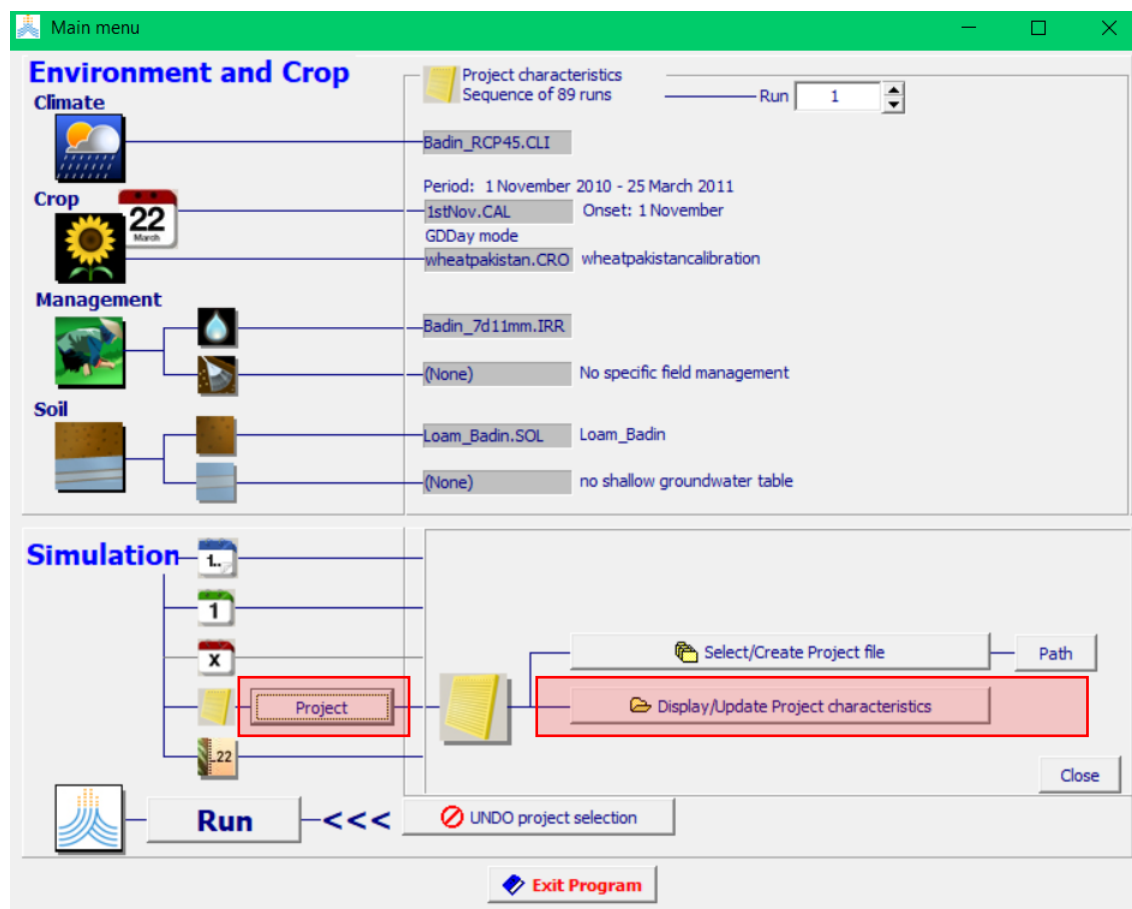
Wheat_Multan_1Nov_7d13mm_85 ☐



How to create the Project file: Wheat_Badin_1Nov_7d11mm_85

- 1) Make sure that the created project file is selected
- 2) Click on “Project”
- 3) Click on “Display/Update Project characteristic

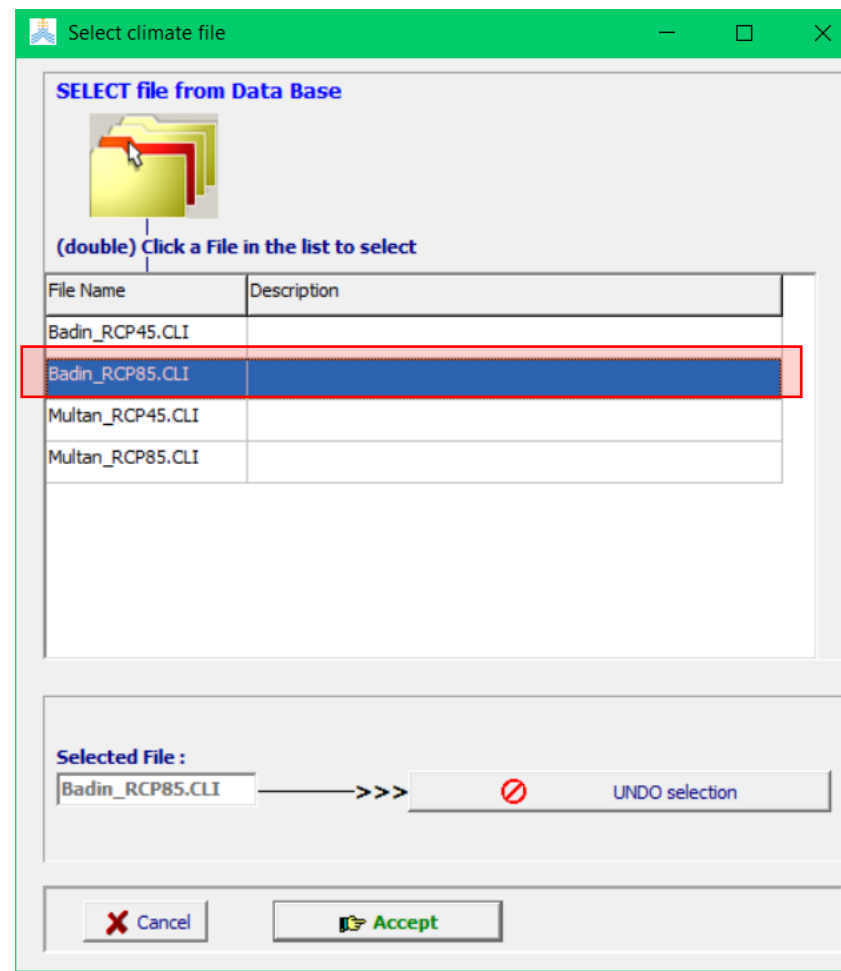
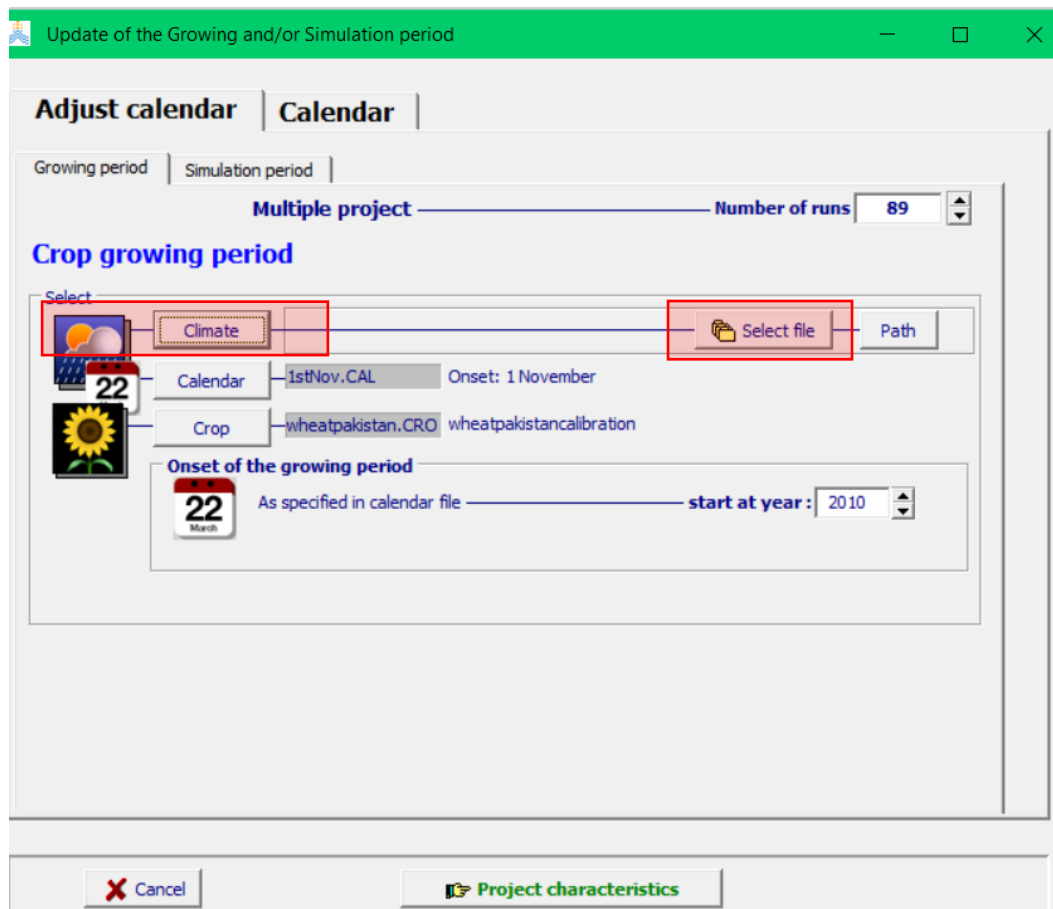
- 4) Select “Environment, Crop and Simulation files
- 5) Click on “Update”



