Example on Deficit irrigation

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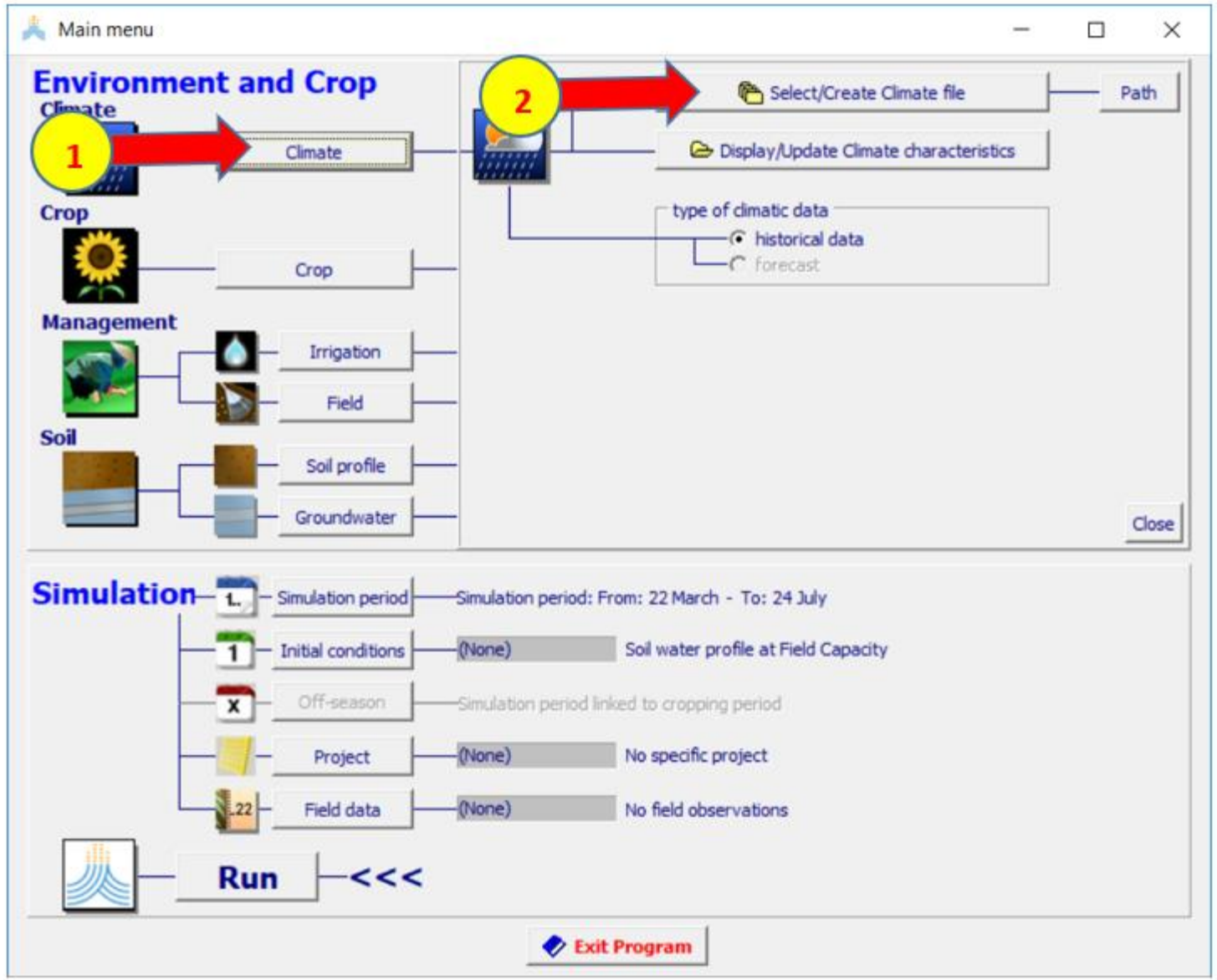
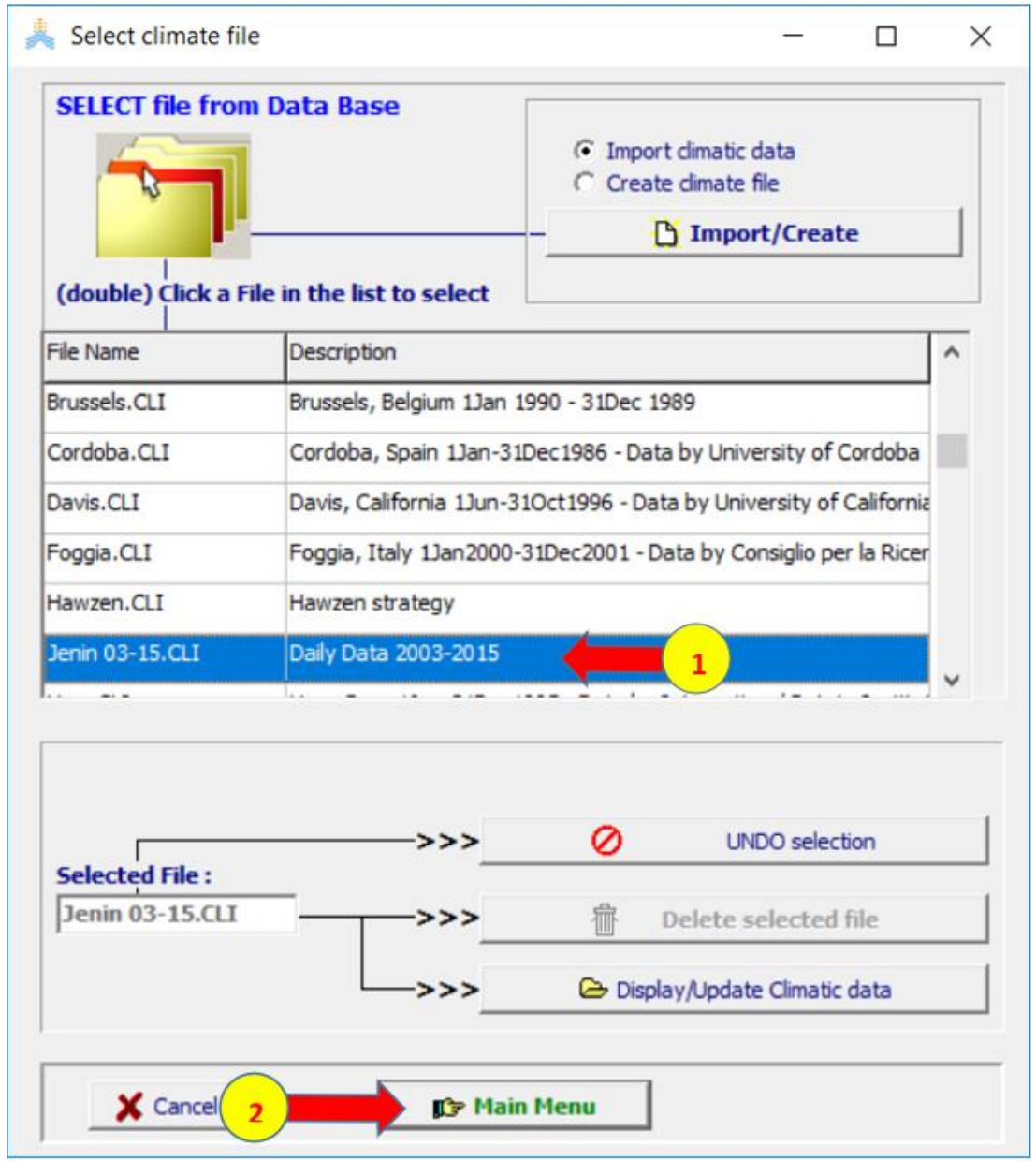
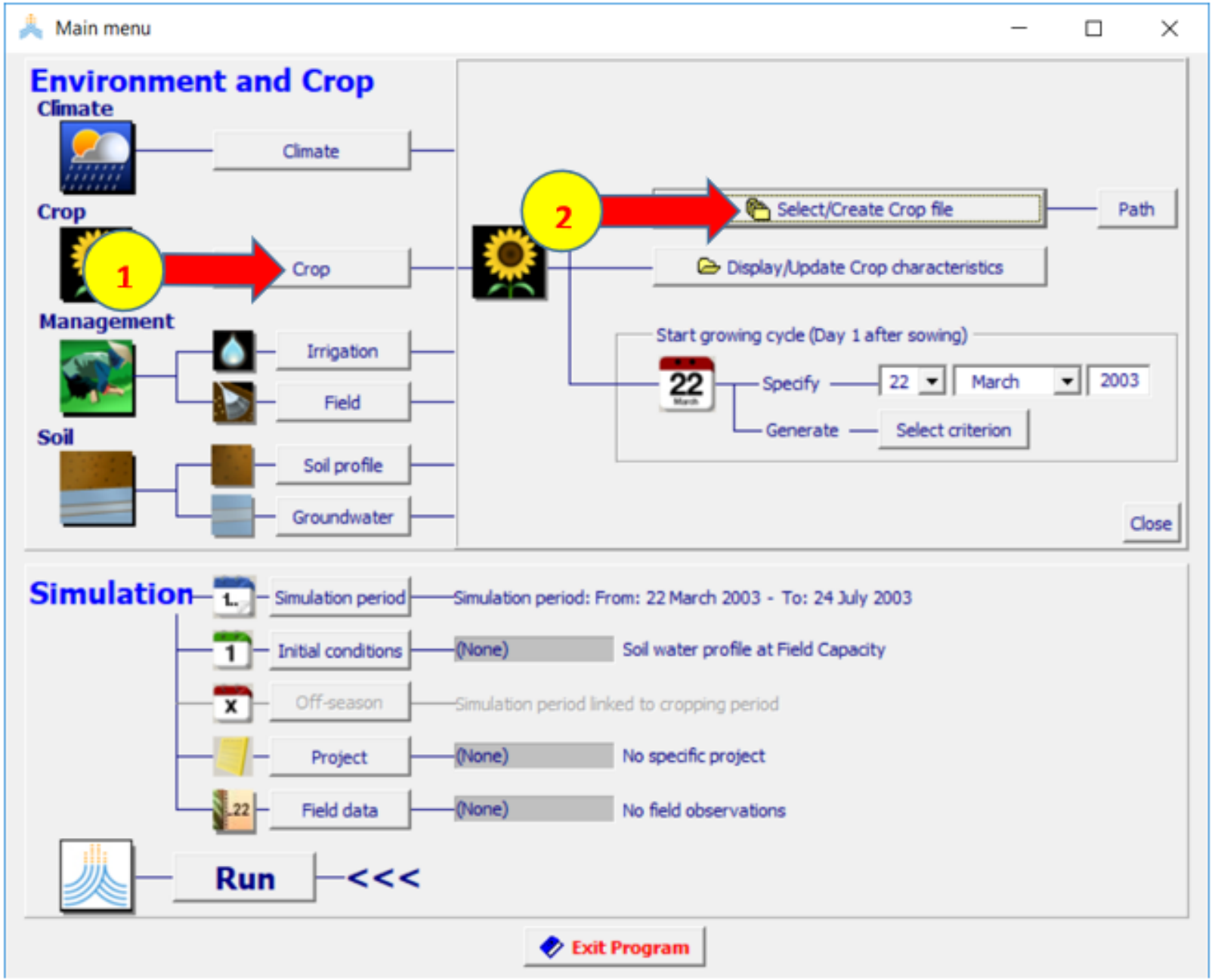
المركز العربي لدراسات المناطق الجافه و الأراضي القاحلة

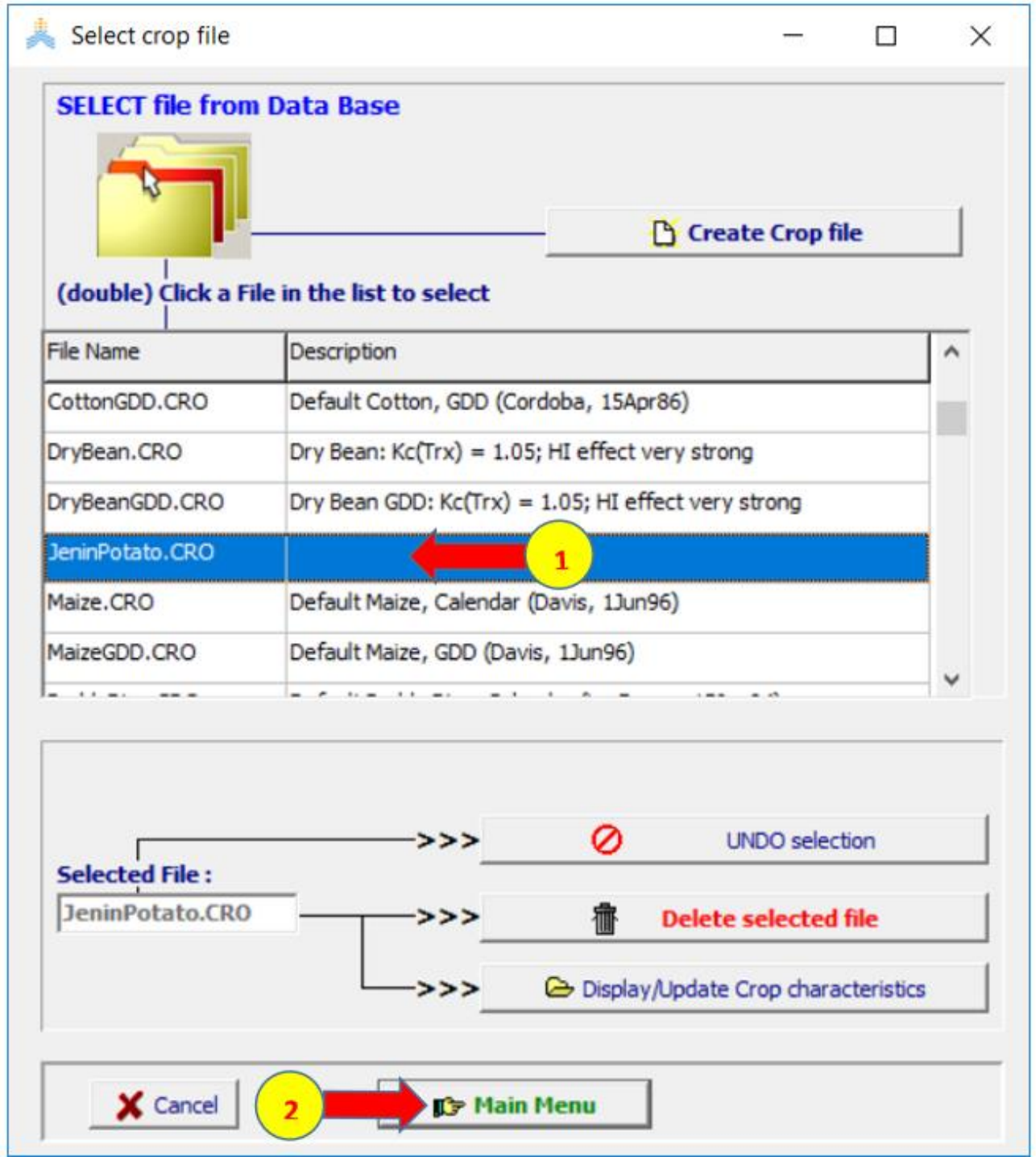
(ACSAD)