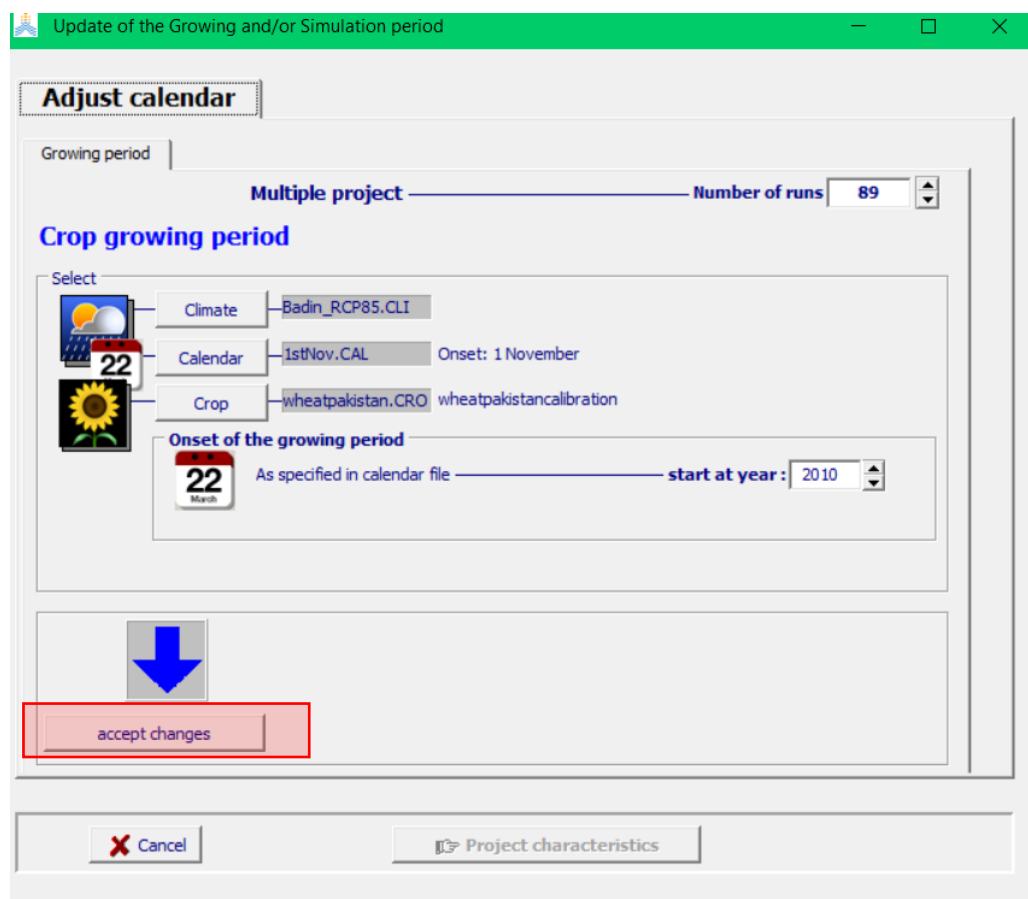
How to create the Project file: Wheat_Badin_1Nov_7d11mm_85

- 1) Click on “Climate”
- 2) Click on “Select file”

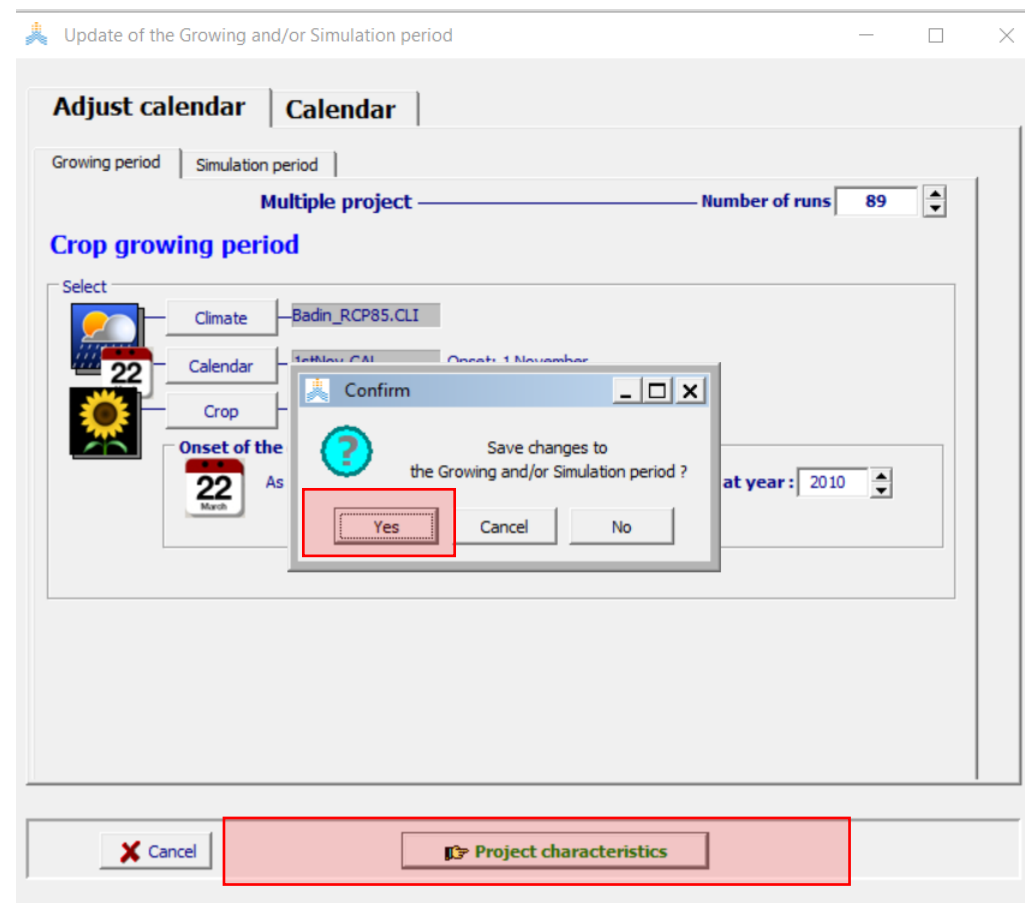
- 4) Select “Badin_RCP85”
- 5) Click on “Accept”



1) Click on “Accept changes”



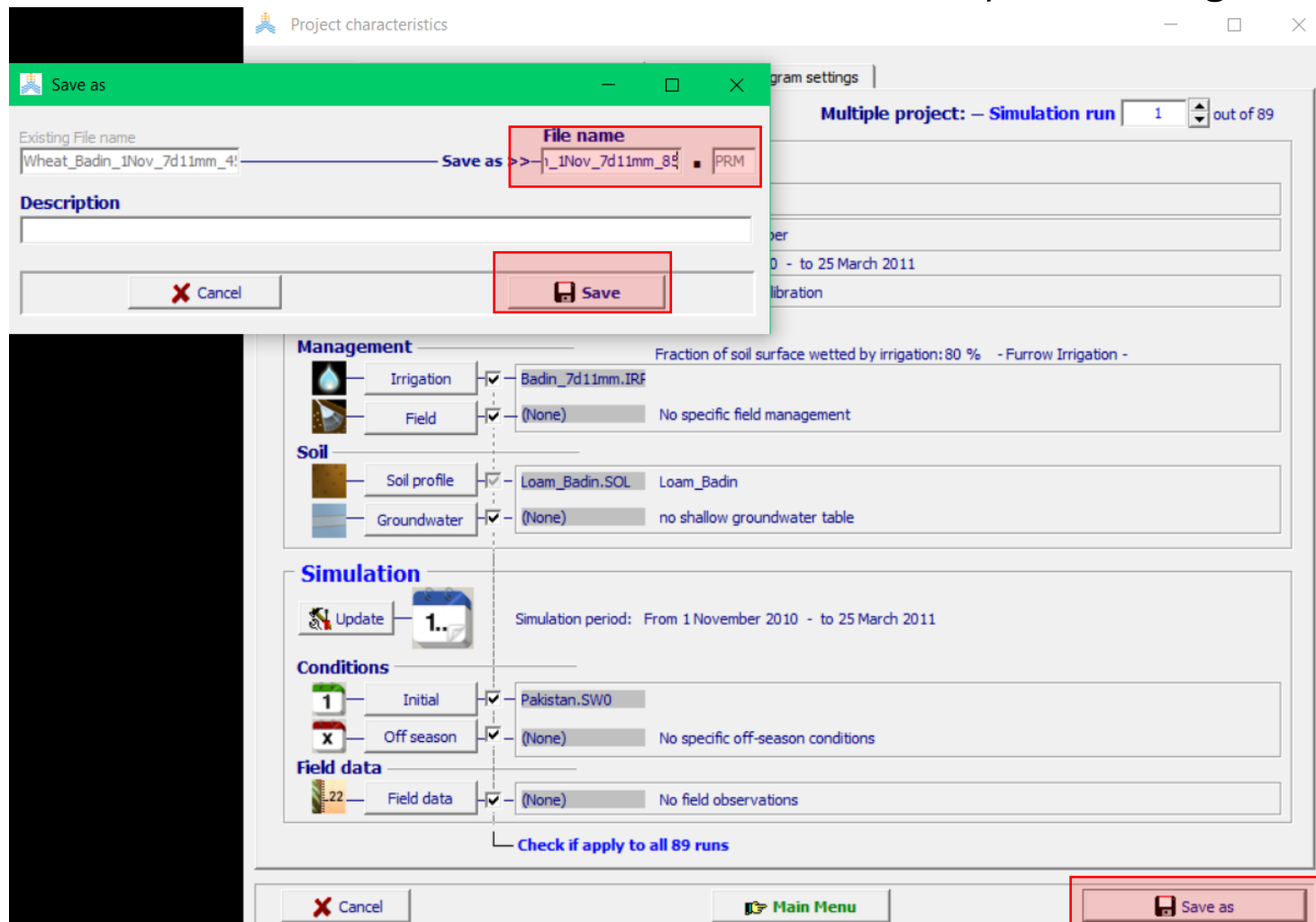
2) Select “Project characteristic”
3) Save changes clicking on “Yes”





How to create the Project file: **Wheat_Badin_1Nov_7d11mm_85**

- 1) Click on “Save as” (right bottom corner)
- 2) Name the file as: **Wheat_Badin_1Nov_7d11mm_85**
- 3) Save changes clicking on “Save”