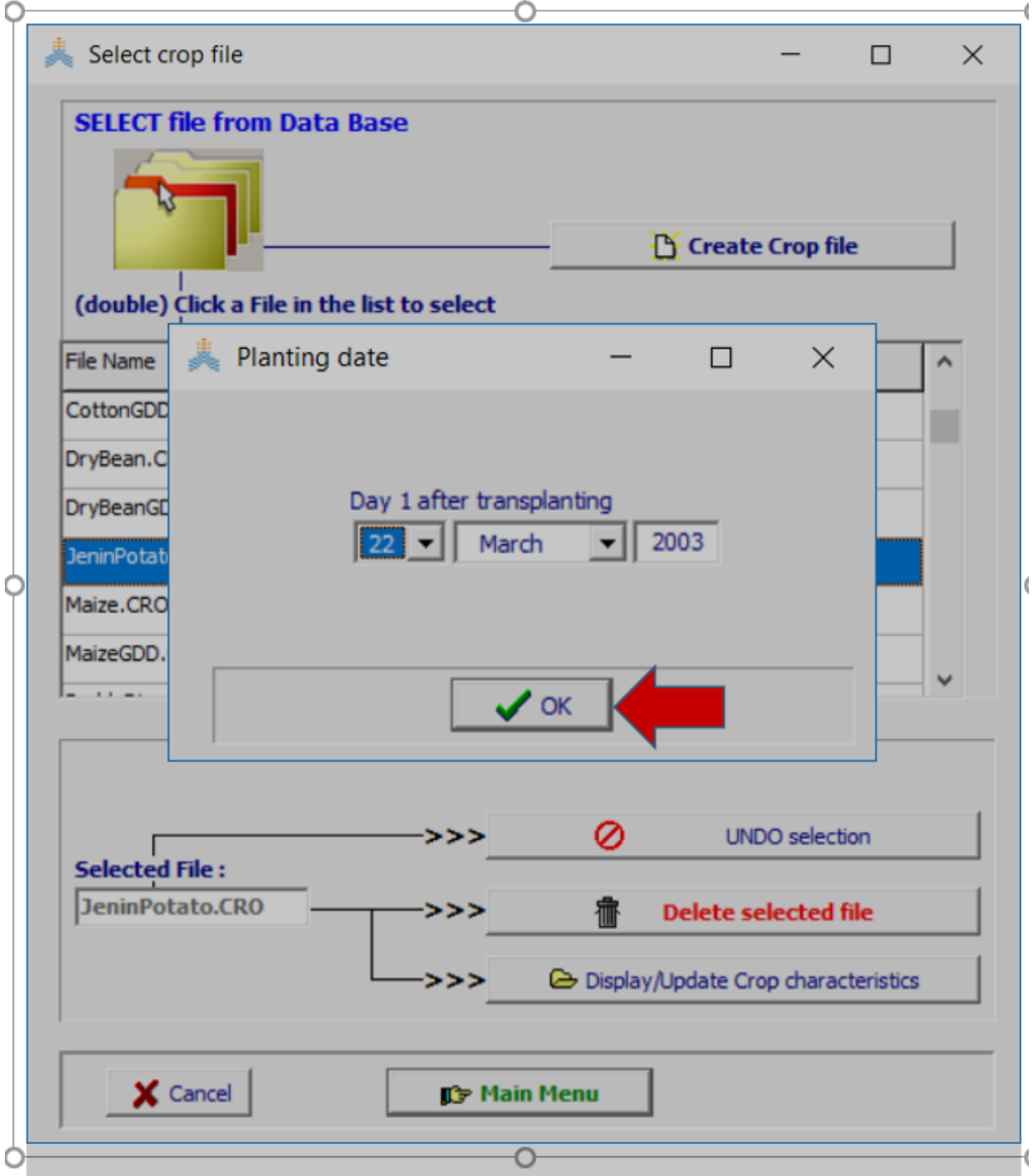
Example of full irrigation scheduling

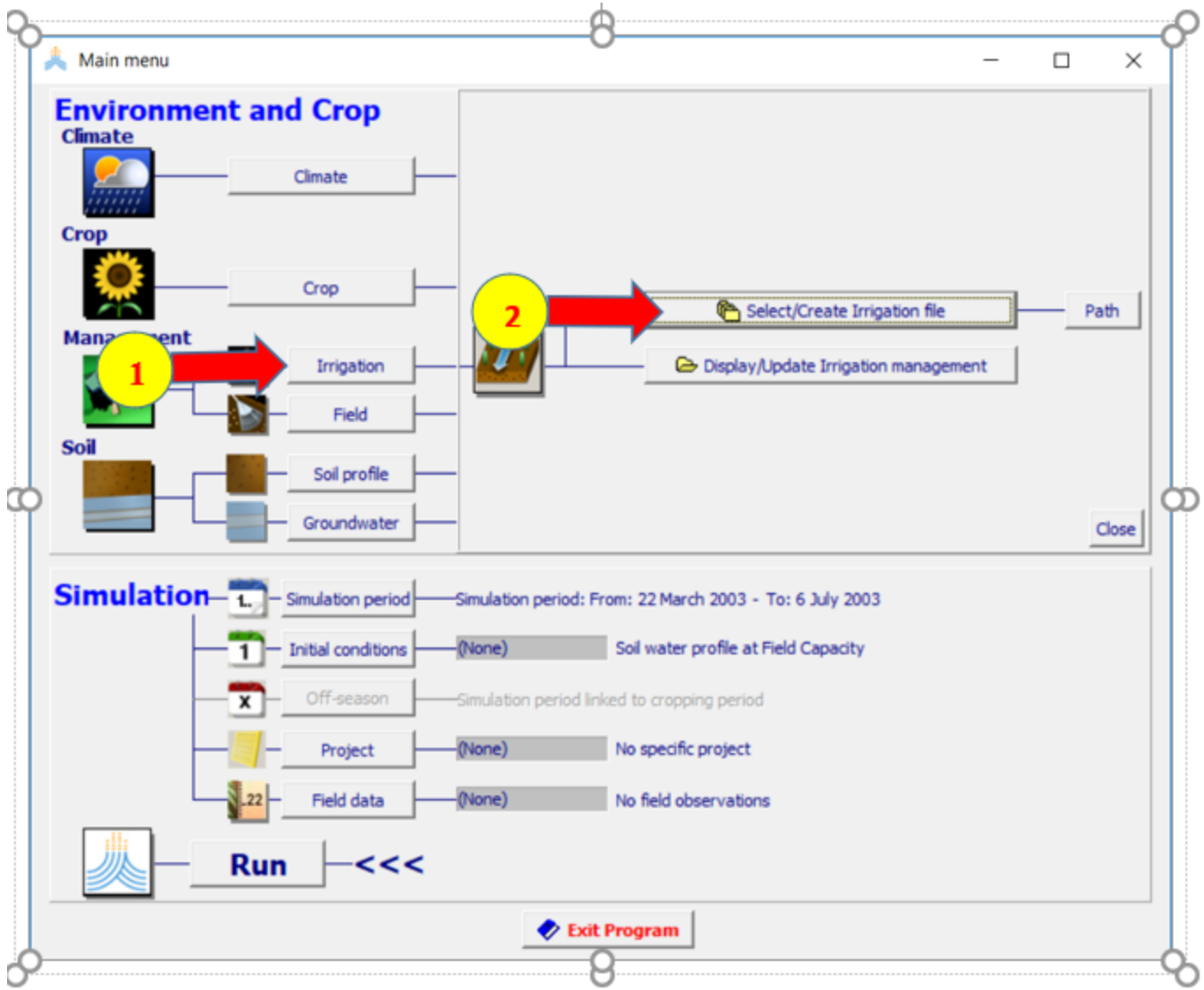

Main menu
Environment and Crop
Climate
1
Climate
Crop
Crop
Management
Irrigation
Field
Soil
Soil profile
Groundwater
2
Select/Create Climate file
Path
Display/Update Climate characteristics
type of climatic data
historical data
forecast
Close
Simulation
Simulation period
Simulation period: From: 22 March - To: 24 July
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program

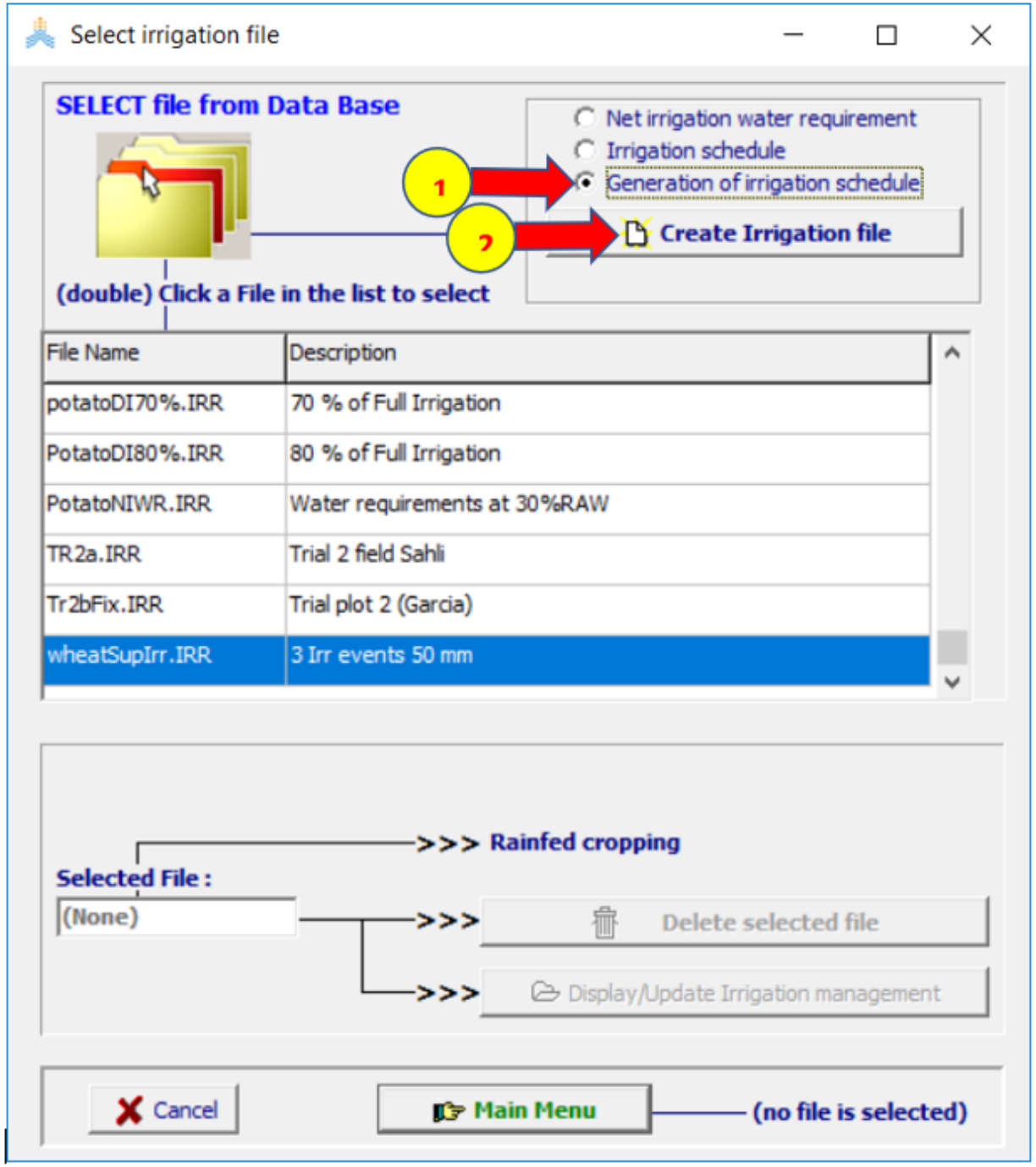

Select climate file
SELECT file from Data Base
Import climatic data
Create climate file
Import/Create
(double) Click a File in the list to select
File Name
Description
Brussels.CLI
Brussels, Belgium 1Jan 1990 - 31Dec 1989
Cordoba.CLI
Cordoba, Spain 1Jan-31Dec1986 - Data by University of Cordoba
Davis.CLI
Davis, California 1Jun-31Oct1996 - Data by University of California
Foggia.CLI
Foggia, Italy 1Jan2000-31Dec2001 - Data by Consiglio per la Ricer
Hawzen.CLI
Hawzen strategy
Jenin 03-15.CLI
Daily Data 2003-2015
1
Selected File :
Jenin 03-15.CLI
>>>
UNDO selection
>>>
Delete selected file
>>>
Display/Update Climatic data
Cancel
2
Main Menu

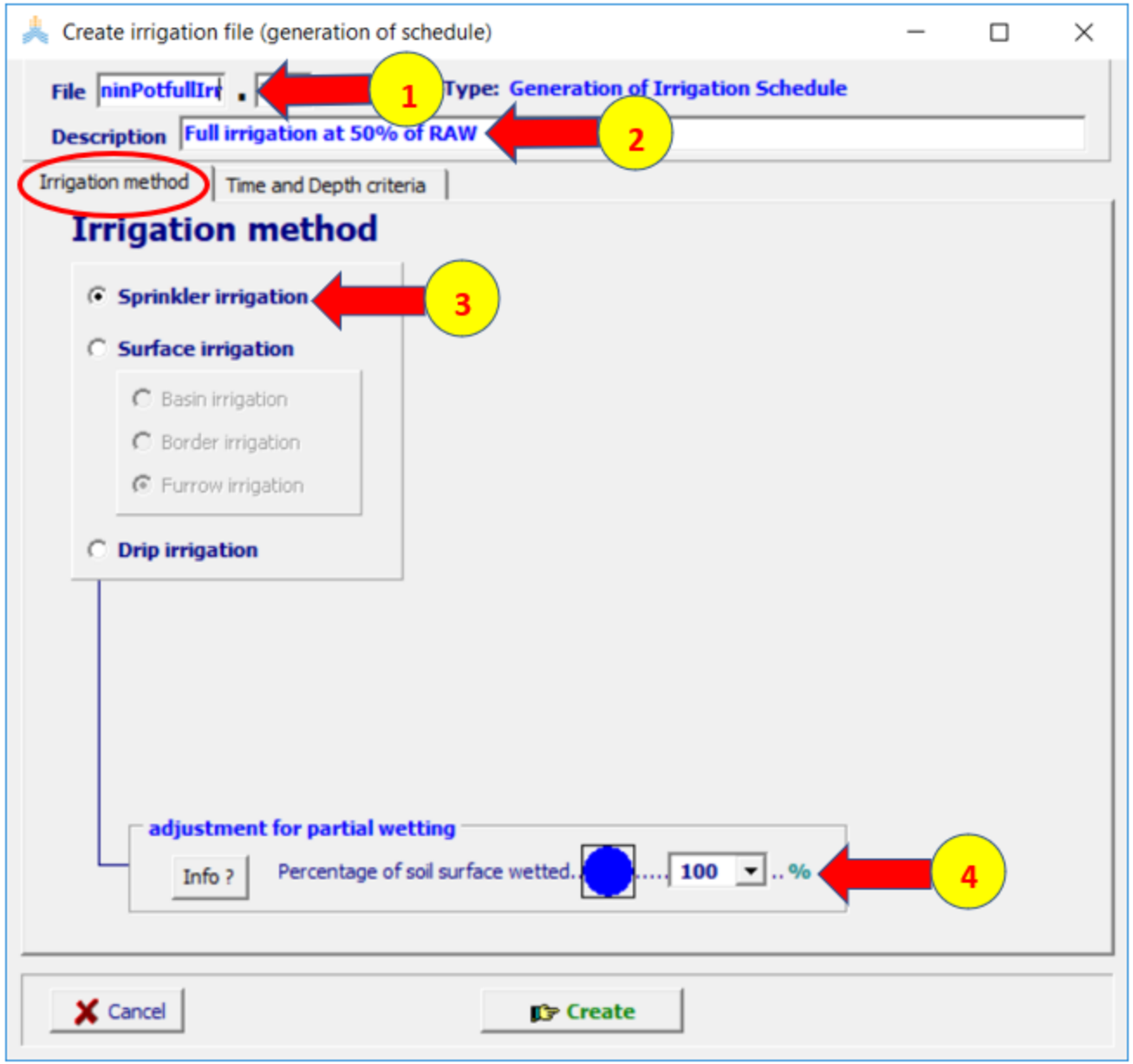

Main menu
Environment and Crop
Climate
Climate
Crop
1
Crop
Management
Irrigation
Field
Soil
Soil profile
Groundwater
2
Select/Create Crop file
Path
Display/Update Crop characteristics
Start growing cycle (Day 1 after sowing)
22
Specify
22
March
2003
Generate
Select criterion
Close
Simulation
Simulation period
Simulation period: From: 22 March 2003 - To: 24 July 2003
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program

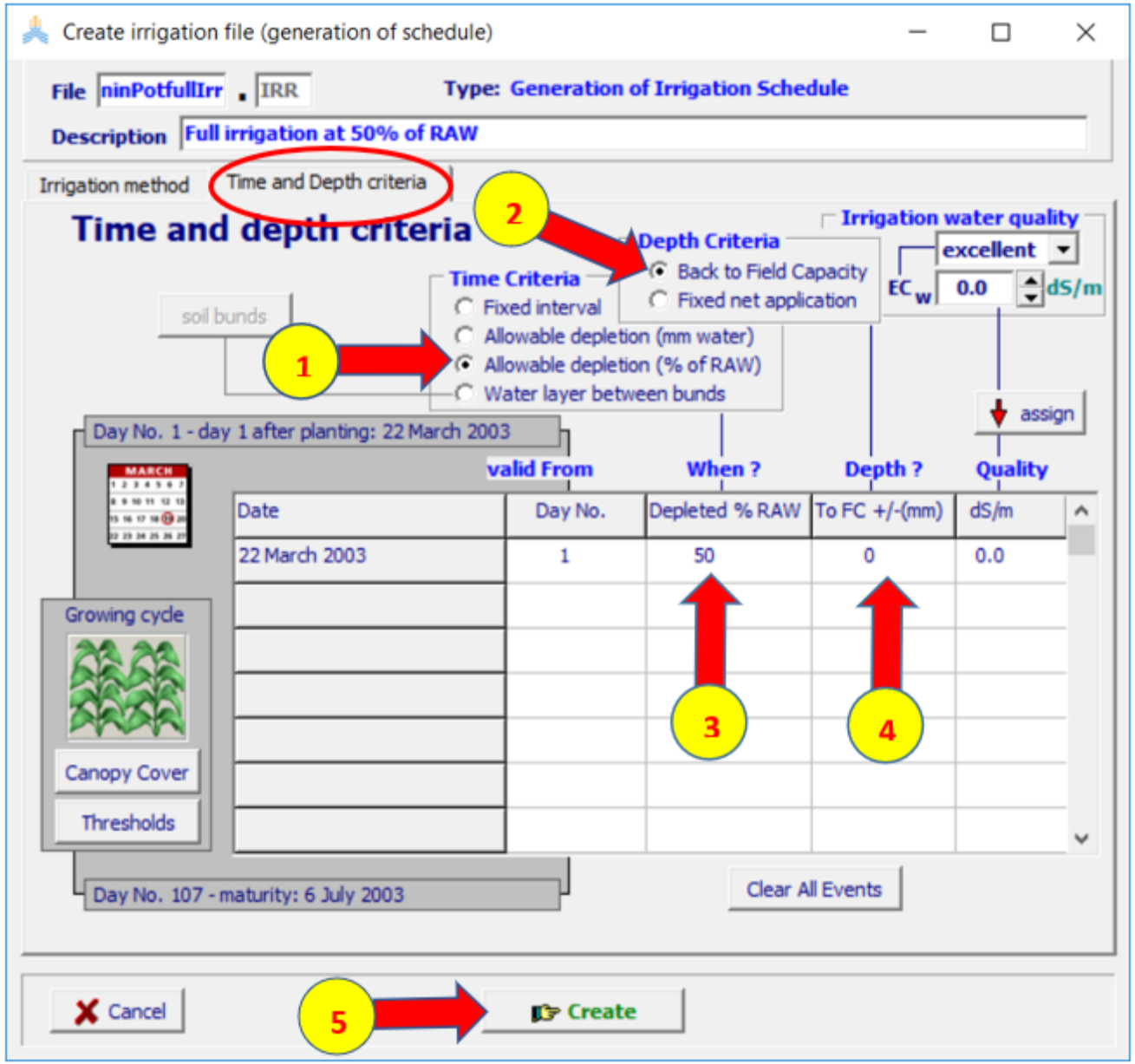

Select crop file
SELECT file from Data Base
Create Crop file
(double) Click a File in the list to select
File Name
Description
CottonGDD.CRO
Default Cotton, GDD (Cordoba, 15Apr86)
DryBean.CRO
Dry Bean: Kc(Trx) = 1.05; HI effect very strong
DryBeanGDD.CRO
Dry Bean GDD: Kc(Trx) = 1.05; HI effect very strong
JeninPotato.CRO
1
Maize.CRO
Default Maize, Calendar (Davis, 1Jun96)
MaizeGDD.CRO
Default Maize, GDD (Davis, 1Jun96)
Selected File :
JeninPotato.CRO
>>>
UNDO selection
>>>
Delete selected file
>>>
Display/Update Crop characteristics
Cancel
2
Main Menu