How to create the Project file: **Wheat_Multan_1Nov_7d13mm_45**

Crop_Location_SowingDate_Irrigation_RCP

Wheat_Badin_1Nov_7d11mm_45 ☒

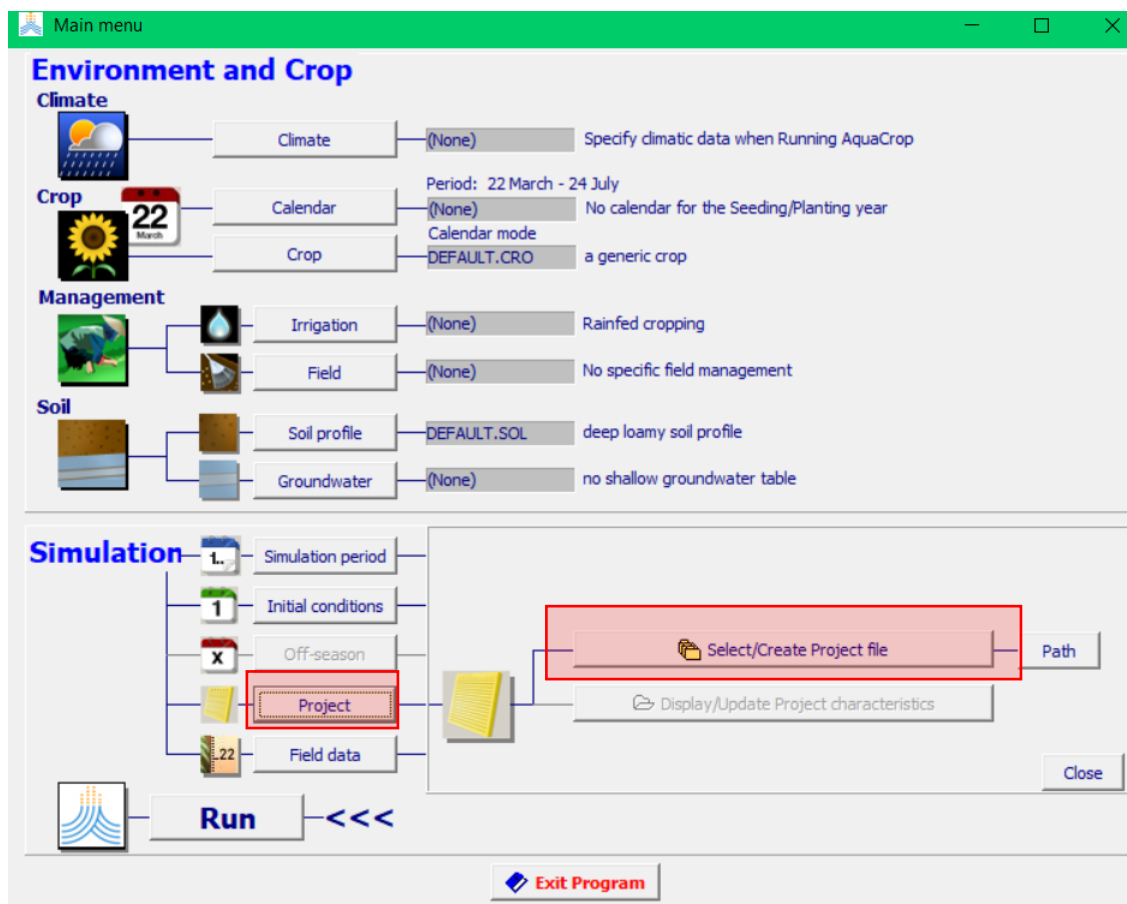
Wheat_Badin_1Nov_7d11mm_85 ☒

Wheat_Multan_1Nov_7d13mm_45 ☐

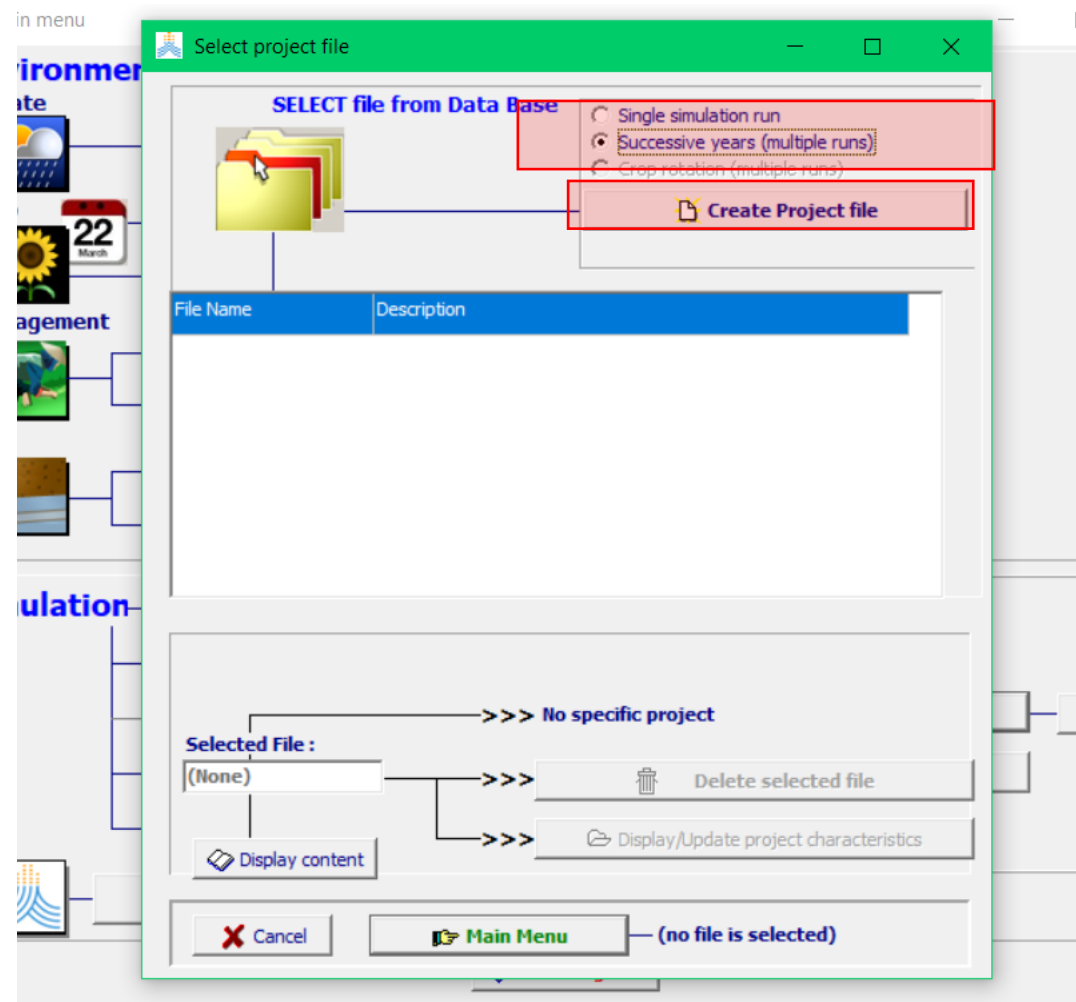
Wheat_Multan_1Nov_7d13mm_85 ☐



- 1) Select “Project”
- 2) Click on “Select/create Project file”



- 3) Select “Successive years (multiple runs)”
- 4) Click on “Create project file”





1) Step by step select the following files

Create project (multiple runs) - successive years

Environment and Crop

Climate
Calendar
Crop
Irrigation
Field
Soil profile
Groundwater

Simulation

1..
1
X
23
MARCH
2 3 4 5 6 7
8 9 10 11 12 13
14 15 16 17 18 19 20
21 22 23 24 25 26 27

Successive years of cultivation

missing climate file

Climate

Climate file management | Rain | ETo | Temperature | Atmospheric CO2 concentration