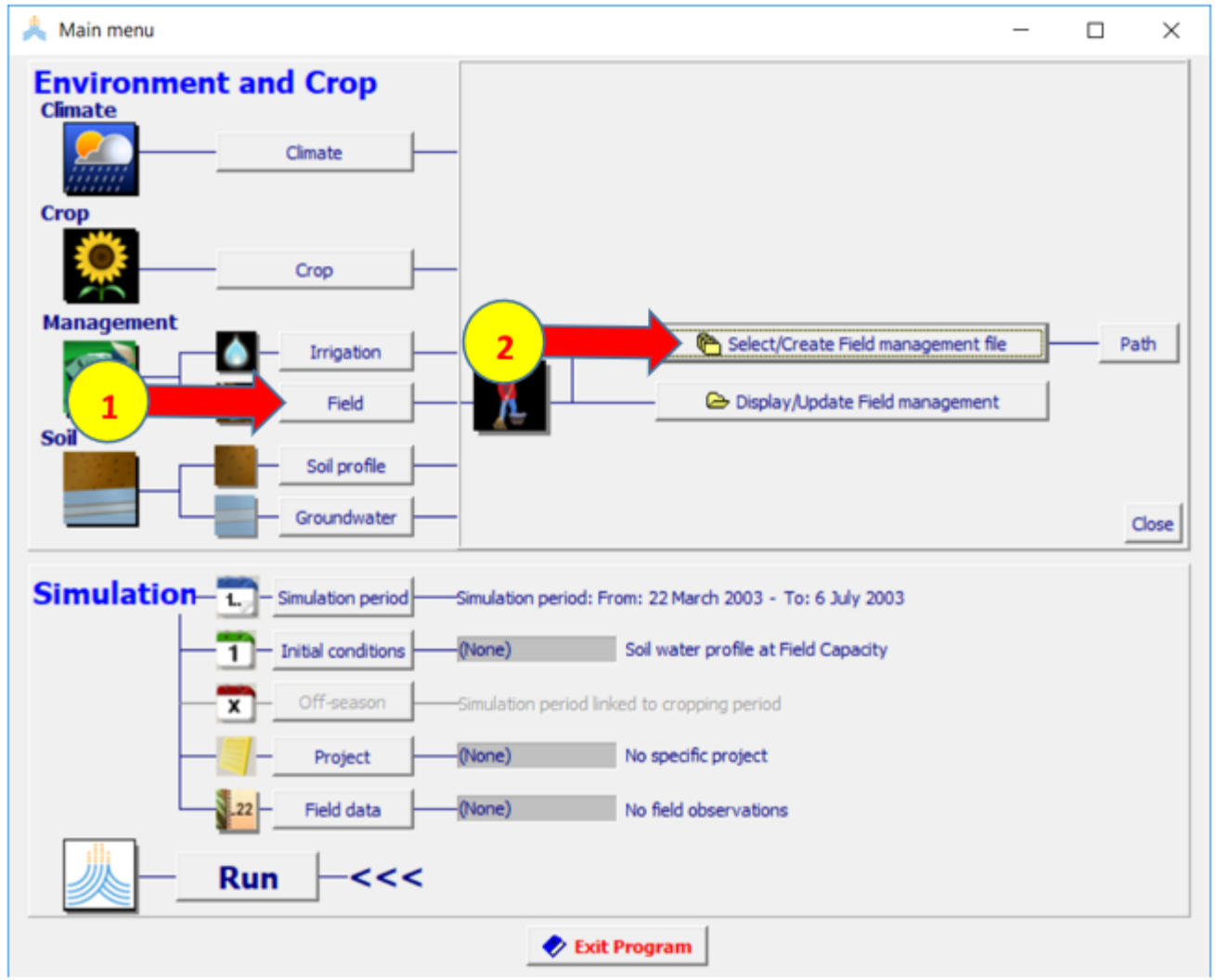

Select crop file
SELECT file from Data Base
Create Crop file
(double) Click a File in the list to select
File Name
CottonGDD
DryBean.C
DryBeanGD
JeninPotat
Maize.CRO
MaizeGDD.
Planting date
Day 1 after transplanting
22
March
2003
OK
UNDO selection
Selected File :
JeninPotato.CRO
Delete selected file
Display/Update Crop characteristics
Cancel
Main Menu

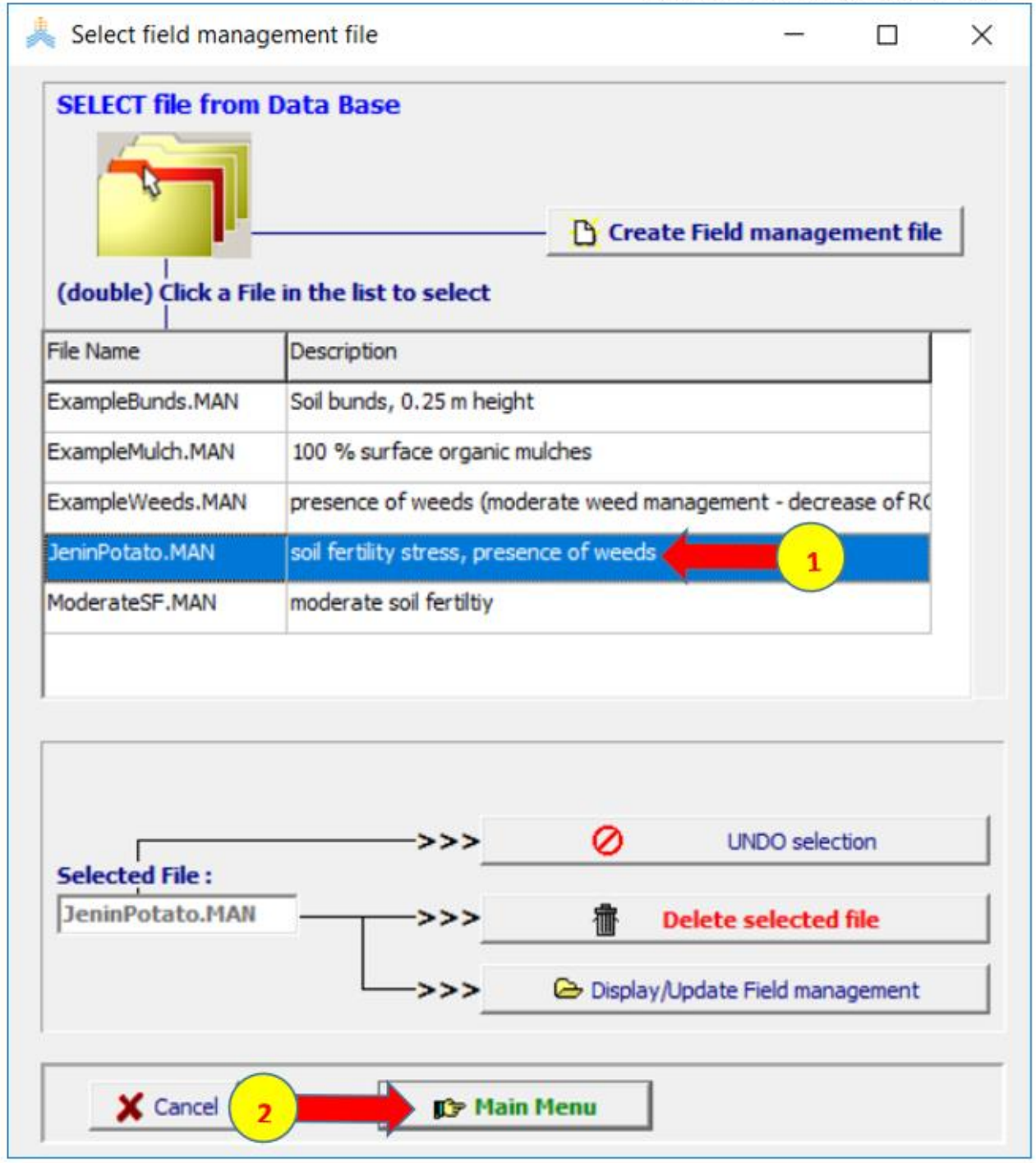

Main menu
Environment and Crop
Climate
Climate
Crop
Crop
Management
Irrigation
Field
Soil
Soil profile
Groundwater
1
2
Select/Create Irrigation file
Path
Display/Update Irrigation management
Close
Simulation
Simulation period
Simulation period: From: 22 March 2003 - To: 6 July 2003
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program

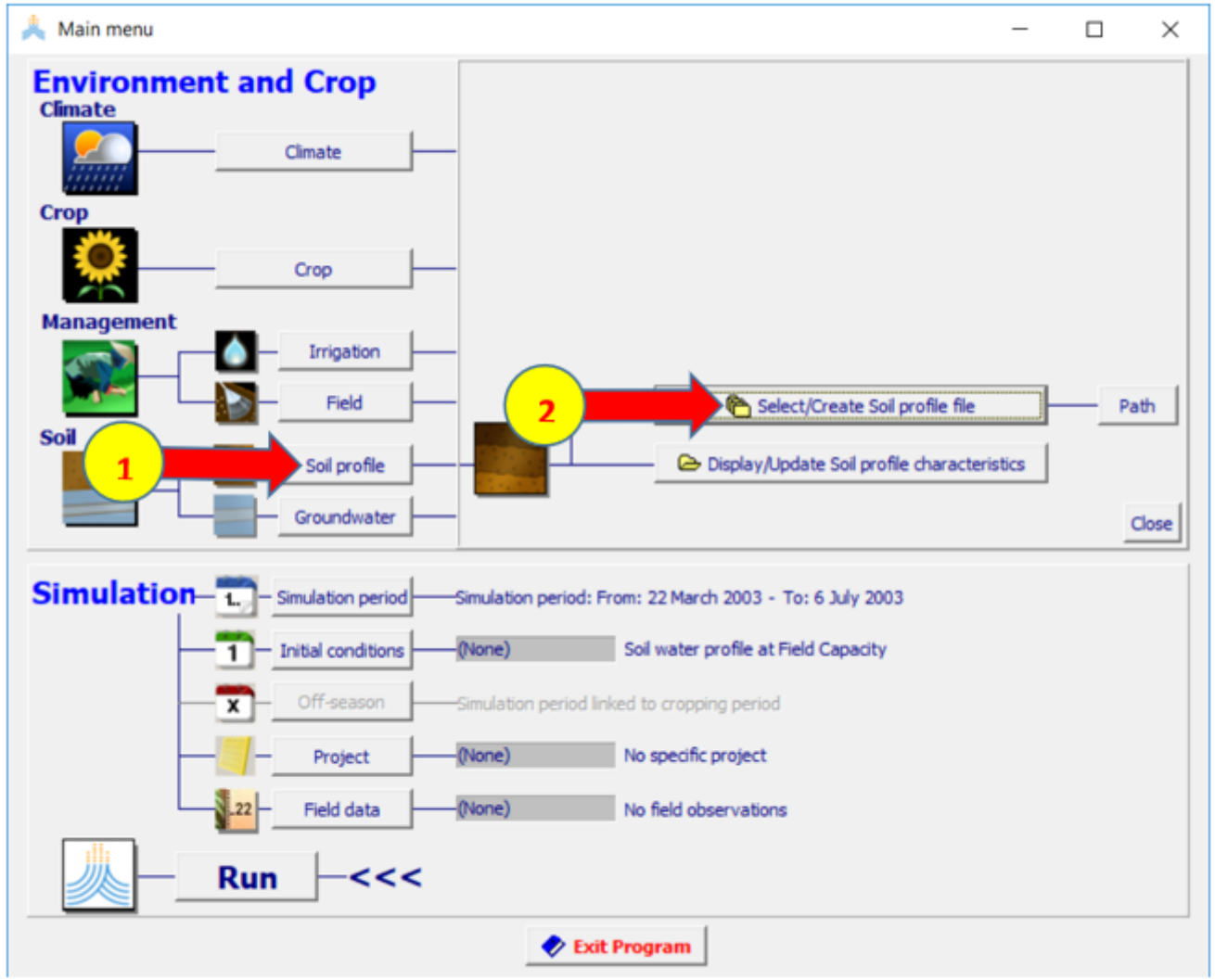

Select irrigation file
SELECT file from Data Base
Net irrigation water requirement
Irrigation schedule
Generation of irrigation schedule
1
2
Create Irrigation file
(double) Click a File in the list to select
File Name
Description
potatoDI70%.IRR
70 % of Full Irrigation
PotatoDI80%.IRR
80 % of Full Irrigation
PotatoNIWR.IRR
Water requirements at 30%RAW
TR2a.IRR
Trial 2 field Sahli
Tr2bFix.IRR
Trial plot 2 (Garcia)
wheatSupIrr.IRR
3 Irr events 50 mm
>>> Rainfed cropping
Selected File :
(None)
>>>
Delete selected file
>>>
Display/Update Irrigation management
Cancel
Main Menu
(no file is selected)

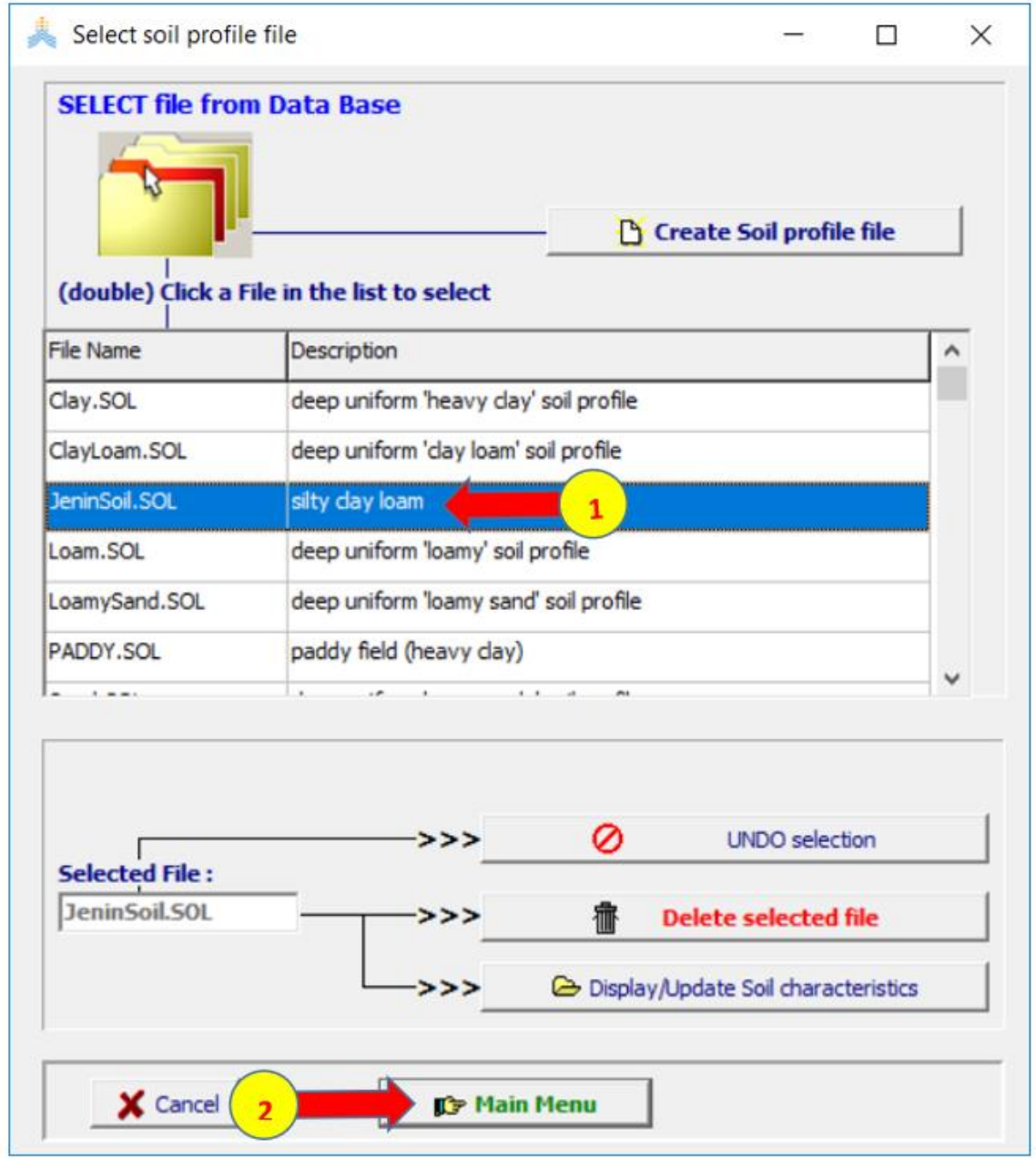

Create irrigation file (generation of schedule)
File ninPotfullIrr .
Type: Generation of Irrigation Schedule
Description Full irrigation at 50% of RAW
Irrigation method
Time and Depth criteria
Irrigation method
Sprinkler irrigation
Surface irrigation
Basin irrigation
Border irrigation
Furrow irrigation
Drip irrigation
adjustment for partial wetting
Info ?
Percentage of soil surface wetted.
100
%
Cancel
Create
1
2
3
4

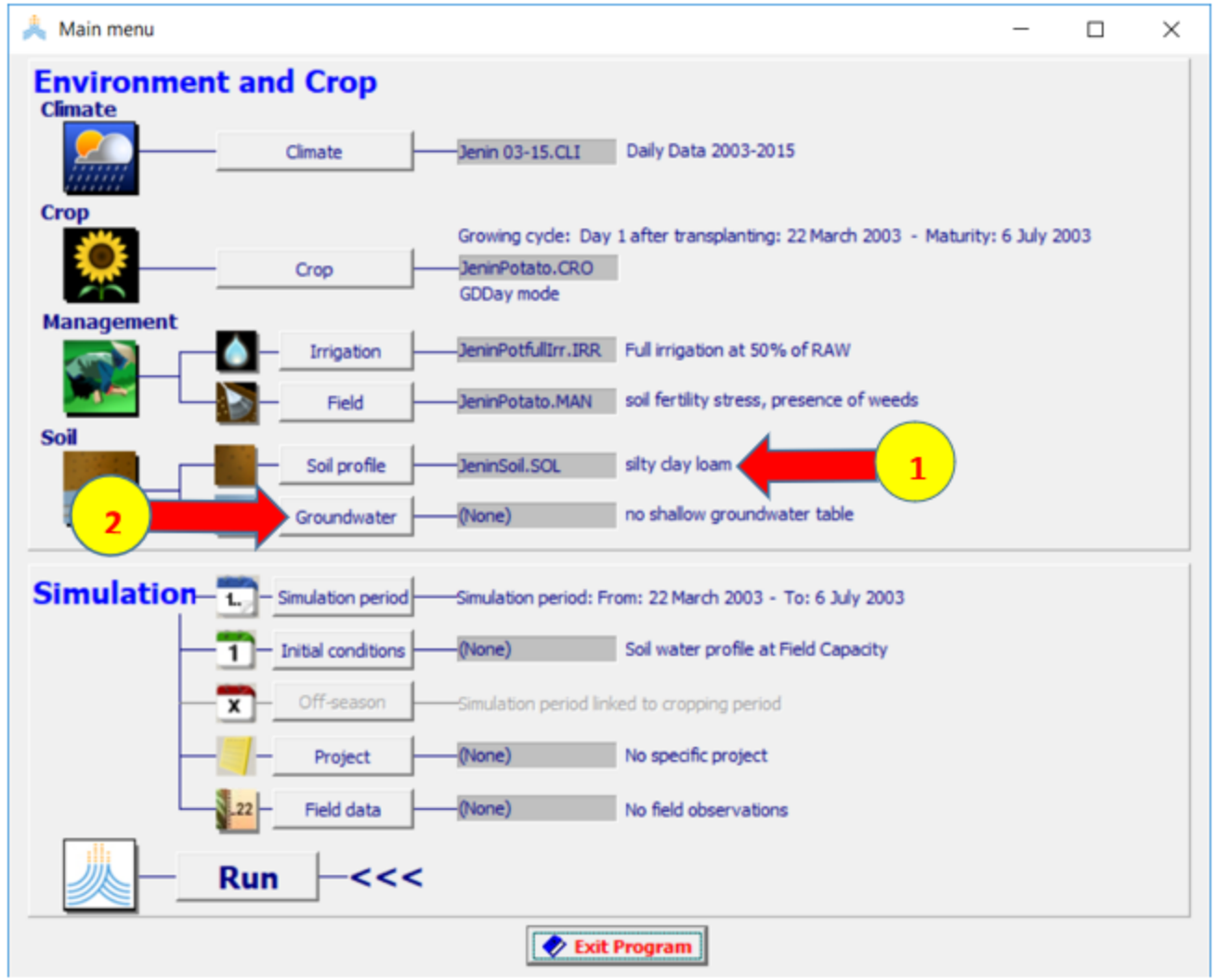

Create irrigation file (generation of schedule)
File ninPotfullIrr . IRR
Type: Generation of Irrigation Schedule
Description Full irrigation at 50% of RAW
Irrigation method
Time and Depth criteria
Time and depth criteria
Irrigation water quality
excellent
EC w 0.0 dS/m
Depth Criteria
Back to Field Capacity
Fixed net application
Time Criteria
Fixed interval
Allowable depletion (mm water)
Allowable depletion (% of RAW)
Water layer between bunds
soil bunds
assign
Day No. 1 - day 1 after planting: 22 March 2003
valid From
When ?
Depth ?
Quality
Date
Day No.
Depleted % RAW
To FC +/-(mm)
dS/m
22 March 2003
1
50
0
0.0
Growing cycle
Canopy Cover
Thresholds
Day No. 107 - maturity: 6 July 2003
Clear All Events
Cancel
Create
1
2
3
4
5

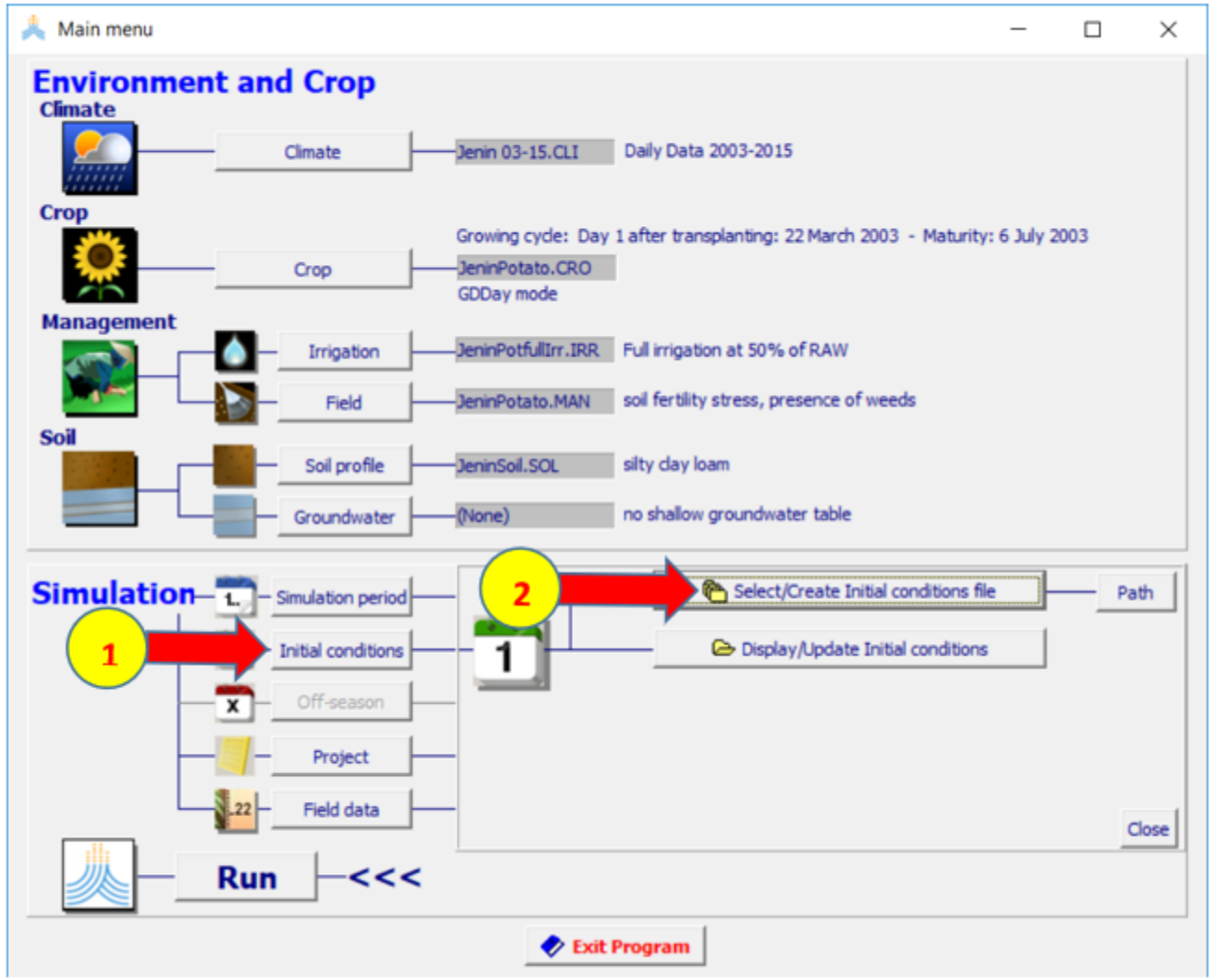

Main menu
Environment and Crop
Climate
Climate
Crop
Crop
Management
Irrigation
Field
Soil
Soil profile
Groundwater
1
2
Select/Create Field management file
Path
Display/Update Field management
Close
Simulation
Simulation period
Simulation period: From: 22 March 2003 - To: 6 July 2003
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program


Select field management file
SELECT file from Data Base
Create Field management file
(double) Click a File in the list to select
File Name
Description
ExampleBunds.MAN
Soil bunds, 0.25 m height
ExampleMulch.MAN
100 % surface organic mulches
ExampleWeeds.MAN
presence of weeds (moderate weed management - decrease of RC
JeninPotato.MAN
soil fertility stress, presence of weeds
1
ModerateSF.MAN
moderate soil fertiltiy
Selected File :
JeninPotato.MAN
UNDO selection
Delete selected file
Display/Update Field management
Cancel
2
Main Menu

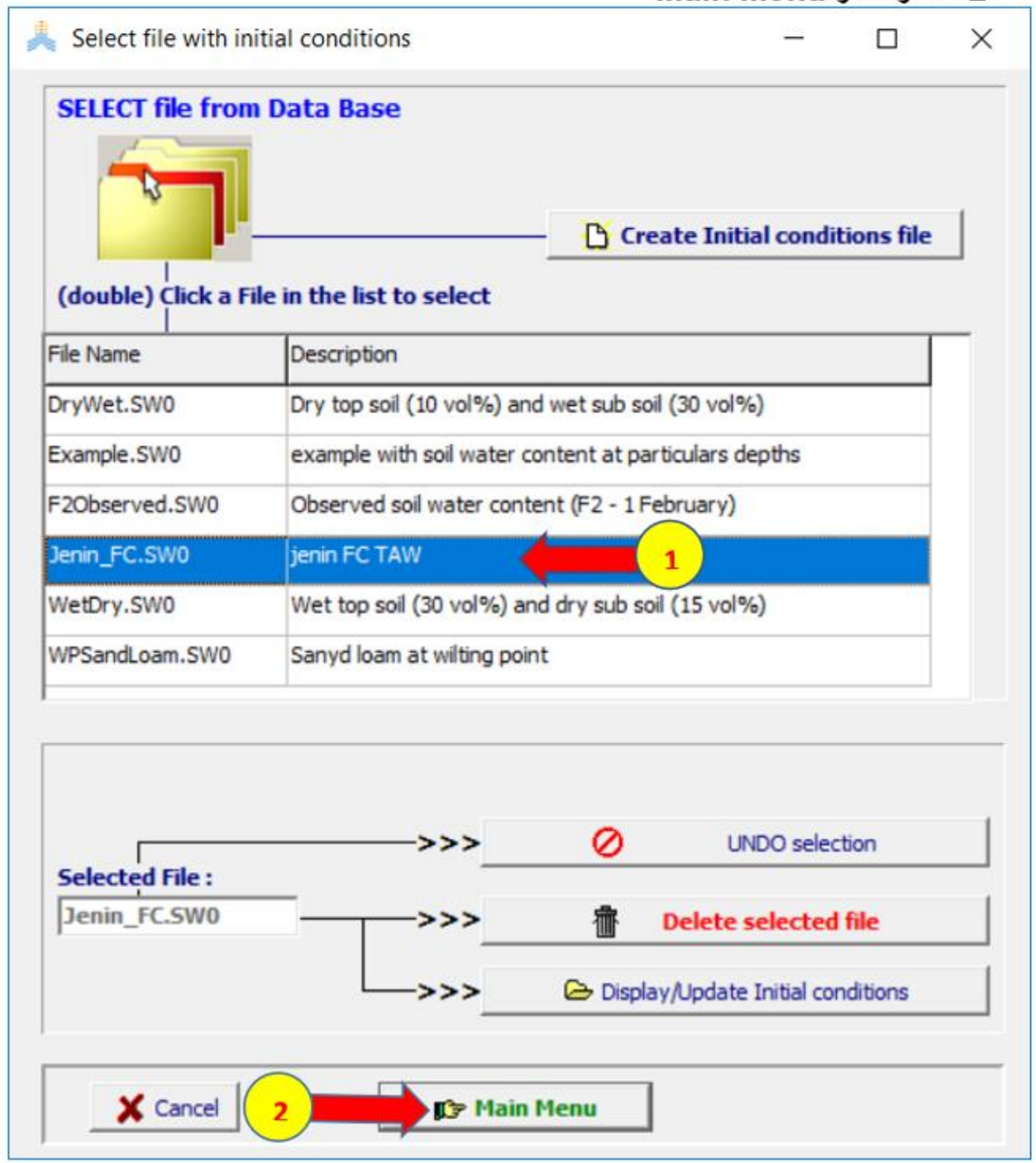

Main menu
Environment and Crop
Climate
Climate
Crop
Crop
Management
Irrigation
Field
Soil
Soil profile
Groundwater
1
2
Select/Create Soil profile file
Path
Display/Update Soil profile characteristics
Close
Simulation
Simulation period
Simulation period: From: 22 March 2003 - To: 6 July 2003
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program

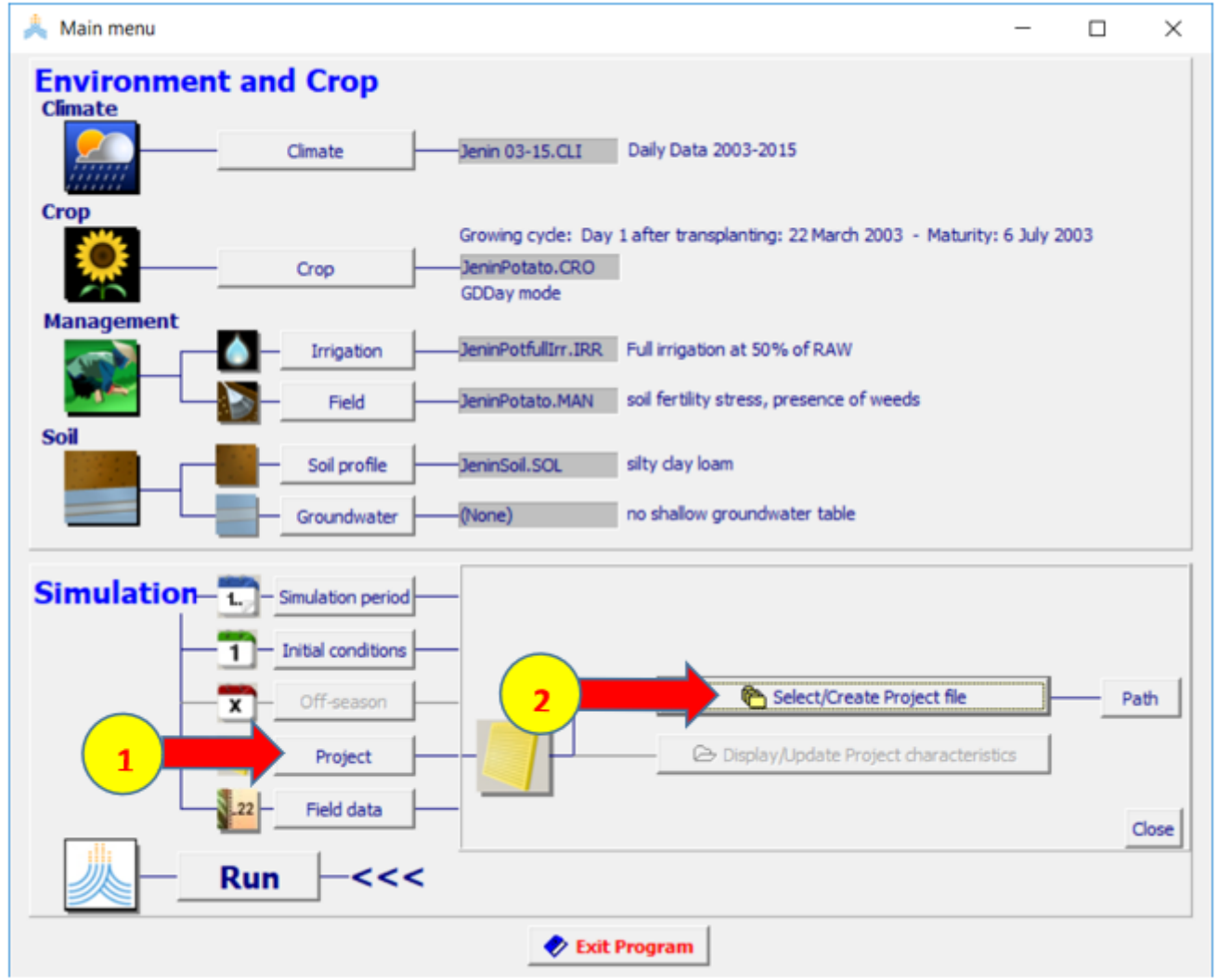

Select soil profile file
SELECT file from Data Base
Create Soil profile file
(double) Click a File in the list to select
File Name
Description
Clay.SOL
deep uniform 'heavy clay' soil profile
ClayLoam.SOL
deep uniform 'clay loam' soil profile
JeninSoil.SOL
silty clay loam
1
Loam.SOL
deep uniform 'loamy' soil profile
LoamySand.SOL
deep uniform 'loamy sand' soil profile
PADDY.SOL
paddy field (heavy clay)
Selected File :
JeninSoil.SOL
>>>
UNDO selection
>>>
Delete selected file
>>>
Display/Update Soil characteristics
Cancel
2
Main Menu