Climate file

Select file | Path

File name (None)

Description Specify climatic data when Running AquaCrop

Range

from any date — to any date

File

Rainfall (None) Specify Rain data when Running AquaCrop

ETo (None) Specify ETo data when Running AquaCrop

Temperature (None) Default temperature data: Tmin = 12.0 and Tmax = 28.0 °C

CO2 MaunaLoa.CO2 Default atmospheric CO2 concentration from 1902 to 2099

Cancel Create

Multan_RCP45

1stNovember

WheatPakistan

Multan_7d13mm

ClayLoam_Multan

Pakistan



How to create the Project file: Wheat_Multan_1Nov_7d13mm_45

1) After selecting all the files, click on “Create”

1) Save the file as “Wheat_Multan_1Nov_7d13mm_45”

Create project (multiple runs) - successive years

Environment and Crop

Climate | Calendar | Crop | Irrigation | Field | Soil profile | Groundwater

Successive years of cultivation missing climate file

Climate

Climate file management | Rain | ET0 | Temperature | Atmospheric CO2 concentration

Climate file ———— Select file ———— Path

File name (None)
Description Specify climatic data when Running AquaCrop

Range
from any date — to any date

File
Rainfall (None) Specify Rain data when Running AquaCrop
ET0 (None) Specify ET0 data when Running AquaCrop
Temperature (None) Default temperature data: Tmin = 12.0 and Tmax = 28.0 °C
CO2 MaunaLoa.CO2 Default atmospheric CO2 concentration from 1902 to 2099

Cancel Create

Save as

Existing File name (None) ———— Save as >> File name PRM

Description

Cancel Save



How to create the Project file: **Wheat_Multan_1Nov_7d13mm_85**

Crop_Location_SowingDate_Irrigation_RCP

Wheat_Badin_1Nov_7d11mm_45 ☒

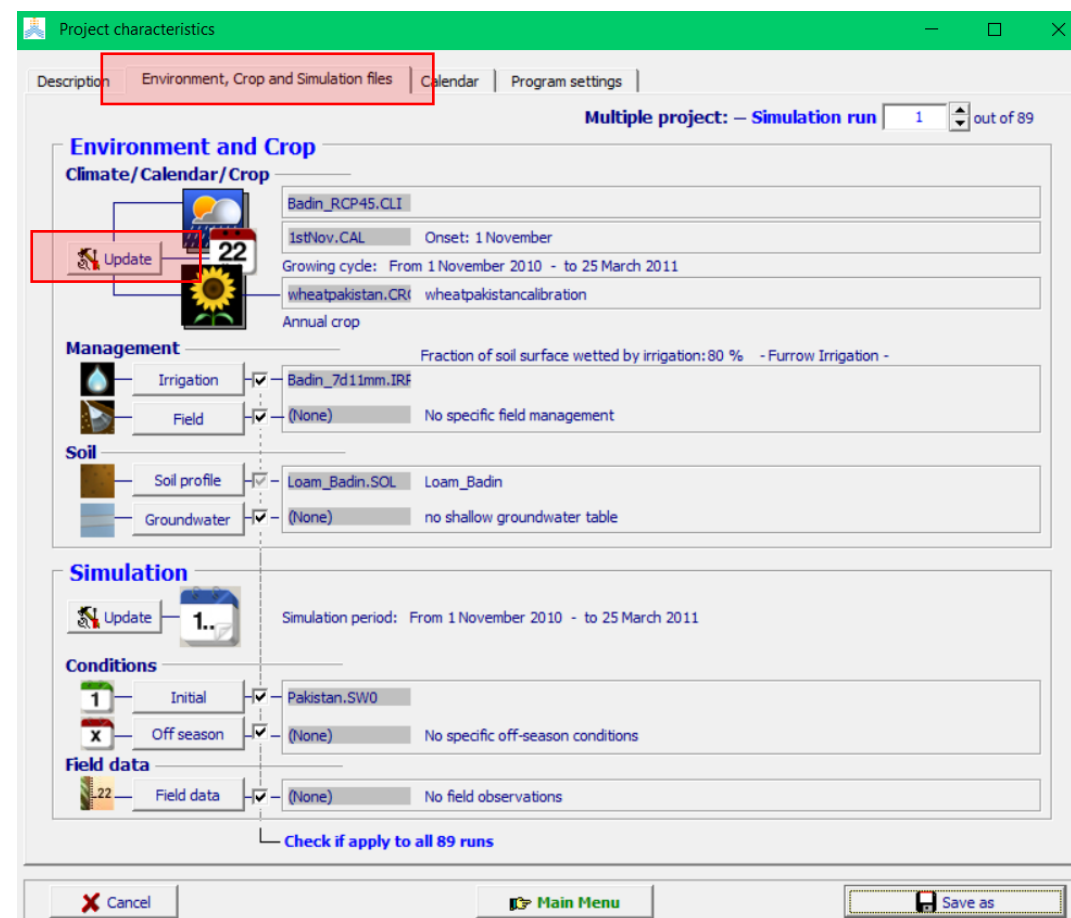
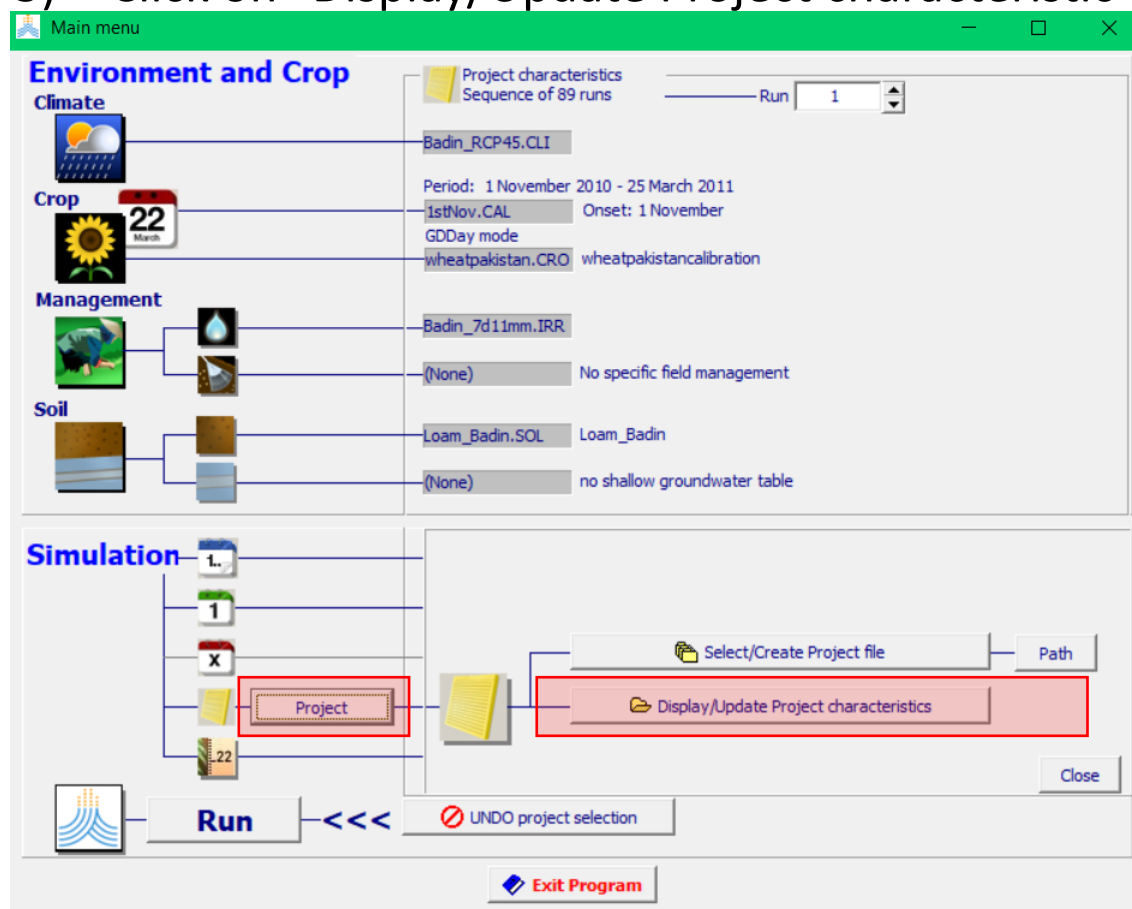
Wheat_Badin_1Nov_7d11mm_85 ☒