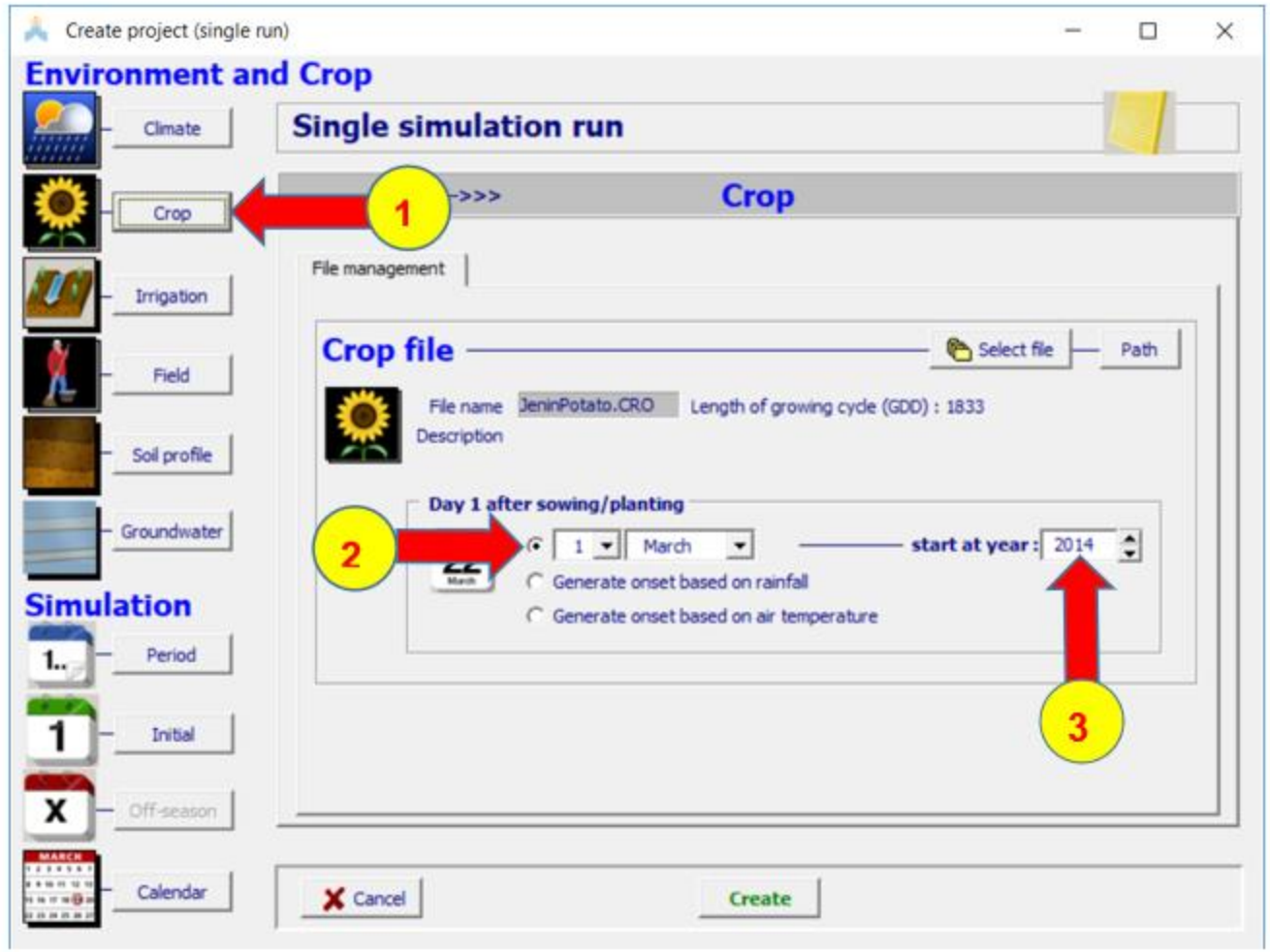

Main menu
Environment and Crop
Climate
Climate
Jenin 03-15.CLI
Daily Data 2003-2015
Crop
Growing cycle: Day 1 after transplanting: 22 March 2003 - Maturity: 6 July 2003
Crop
JeninPotato.CRO
GDDay mode
Management
Irrigation
JeninPotfullIrr.IRR
Full irrigation at 50% of RAW
Field
JeninPotato.MAN
soil fertility stress, presence of weeds
Soil
Soil profile
JeninSoil.SOL
silty clay loam
1
2
Groundwater
(None)
no shallow groundwater table
Simulation
Simulation period
Simulation period: From: 22 March 2003 - To: 6 July 2003
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program

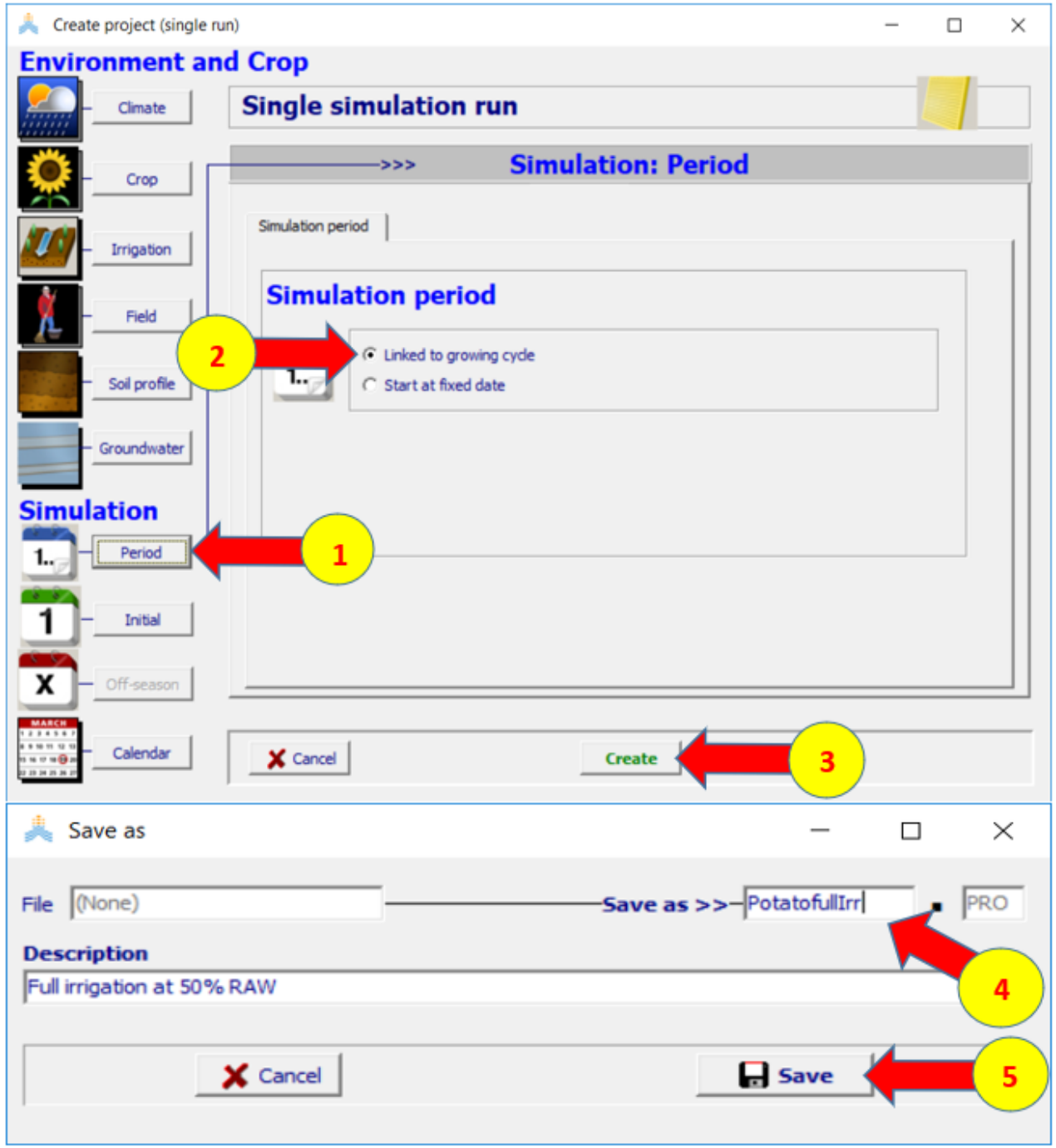

Main menu
Environment and Crop
Climate
Climate
Jenin 03-15.CLI
Daily Data 2003-2015
Crop
Crop
Growing cycle: Day 1 after transplanting: 22 March 2003 - Maturity: 6 July 2003
JeninPotato.CRO
GDDay mode
Management
Irrigation
JeninPotfullIrr.IRR
Full irrigation at 50% of RAW
Field
JeninPotato.MAN
soil fertility stress, presence of weeds
Soil
Soil profile
JeninSoil.SOL
silty clay loam
Groundwater
(None)
no shallow groundwater table
Simulation
1
2
Simulation period
Initial conditions
Off-season
Project
Field data
Select/Create Initial conditions file
Path
Display/Update Initial conditions
Close
Run
<<<
Exit Program

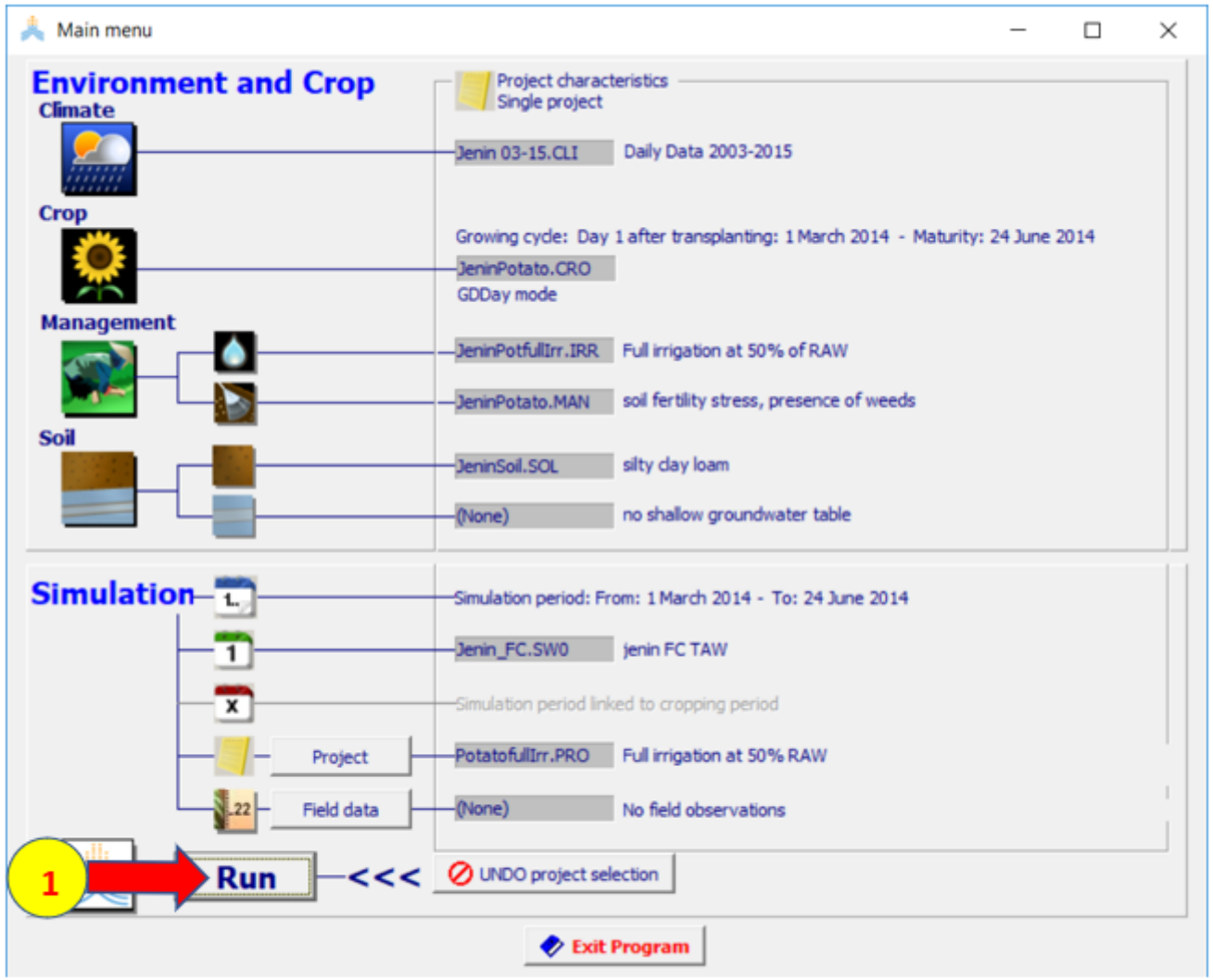
Main Menu القائمة الرئيسية -2

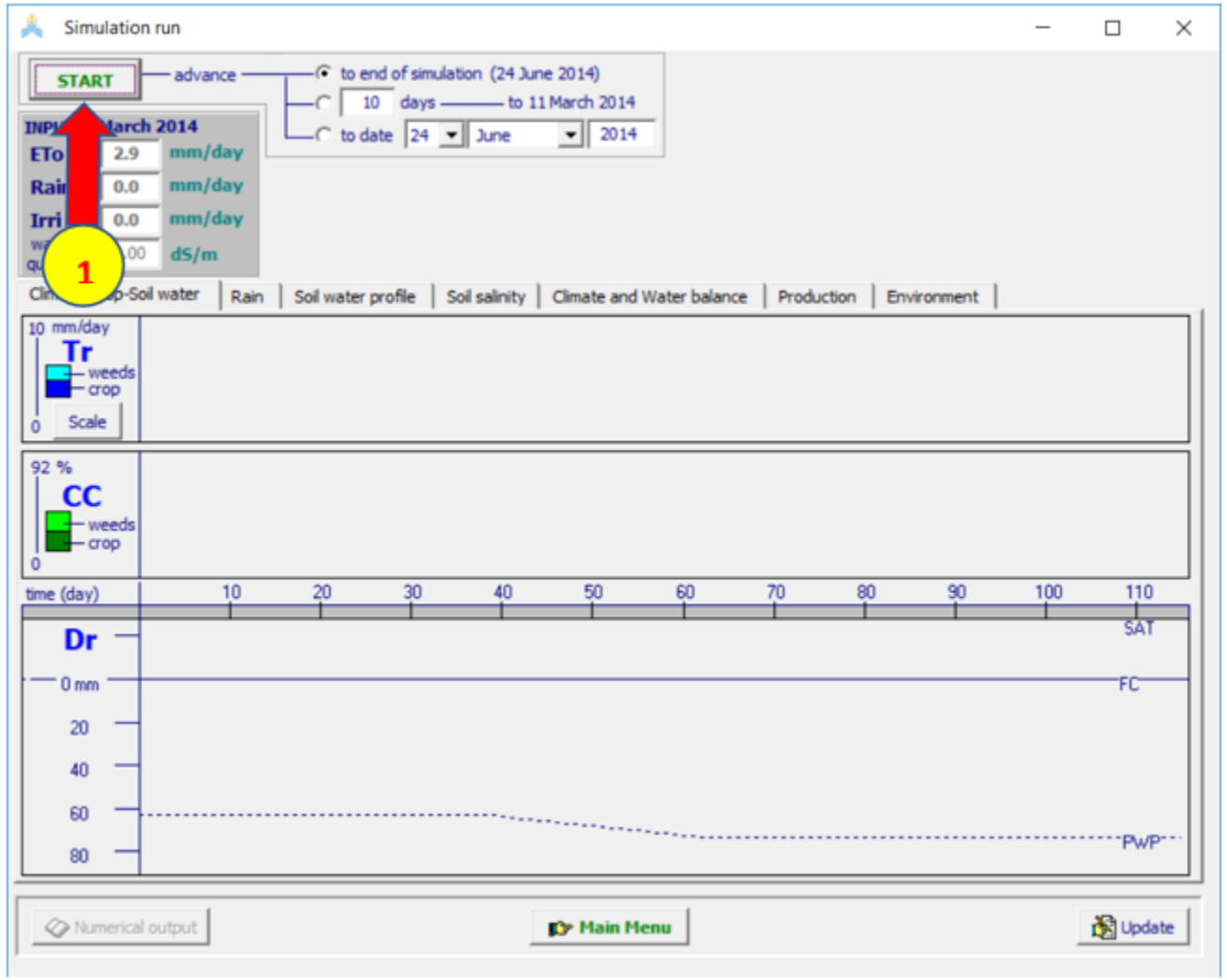


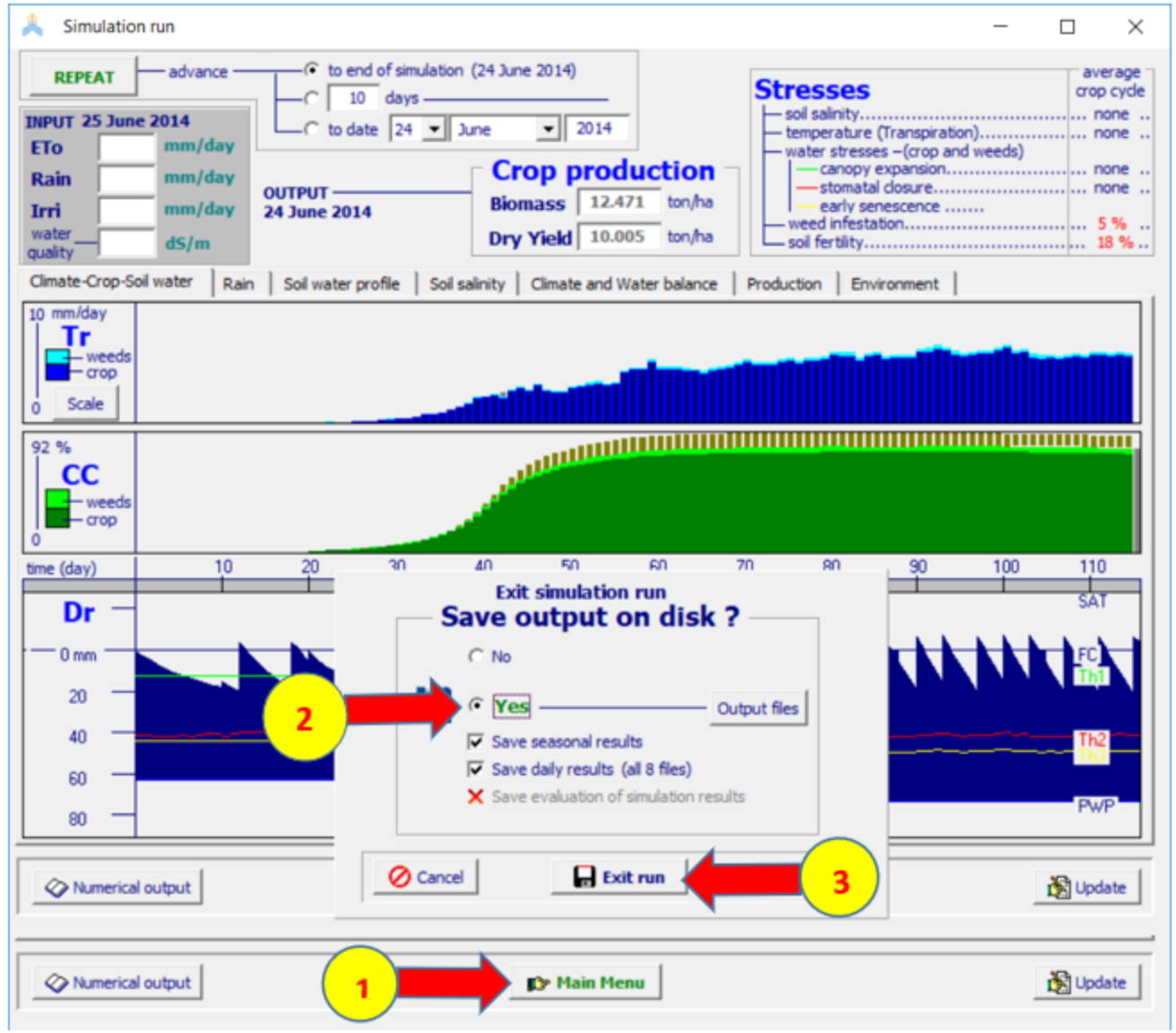

Main menu
Environment and Crop
Climate
Climate
Jenin 03-15.CLI
Daily Data 2003-2015
Crop
Crop
Growing cycle: Day 1 after transplanting: 22 March 2003 - Maturity: 6 July 2003
JeninPotato.CRO
GDDay mode
Management
Irrigation
JeninPotfullIrr.IRR
Full irrigation at 50% of RAW
Field
JeninPotato.MAN
soil fertility stress, presence of weeds
Soil
Soil profile
JeninSoil.SOL
silty clay loam
Groundwater
(None)
no shallow groundwater table
Simulation
Simulation period
Initial conditions
Off-season
Project
Field data
1
2
Select/Create Project file
Path
Display/Update Project characteristics
Close
Run
<<<
Exit Program

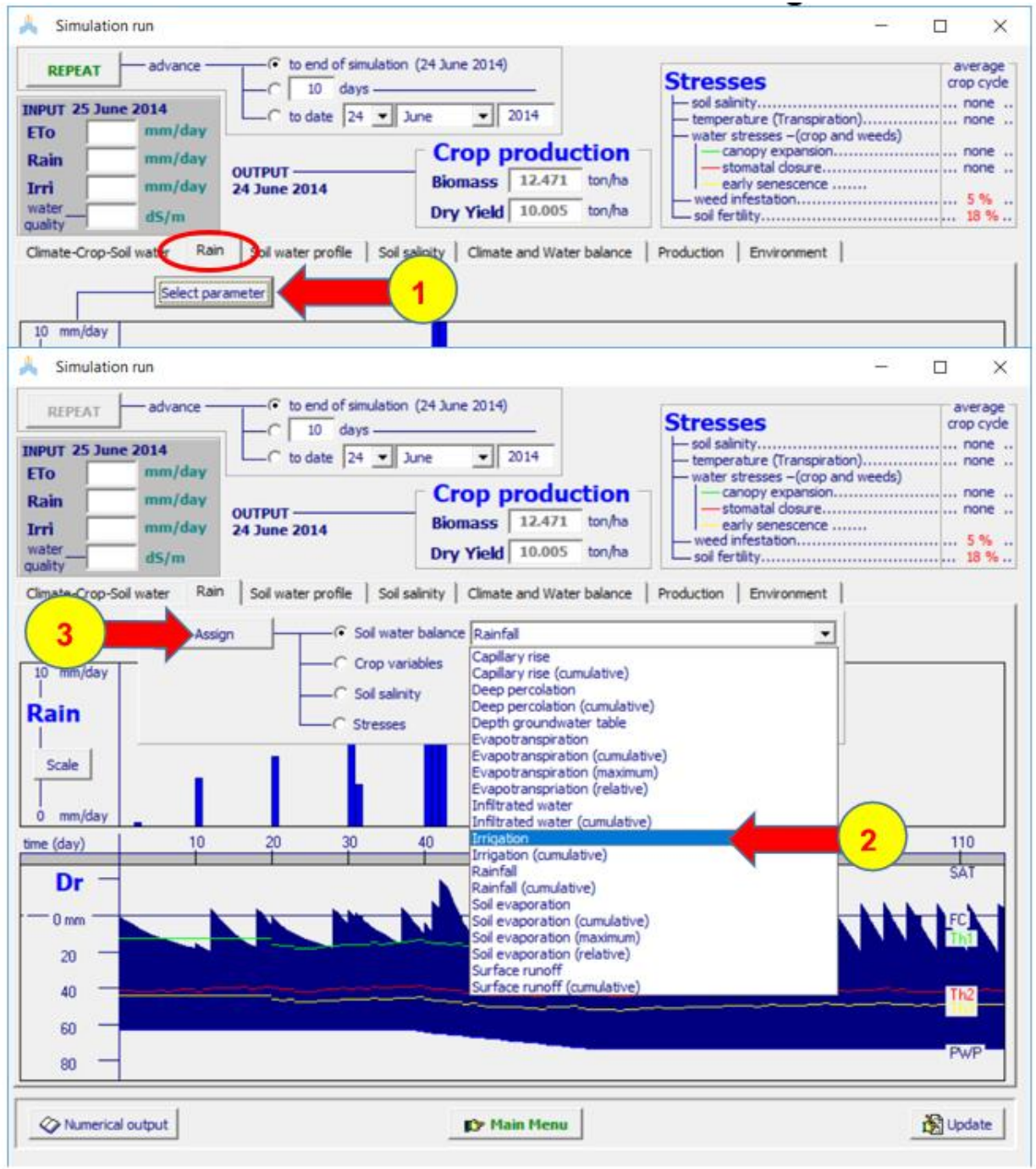

Create project (single run)
Environment and Crop
Climate
Crop
Irrigation
Field
Soil profile
Groundwater
Simulation
Period
Initial
Off-season
Calendar
Single simulation run
Crop
1
File management
Crop file
Select file
Path
File name JeninPotato.CRO
Length of growing cycle (GDD) : 1833
Description
Day 1 after sowing/planting
2
1
March
start at year : 2014
Generate onset based on rainfall
Generate onset based on air temperature
3
Cancel
Create

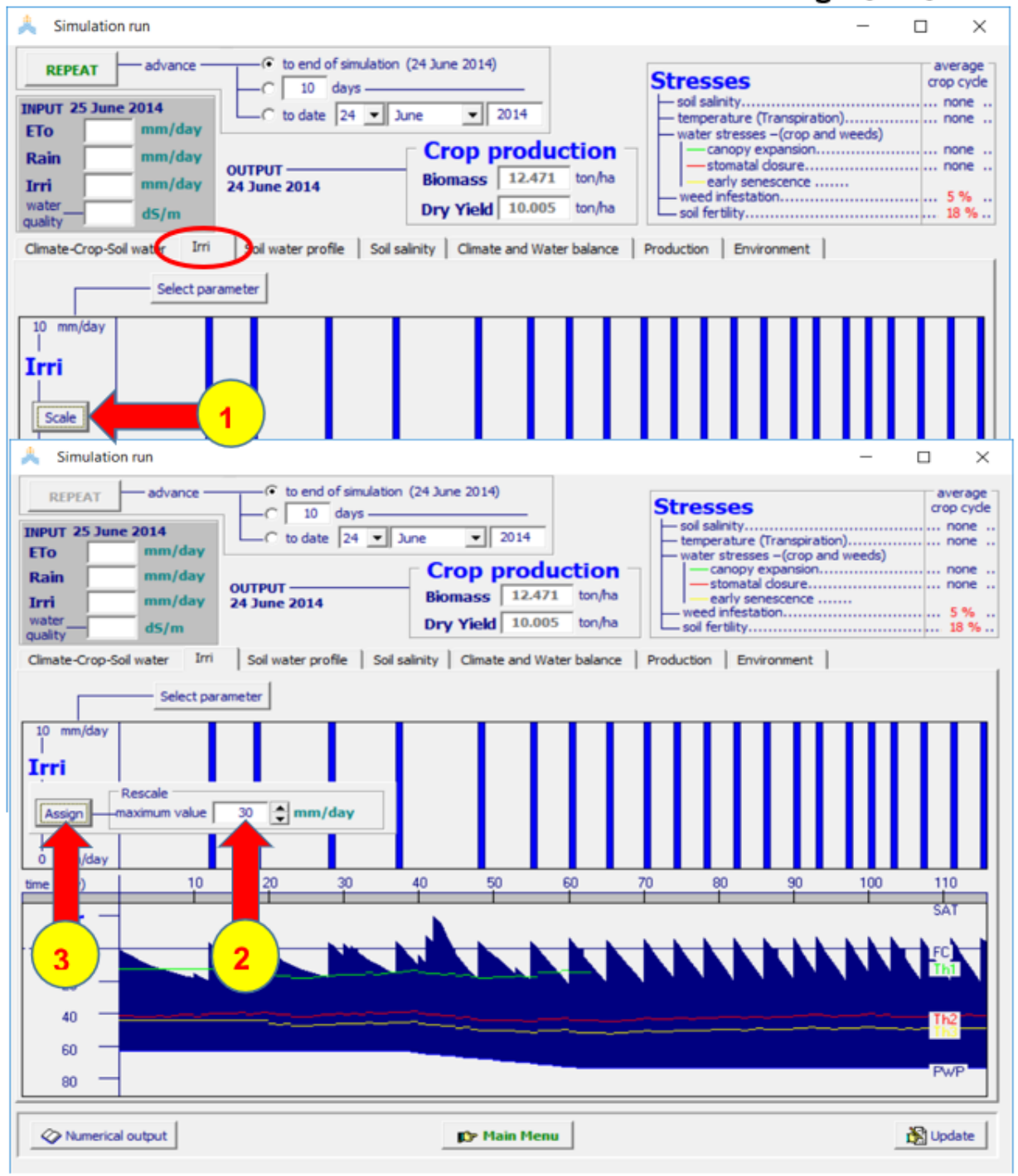

Create project (single run)
Environment and Crop
Climate
Crop
Irrigation
Field
Soil profile
Groundwater
Simulation
Period
Initial
Off-season
Calendar
Single simulation run
>>> Simulation: Period
Simulation period
Simulation period
Linked to growing cycle
Start at fixed date
Cancel
Create
1
2
3
Save as
File
(None)
Save as >>
PotatofullIrr
PRO
Description
Full irrigation at 50% RAW
Cancel
Save
4
5

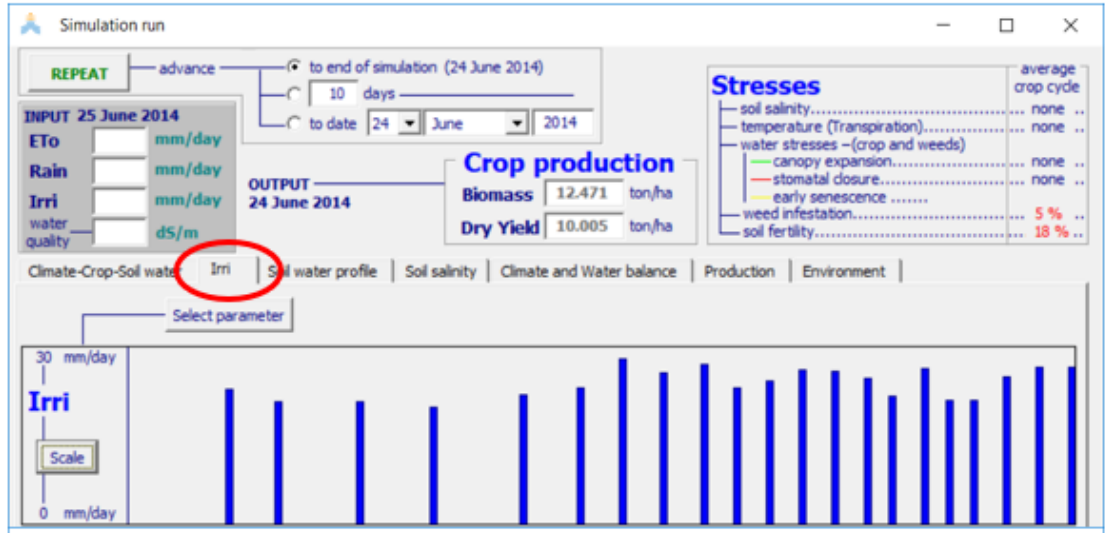

Main menu
Environment and Crop
Climate
Crop
Management
Soil
Project characteristics
Single project
Jenin 03-15.CLI
Daily Data 2003-2015
Growing cycle: Day 1 after transplanting: 1 March 2014 - Maturity: 24 June 2014
JeninPotato.CRO
GDDay mode
JeninPotfullIrr.IRR
Full irrigation at 50% of RAW
JeninPotato.MAN
soil fertility stress, presence of weeds
JeninSoil.SOL
silty clay loam
(None)
no shallow groundwater table
Simulation
Simulation period: From: 1 March 2014 - To: 24 June 2014
Jenin_FC.SW0
jenin FC TAW
Simulation period linked to cropping period
Project
PotatofullIrr.PRO
Full irrigation at 50% RAW
Field data
(None)
No field observations
1
Run
<<<
UNDO project selection
Exit Program

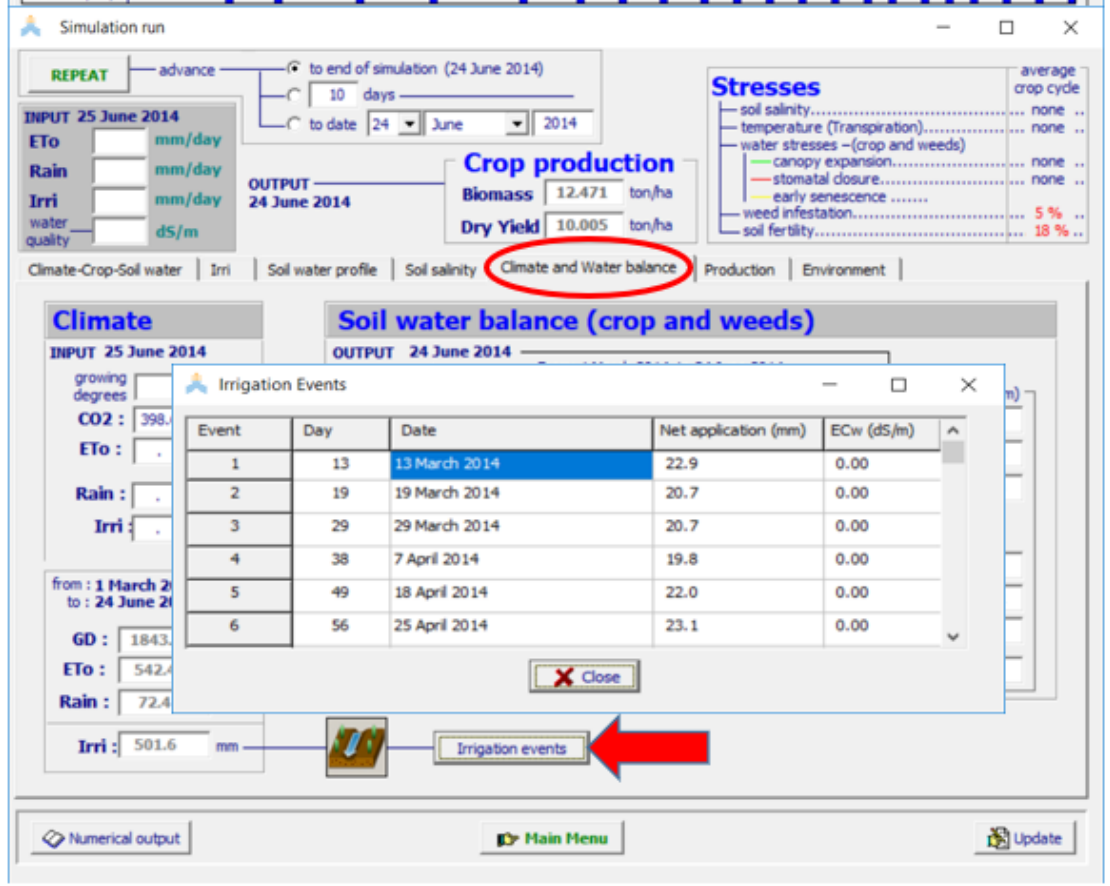

Simulation run
START
advance
to end of simulation (24 June 2014)
10 days
to 11 March 2014
to date 24 June 2014
March 2014
ETo 2.9 mm/day
Rain 0.0 mm/day
Irri 0.0 mm/day
dS/m
1
Rain
Soil water profile
Soil salinity
Climate and Water balance
Production
Environment
10 mm/day
Tr
weeds
crop
Scale
0
92 %
CC
weeds
crop
0
time (day)
10 20 30 40 50 60 70 80 90 100 110
Dr
SAT
0 mm
FC
20
40
60
80
PWP
Numerical output
Main Menu
Update


Simulation run
REPEAT
advance
to end of simulation (24 June 2014)
10 days
to date 24 June 2014
INPUT 25 June 2014
ETo mm/day
Rain mm/day
Irri mm/day
water quality dS/m
OUTPUT 24 June 2014
Crop production
Biomass 12.471 ton/ha
Dry Yield 10.005 ton/ha
Stresses
average crop cycle
soil salinity ... none
temperature (Transpiration) ... none
water stresses –(crop and weeds)
canopy expansion ... none
stomatal closure ... none
early senescence
weed infestation ... 5 %
soil fertility ... 18 %
Climate-Crop-Soil water
Rain
Soil water profile
Soil salinity
Climate and Water balance
Production
Environment
10 mm/day
Tr
weeds
crop
0
Scale
92 %
CC
weeds
crop
0
time (day)
10
20
30
40
50
60
70
80
90
100
110
Dr
0 mm
20
40
60
80
SAT
FC
Th1
Th2
Th3
PWP
Exit simulation run
Save output on disk ?
No
Yes
Output files
Save seasonal results
Save daily results (all 8 files)
Save evaluation of simulation results
Cancel
Exit run
Numerical output
Update
Numerical output
Main Menu
Update
1
2
3


Simulation run
REPEAT
advance
to end of simulation (24 June 2014)
10 days
to date 24 June 2014
INPUT 25 June 2014
ETo mm/day
Rain mm/day
Irri mm/day
water quality dS/m
OUTPUT 24 June 2014
Crop production
Biomass 12.471 ton/ha
Dry Yield 10.005 ton/ha
Stresses
average crop cycle
soil salinity none
temperature (Transpiration) none
water stresses –(crop and weeds)
canopy expansion none
stomatal closure none
early senescence
weed infestation 5 %
soil fertility 18 %
Climate-Crop-Soil water
Rain
Soil water profile
Soil salinity
Climate and Water balance
Production
Environment
Select parameter
1
10 mm/day
Simulation run
REPEAT
advance
to end of simulation (24 June 2014)
10 days
to date 24 June 2014
INPUT 25 June 2014
ETo mm/day
Rain mm/day
Irri mm/day
water quality dS/m
OUTPUT 24 June 2014
Crop production
Biomass 12.471 ton/ha
Dry Yield 10.005 ton/ha
Stresses
average crop cycle
soil salinity none
temperature (Transpiration) none
water stresses –(crop and weeds)
canopy expansion none
stomatal closure none
early senescence
weed infestation 5 %
soil fertility 18 %
Climate-Crop-Soil water
Rain
Soil water profile
Soil salinity
Climate and Water balance
Production
Environment
3
Assign
Soil water balance
Crop variables
Soil salinity
Stresses
Rainfall
Capillary rise
Capillary rise (cumulative)
Deep percolation
Deep percolation (cumulative)
Depth groundwater table
Evapotranspiration
Evapotranspiration (cumulative)
Evapotranspiration (maximum)
Evapotranspriation (relative)
Infiltrated water
Infiltrated water (cumulative)
Irrigation
Irrigation (cumulative)
Rainfall
Rainfall (cumulative)
Soil evaporation
Soil evaporation (cumulative)
Soil evaporation (maximum)
Soil evaporation (relative)
Surface runoff
Surface runoff (cumulative)
2
10 mm/day
Rain
Scale
0 mm/day
time (day)
10
20
30
40
110
SAT
Dr
0 mm
20
40
60
80
FC
Th1
Th2
PWP
Numerical output
Main Menu
Update