Wheat_Multan_1Nov_7d13mm_45 ☒

Wheat_Multan_1Nov_7d13mm_85 ☐

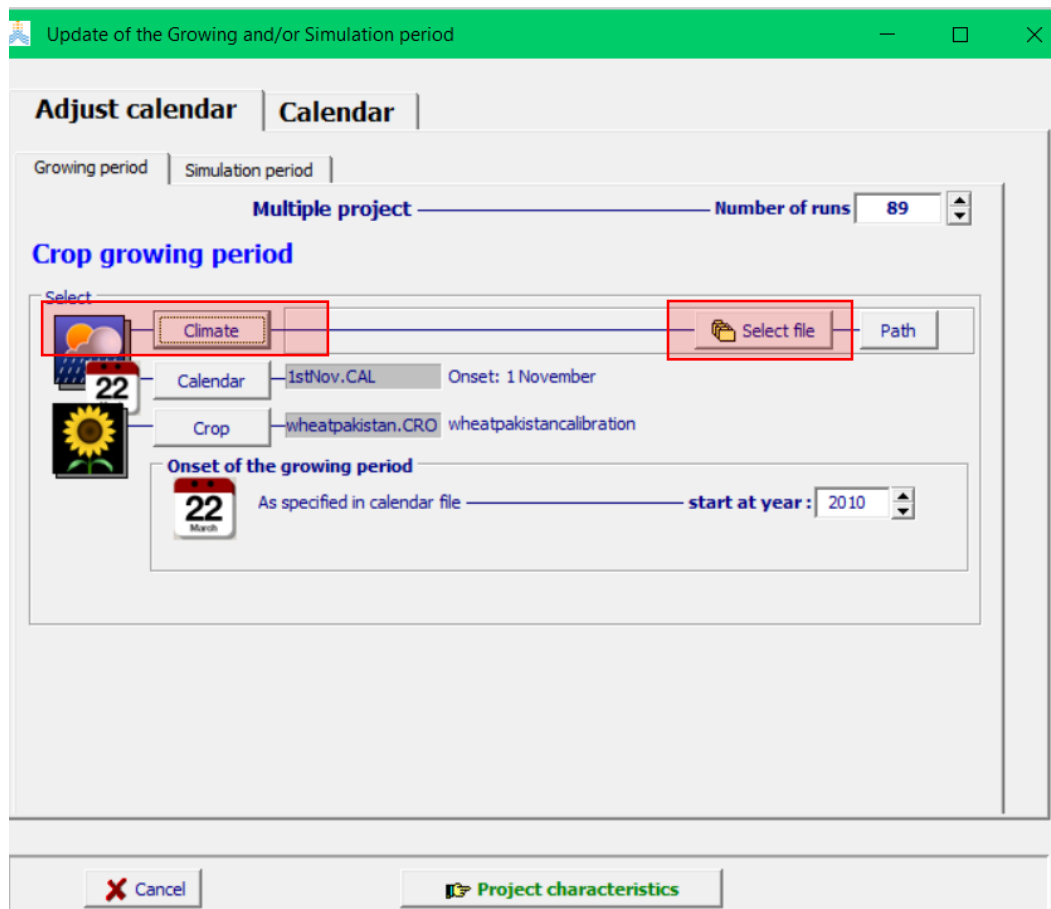
- 1) Make sure that the created project file for Multan RCP45 is selected
- 2) Click on “Project”
- 3) Click on “Display/Update Project characteristic

- 4) Select “Environment, Crop and Simulation files
- 5) Click on “Update”



- 1) Click on “Climate”
- 2) Click on “Select file”

- 4) Select “Multan_RCP85”
- 5) Click on “Accept”



1) Click on “Accept changes”

Update of the Growing and/or Simulation period

Adjust calendar

Growing period

Multiple project — Number of runs: 1

Crop growing period

Select

Climate: Multan_RCP85.CLI

Calendar: 1stNov.CAL Onset: 1 November

Crop: wheatpakistan.CRO wheatpakistancalibration

Onset of the growing period

22 March As specified in calendar file — start at year: 2010

accept changes

Cancel Project characteristics

2) Select “Project characteristic”

3) Save changes clicking on “Yes”

Update of the Growing and/or Simulation period

Adjust calendar **Calendar**

Growing period Simulation period

Multiple project — Number of runs: 89

Crop growing period

Select

Climate: Badin_RCP85.CLI

Calendar: 1stNov.CAL Onset: 1 November

Crop: wheatpakistan.CRO wheatpakistancalibration

Onset of the growing period

22 March As specified in calendar file — start at year: 2010

Confirm

Save changes to the Growing and/or Simulation period?

Yes Cancel No

Cancel Project characteristics



How to create the Project file: **Wheat_Multan_1Nov_7d13mm_85**

- 1) Click on “Save as” (right bottom corner)
- 2) Name the file as: **Wheat_Multan_1Nov_7d13mm_85**
- 3) Save changes clicking on “Save”

The screenshot displays the 'Project characteristics' window with a 'Save as' dialog box open. The dialog box has a green title bar and contains the following elements:

- Existing File name:** A text field containing 'Wheat_Multan_1Nov_7d13mm_85'.
- File name:** A text field containing 'h_1Nov_7d13mm_85'.
- Description:** An empty text field.
- Buttons:** 'Cancel' and 'Save' buttons at the bottom.

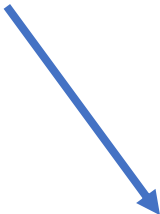
The background window, titled 'Project characteristics', shows the following settings:

- Management:** Irrigation (checked) set to 'Multan_7d13mm.IF', Field (checked) set to '(None)'. Fraction of soil surface wetted by irrigation: 80 % - Furrow Irrigation -
- Soil:** Soil profile (checked) set to 'ClayLoam_Multan.I', Groundwater (checked) set to '(None)'. ClayLoam, no shallow groundwater table.
- Simulation:** Simulation period: From 1 November 2010 - to 13 April 2011.
- Conditions:** Initial (checked) set to 'Pakistan.SW0', Off season (checked) set to '(None)'. No specific off-season conditions.
- Field data:** Field data (checked) set to '(None)'. No field observations.
- Buttons:** 'Cancel', 'Main Menu', and 'Save as' buttons at the bottom.

All the project files are created, you can find them in the DATA folder of AquaCrop

Crop_Location_SowingDate_Irrigation_RCP

Wheat_Badin_1Nov_7d11mm_45	<input checked="" type="checkbox"/>
Wheat_Badin_1Nov_7d11mm_85	<input checked="" type="checkbox"/>
Wheat_Multan_1Nov_7d13mm_45	<input checked="" type="checkbox"/>
Wheat_Multan_1Nov_7d13mm_85	<input checked="" type="checkbox"/>

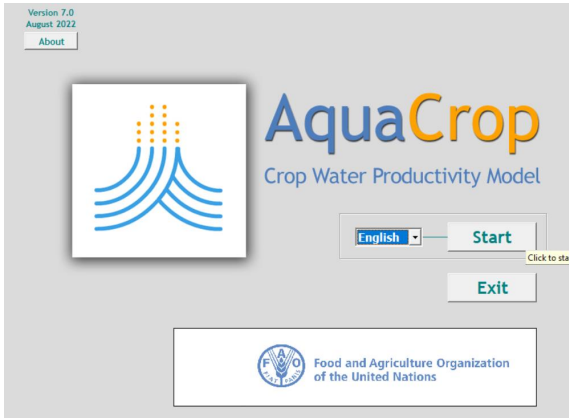


(C:) > FAO > Pakistan > GUI_AC71 > AquaCropV71No13102023 > DATA

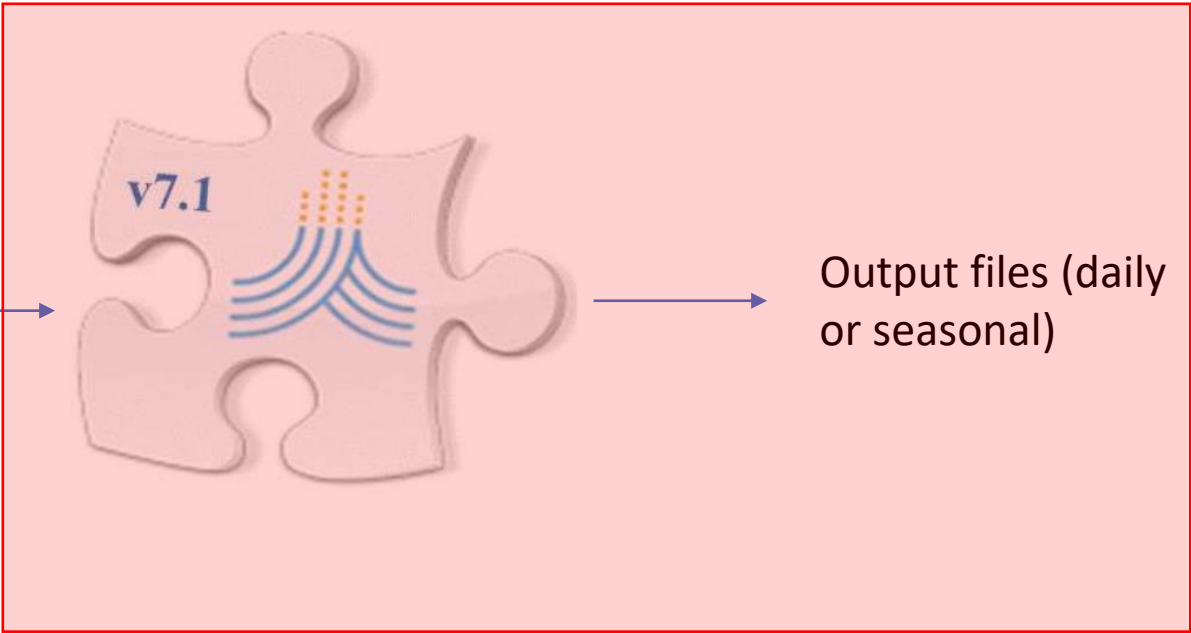
Nome	Ultima modifica	Tipo
RCP4-5.CO2	21/10/2022 16:02	File CO2
RCP8-5.CO2	21/10/2022 16:02	File CO2
wheatpakistan.CRO	24/11/2023 15:17	File CRO
Badin_7d11mm.IRR	01/12/2023 17:55	File IRR
Multan_7d13mm.IRR	01/12/2023 17:58	File IRR
Bad85.PLU	08/11/2023 12:41	File PLU
Badin_RCP45.PLU	20/11/2023 18:14	File PLU
Multan_RCP45.PLU	21/11/2023 17:26	File PLU
Multan_RCP85.PLU	21/11/2023 17:28	File PLU
Wheat_Badin_1Nov_7d11mm_45.PPn	04/12/2023 15:57	File PPn
Wheat_Badin_1Nov_7d11mm_85.PPn	04/12/2023 16:19	File PPn
Wheat_Multan_1Nov_7d13mm_45.PPn	04/12/2023 16:47	File PPn
Wheat_Multan_1Nov_7d13mm_85.PPn	04/12/2023 16:39	File PPn
Wheat_Badin_1Nov_7d11mm_45.PRM	04/12/2023 15:57	File PRM
Wheat_Badin_1Nov_7d11mm_85.PRM	04/12/2023 16:19	File PRM
Wheat_Multan_1Nov_7d13mm_45.PRM	04/12/2023 16:47	File PRM
Wheat_Multan_1Nov_7d13mm_85.PRM	04/12/2023 16:39	File PRM



Use of the Plug-in



Project files
(.PRMs or .PROs)



Output files (daily
or seasonal)



Use of the Plugin

Copy and paste the PRM files from the DATA folder of GUI_AC71 to the LIST folder of the PLUGIN