Simulation run
REPEAT
advance
to end of simulation (24 June 2014)
10 days
to date 24 June 2014
INPUT 25 June 2014
ETo mm/day
Rain mm/day
Irri mm/day
water quality dS/m
OUTPUT 24 June 2014
Crop production
Biomass 12.471 ton/ha
Dry Yield 10.005 ton/ha
Stresses
average crop cycle
soil salinity ... none
temperature (Transpiration) ... none
water stresses –(crop and weeds)
canopy expansion ... none
stomatal closure ... none
early senescence .....
weed infestation ... 5 %
soil fertility ... 18 %
Climate-Crop-Soil water
Irri
Soil water profile
Soil salinity
Climate and Water balance
Production
Environment
Select parameter
10 mm/day
Irri
Scale
1
Simulation run
Assign
Rescale
maximum value 30 mm/day
time
10 20 30 40 50 60 70 80 90 100 110
SAT
FC
Th1
Th2
PWP
40
60
80
2
3
Numerical output
Main Menu
Update

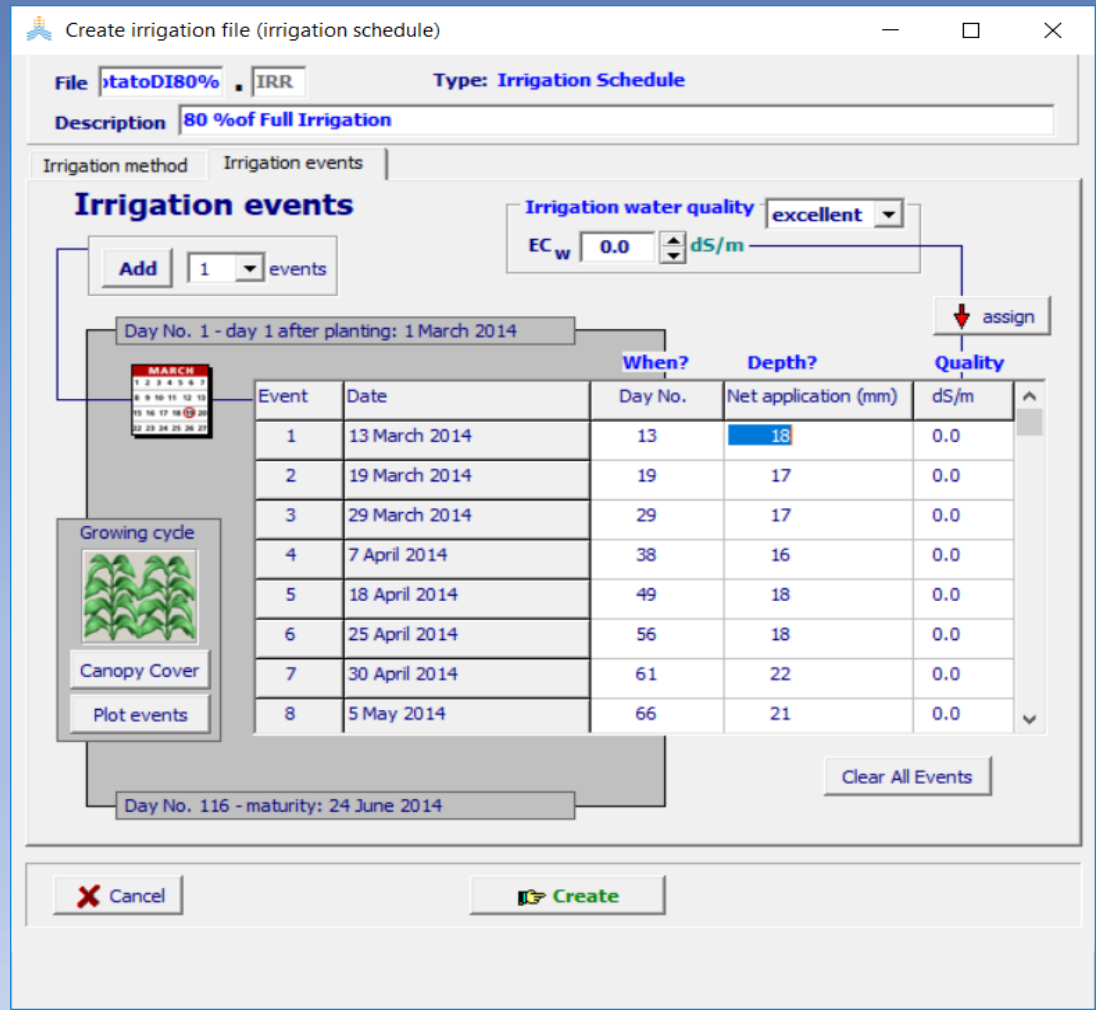

Simulation run
REPEAT
advance
to end of simulation (24 June 2014)
10 days
to date 24 June 2014
INPUT 25 June 2014
ETo mm/day
Rain mm/day
Irri mm/day
water quality dS/m
OUTPUT
24 June 2014
Crop production
Biomass 12.471 ton/ha
Dry Yield 10.005 ton/ha
Stresses
average crop cycle
soil salinity none
temperature (Transpiration) none
water stresses –(crop and weeds)
canopy expansion none
stomatal closure none
early senescence
weed infestation 5 %
soil fertility 18 %
Climate-Crop-Soil wate
Irri
Soil water profile
Soil salinity
Climate and Water balance
Production
Environment
Select parameter
30 mm/day
Irri
Scale
0 mm/day


Simulation run
REPEAT
advance
to end of simulation (24 June 2014)
10 days
to date 24 June 2014
INPUT 25 June 2014
ETo mm/day
Rain mm/day
Irri mm/day
water quality dS/m
OUTPUT
24 June 2014
Crop production
Biomass 12.471 ton/ha
Dry Yield 10.005 ton/ha
Stresses
average crop cycle
soil salinity none
temperature (Transpiration) none
water stresses –(crop and weeds)
canopy expansion none
stomatal closure none
early senescence
weed infestation 5 %
soil fertility 18 %
Climate-Crop-Soil water
Irri
Soil water profile
Soil salinity
Climate and Water balance
Production
Environment
Climate
INPUT 25 June 2014
growing degrees
CO2 :
ETo :
Rain :
Irri :
from : 1 March 2
to : 24 June 2
GD :
ETo :
Rain :
Irri : 501.6 mm
Soil water balance (crop and weeds)
OUTPUT 24 June 2014
Irrigation Events
Event
Day
Date
Net application (mm)
ECw (dS/m)
1 13 13 March 2014 22.9 0.00
2 19 19 March 2014 20.7 0.00
3 29 29 March 2014 20.7 0.00
4 38 7 April 2014 19.8 0.00
5 49 18 April 2014 22.0 0.00
6 56 25 April 2014 23.1 0.00
Close
Irrigation events
Numerical output
Main Menu
Update

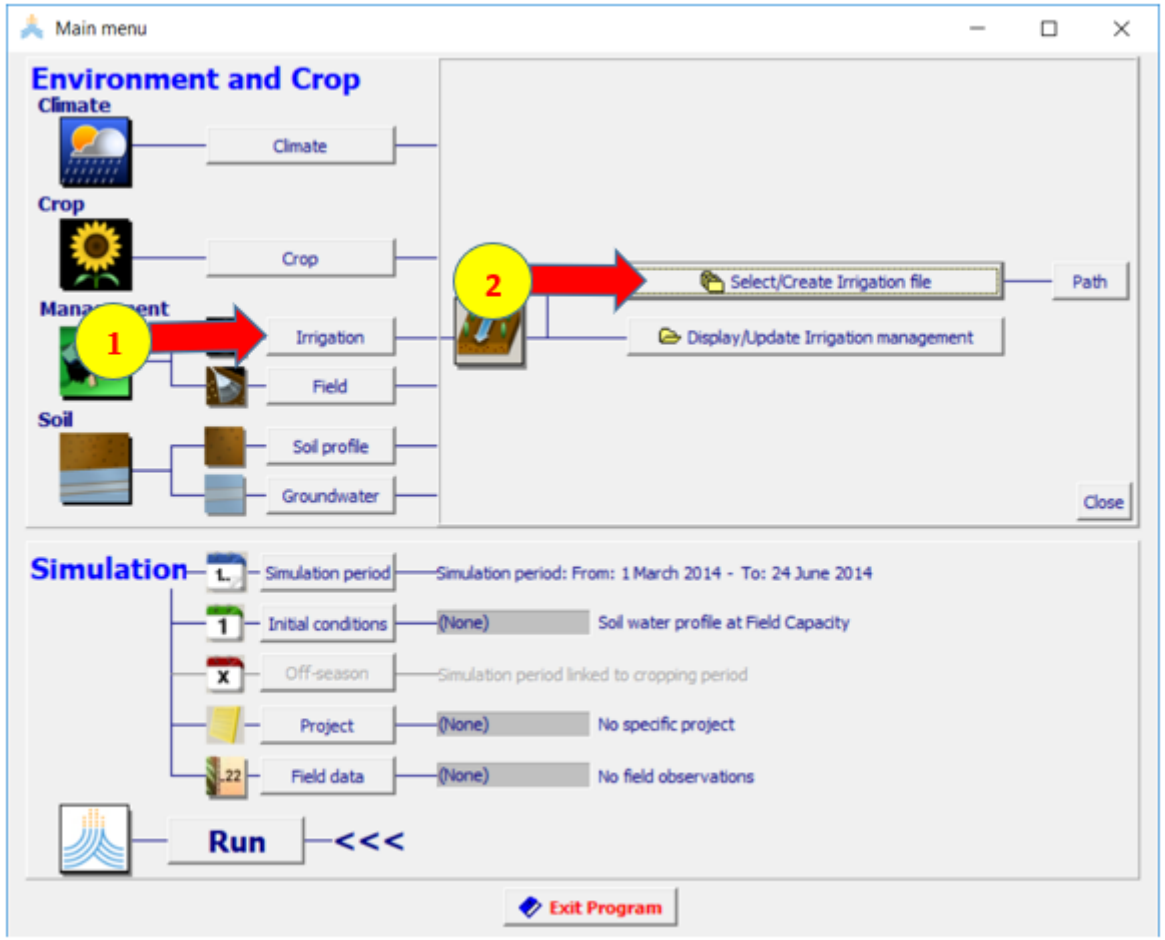
Deficit Irrigation

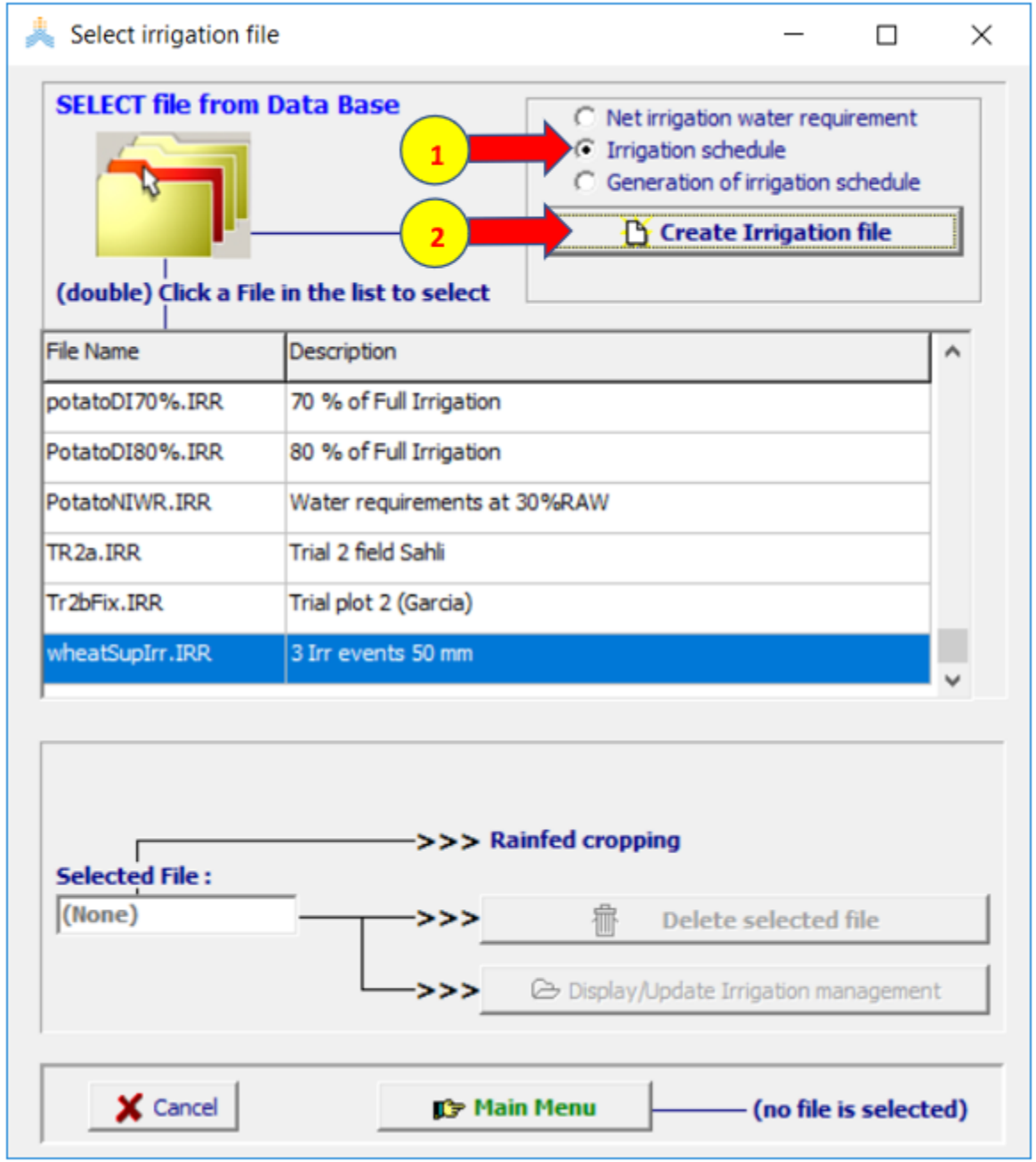
Full Irrigation		Deficit Irr				
DAP	Irri (mm)	0.8Irr	0.7Irr	0.6Irr	0.5Irr	0.4Irr
13	23	18	16	14	12	9
19	21	17	15	13	11	8
29	21	17	15	13	11	8
38	20	16	14	12	10	8
49	22	18	15	13	11	9
56	23	18	16	14	12	9
61	28	22	20	17	14	11
66	26	21	18	16	13	10
71	27	22	19	16	14	11
75	23	18	16	14	12	9
79	24	19	17	14	12	10
83	26	21	18	16	13	10
87	26	21	18	16	13	10
91	25	20	18	15	13	10
94	22	18	15	13	11	9
98	26	21	18	16	13	10
101	21	17	15	13	11	8
104	21	17	15	13	11	8
108	25	20	18	15	13	10
112	27	22	19	16	14	11

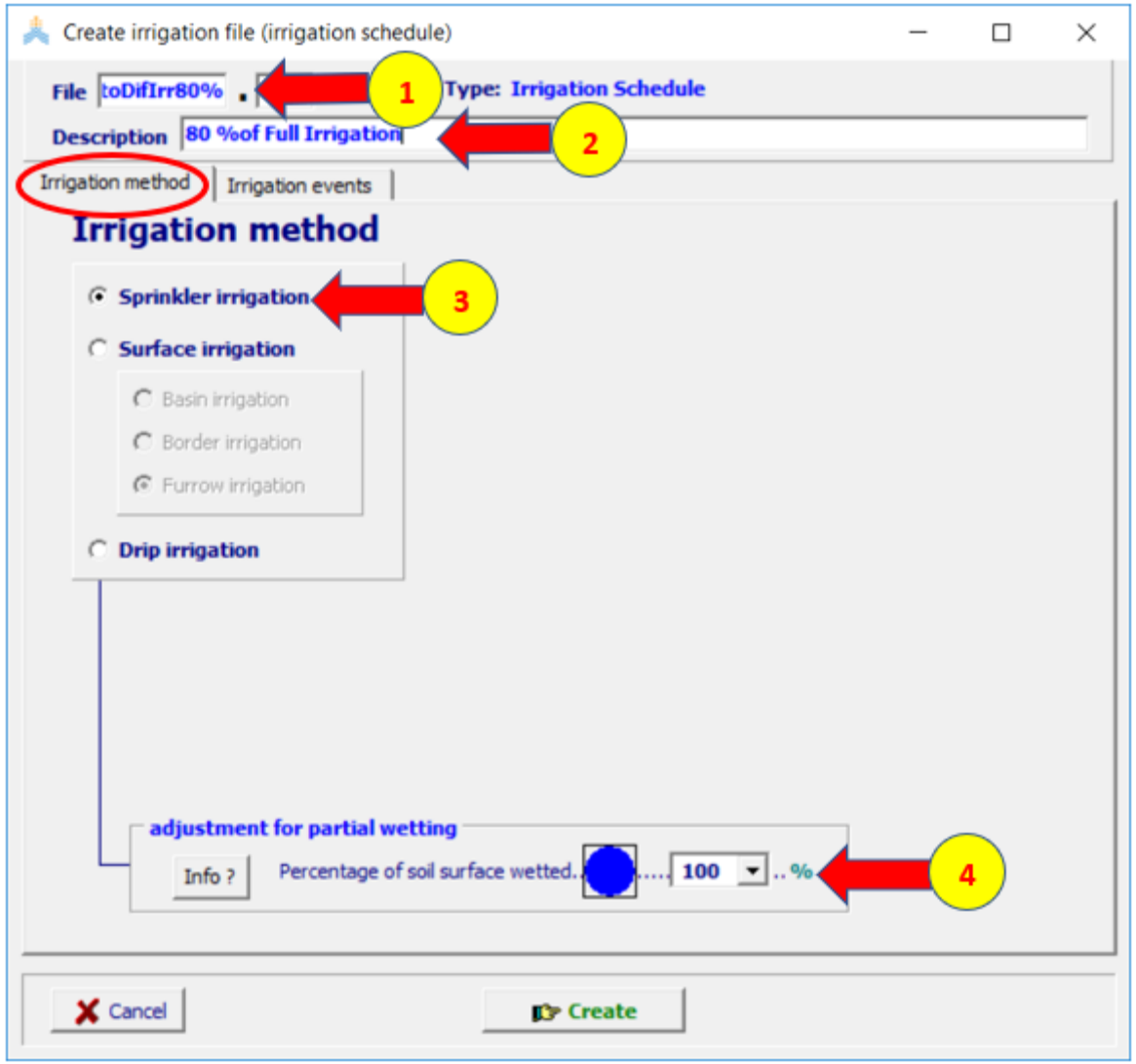
Deficit irrigation schedules are derived from the generated full irrigation schedule by keeping the time of irrigation and decreasing irrigation depth