(C:) > FAO > Pakistan > GUI_AC71 > AquaCropV71No13102023 > DATA

Nome	Ultima modifica	Tipo
RCP4-5.CO2	21/10/2022 16:02	File CO2
RCP8-5.CO2	21/10/2022 16:02	File CO2
wheatpakistan.CRO	24/11/2023 15:17	File CRO
Badin_7d11mm.IRR	01/12/2023 17:55	File IRR
Multan_7d13mm.IRR	01/12/2023 17:58	File IRR
Bad85.PLU	08/11/2023 12:41	File PLU
Badin_RCP45.PLU	20/11/2023 18:14	File PLU
Multan_RCP45.PLU	21/11/2023 17:26	File PLU
Multan_RCP85.PLU	21/11/2023 17:28	File PLU
Wheat_Badin_1Nov_7d11mm_45.PPn	04/12/2023 15:57	File PPn
Wheat_Badin_1Nov_7d11mm_85.PPn	04/12/2023 16:19	File PPn
Wheat_Multan_1Nov_7d13mm_45.PPn	04/12/2023 16:47	File PPn
Wheat_Multan_1Nov_7d13mm_85.PPn	04/12/2023 16:39	File PPn
Wheat_Badin_1Nov_7d11mm_45.PRM	04/12/2023 15:57	File PRM
Wheat_Badin_1Nov_7d11mm_85.PRM	04/12/2023 16:19	File PRM
Wheat_Multan_1Nov_7d13mm_45.PRM	04/12/2023 16:47	File PRM
Wheat_Multan_1Nov_7d13mm_85.PRM	04/12/2023 16:39	File PRM

(C:) > FAO > Pakistan > aquacrop-7.1-x86_64-windows >

Nome	Ultima modifica	Tipo	Dimensione
LIST	01/12/2023 18:05	Cartella di file	
OUT+PRMs	01/12/2023 18:07	Cartella di file	
OUTP	01/12/2023 18:06	Cartella di file	
PARAM	17/08/2022 10:22	Cartella di file	
SIMUL	20/11/2023 15:29	Cartella di file	
aquacrop.exe	20/11/2023 15:24	Applicazione	1.741 KB
AUTHORS.md	20/11/2023 15:24	File MD	1 KB
LICENSE	20/11/2023 15:24	File	2 KB



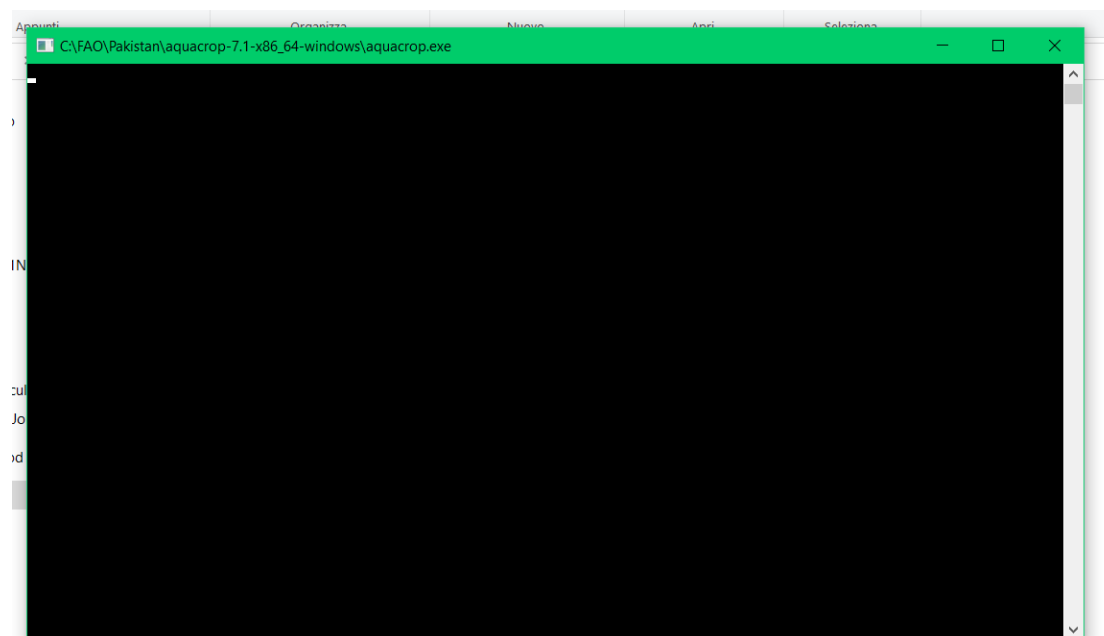
Use of the Plugin

Double click on the .exe file to run the plugin

IS (C:) > FAO > Pakistan > aquacrop-7.1-x86_64-windows >

Nome	Ultima modifica	Tipo	Dimensione
LIST	01/12/2023 18:05	Cartella di file	
OUT+PRMs	01/12/2023 18:07	Cartella di file	
OUTP	01/12/2023 18:06	Cartella di file	
PARAM	17/08/2022 10:22	Cartella di file	
SIMUL	20/11/2023 15:29	Cartella di file	
aquacrop.exe	20/11/2023 15:24	Applicazione	1.741 KB
AUTHORS.md	20/11/2023 15:24	File MD	1 KB
LICENSE	20/11/2023 15:24	File	2 KB

The plugin does not have an interface, wait until this black window closes.



You can find the OUTPUT data in the OUT folder: the plugin produces two OUT files per PRM: daily and seasonal files.

S (C:) > FAO > Pakistan > aquacrop-7.1-x86_64-windows >

Nome	Ultima modifica	Tipo	Dimensione
LIST	01/12/2023 18:05	Cartella di file	
OUT+PRMs	01/12/2023 18:07	Cartella di file	
OUTP	01/12/2023 18:06	Cartella di file	
PARAM	17/08/2022 10:22	Cartella di file	
SIMUL	20/11/2023 15:29	Cartella di file	
aquacrop.exe	20/11/2023 15:24	Applicazione	1.741 KB
AUTHORS.md	20/11/2023 15:24	File MD	1 KB
LICENSE	20/11/2023 15:24	File	2 KB

S (C:) > FAO > Pakistan > aquacrop-7.1-x86_64-windows > OUTP

Nome	Ultima modifica	Tipo	Dimensione
AllDone.OUT	04/12/2023 16:58	File OUT	1 KB
ListProjectsLoaded.OUT	04/12/2023 16:58	File OUT	1 KB
Wheat_Badin_1Nov_7d11mm_45PRMday....	04/12/2023 16:58	File OUT	9.466 KB
Wheat_Badin_1Nov_7d11mm_45PRMseas...	04/12/2023 16:58	File OUT	36 KB
Wheat_Badin_1Nov_7d11mm_85PRMday....	01/12/2023 18:06	File OUT	9.235 KB
Wheat_Badin_1Nov_7d11mm_85PRMseas...	01/12/2023 18:06	File OUT	36 KB
Wheat_Multan_1Nov_7d13mm_45PRMda...	01/12/2023 18:06	File OUT	10.581 KB
Wheat_Multan_1Nov_7d13mm_45PRMse...	01/12/2023 18:06	File OUT	36 KB
Wheat_Multan_1Nov_7d13mm_85PRMda...	01/12/2023 18:07	File OUT	10.261 KB
Wheat_Multan_1Nov_7d13mm_85PRMse...	01/12/2023 18:07	File OUT	36 KB

Thank you!

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