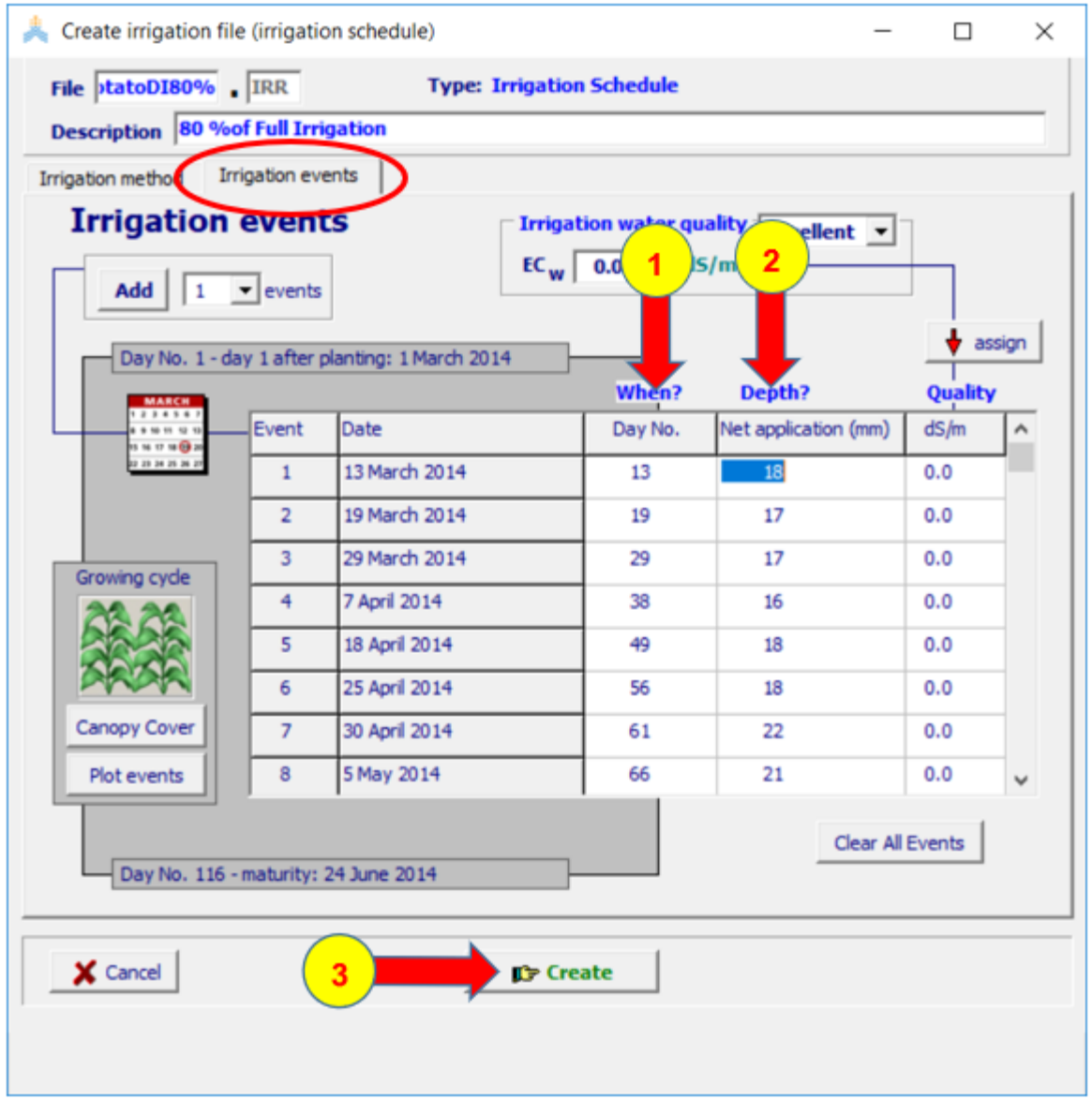


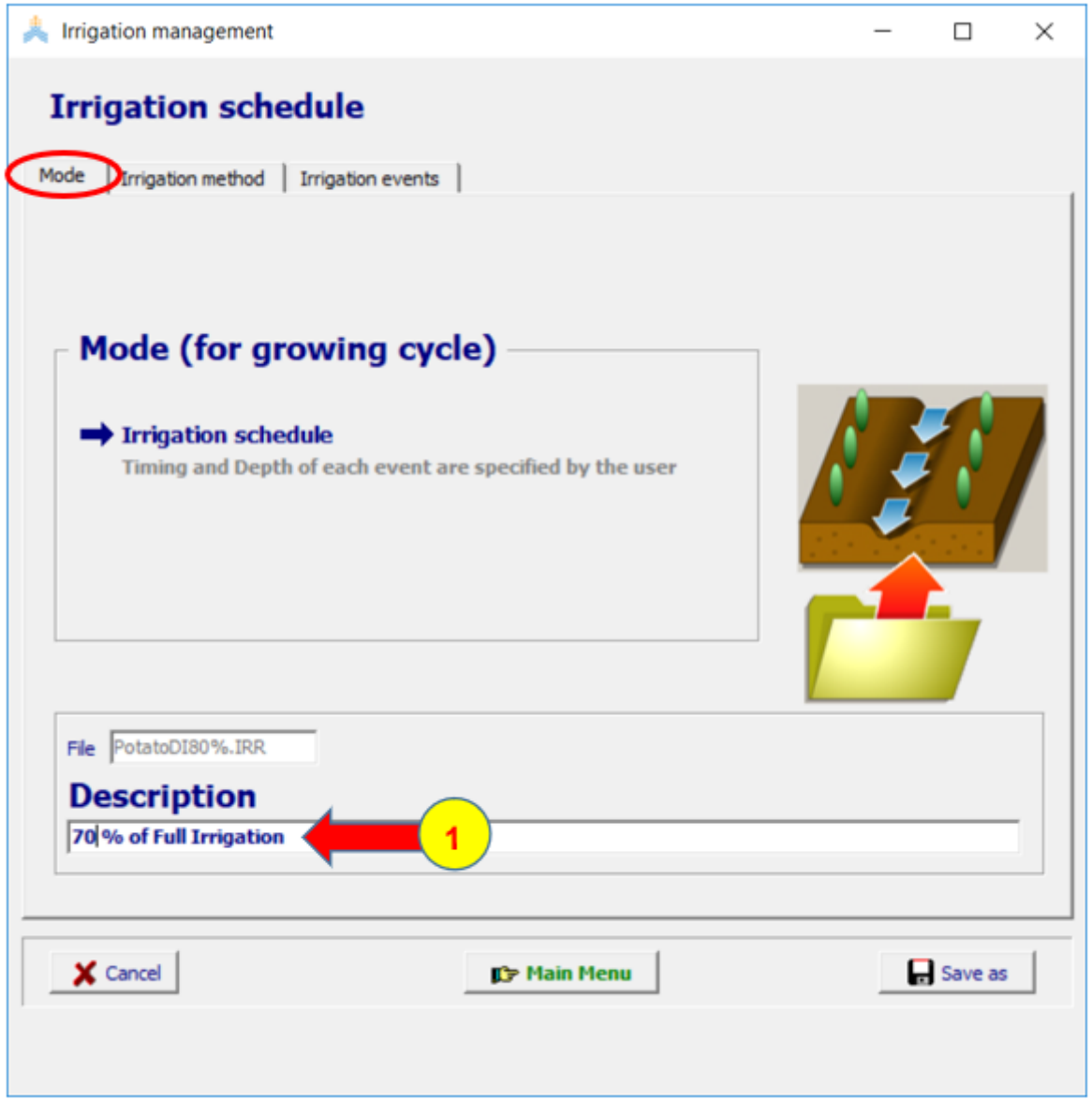
	Irrigation depth					
DAP	**Full Irri**	**0.8Irr**	**0.7Irr**	**0.6Irr**	**0.5Irr**	**0.4Irr**
13	23	18	16	14	12	9
19	21	17	15	13	11	8
29	21	17	15	13	11	8
38	20	16	14	12	10	8
49	22	18	15	13	11	9
56	23	18	16	14	12	9
61	28	22	20	17	14	11
66	26	21	18	16	13	10
71	27	22	19	16	14	11
75	23	18	16	14	12	9
79	24	19	17	14	12	10
83	26	21	18	16	13	10
87	26	21	18	16	13	10
91	25	20	18	15	13	10
94	22	18	15	13	11	9
98	26	21	18	16	13	10
101	21	17	15	13	11	8
104	21	17	15	13	11	8
108	25	20	18	15	13	10
112	27	22	19	16	14	11
116	27	22	19	16	14	11
Sum	**504**	**405**	**354**	**305**	**258**	**199**

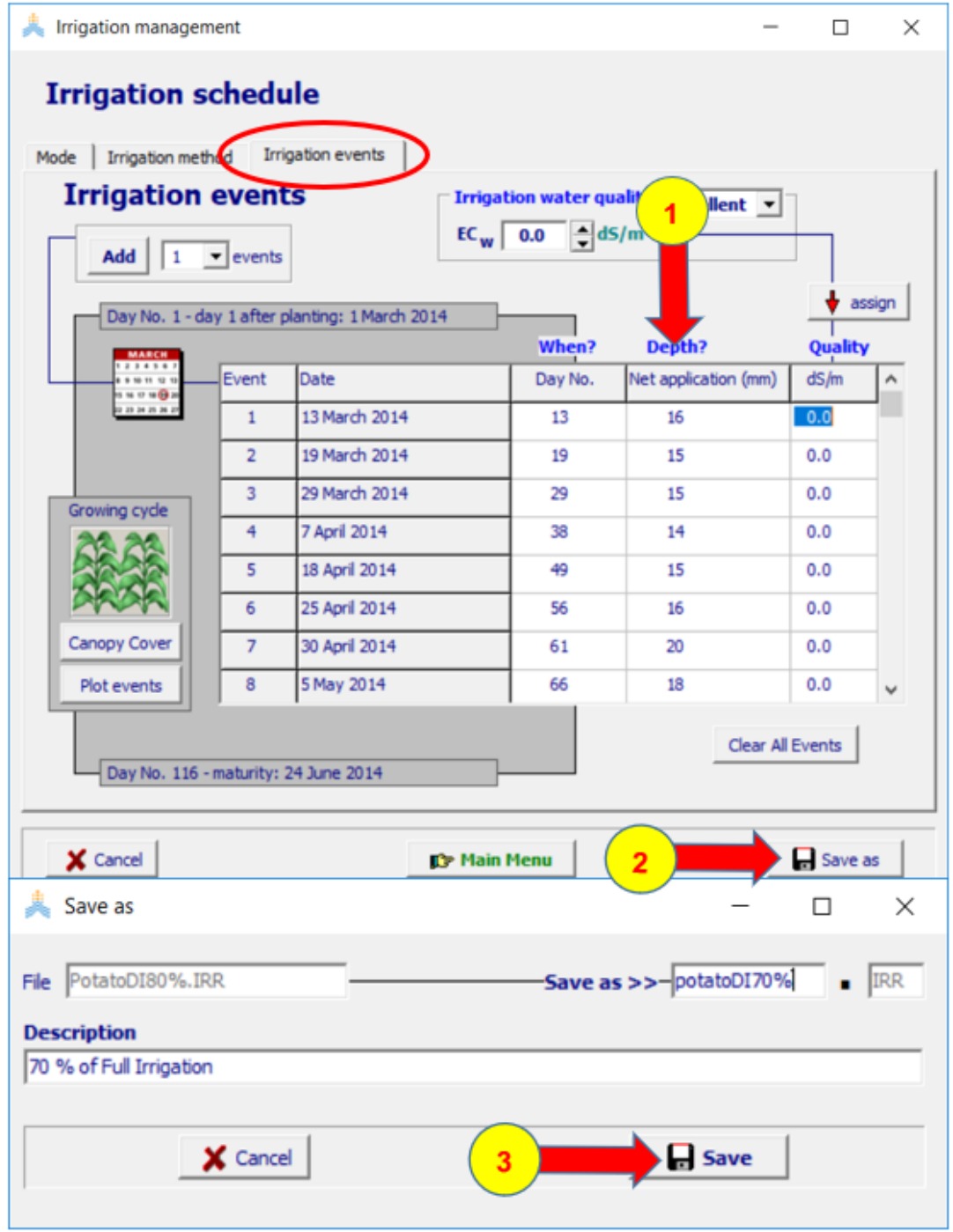

Main menu
Environment and Crop
Climate
Climate
Crop
Crop
Irrigation
Field
Soil
Soil profile
Groundwater
1
2
Select/Create Irrigation file
Path
Display/Update Irrigation management
Close
Simulation
Simulation period
Simulation period: From: 1 March 2014 - To: 24 June 2014
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program

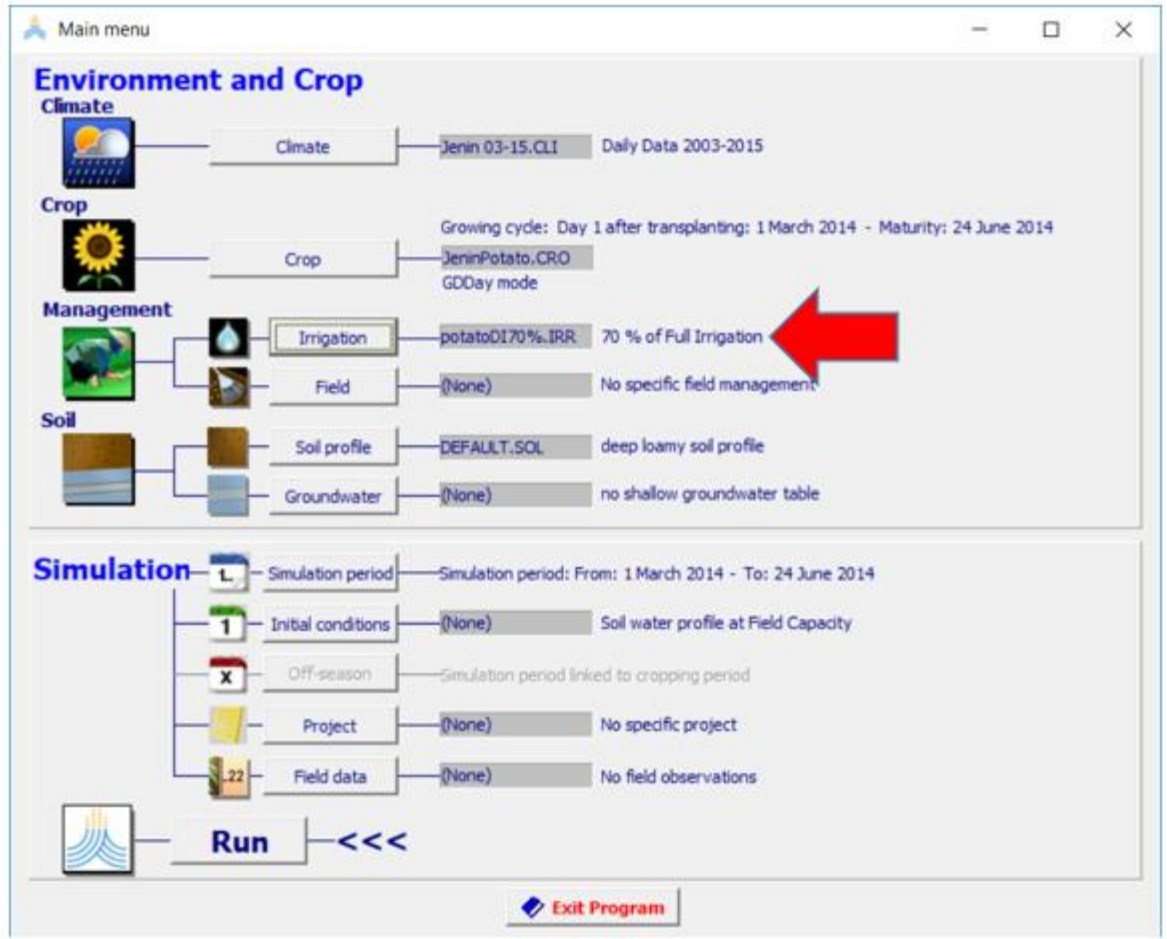

Select irrigation file
SELECT file from Data Base
1
2
Net irrigation water requirement
Irrigation schedule
Generation of irrigation schedule
Create Irrigation file
(double) Click a File in the list to select
File Name
Description
potatoDI70%.IRR
70 % of Full Irrigation
PotatoDI80%.IRR
80 % of Full Irrigation
PotatoNIWR.IRR
Water requirements at 30%RAW
TR2a.IRR
Trial 2 field Sahli
Tr2bFix.IRR
Trial plot 2 (Garcia)
wheatSupIrr.IRR
3 Irr events 50 mm
>>> Rainfed cropping
Selected File :
(None)
>>>
Delete selected file
>>>
Display/Update Irrigation management
Cancel
Main Menu
(no file is selected)

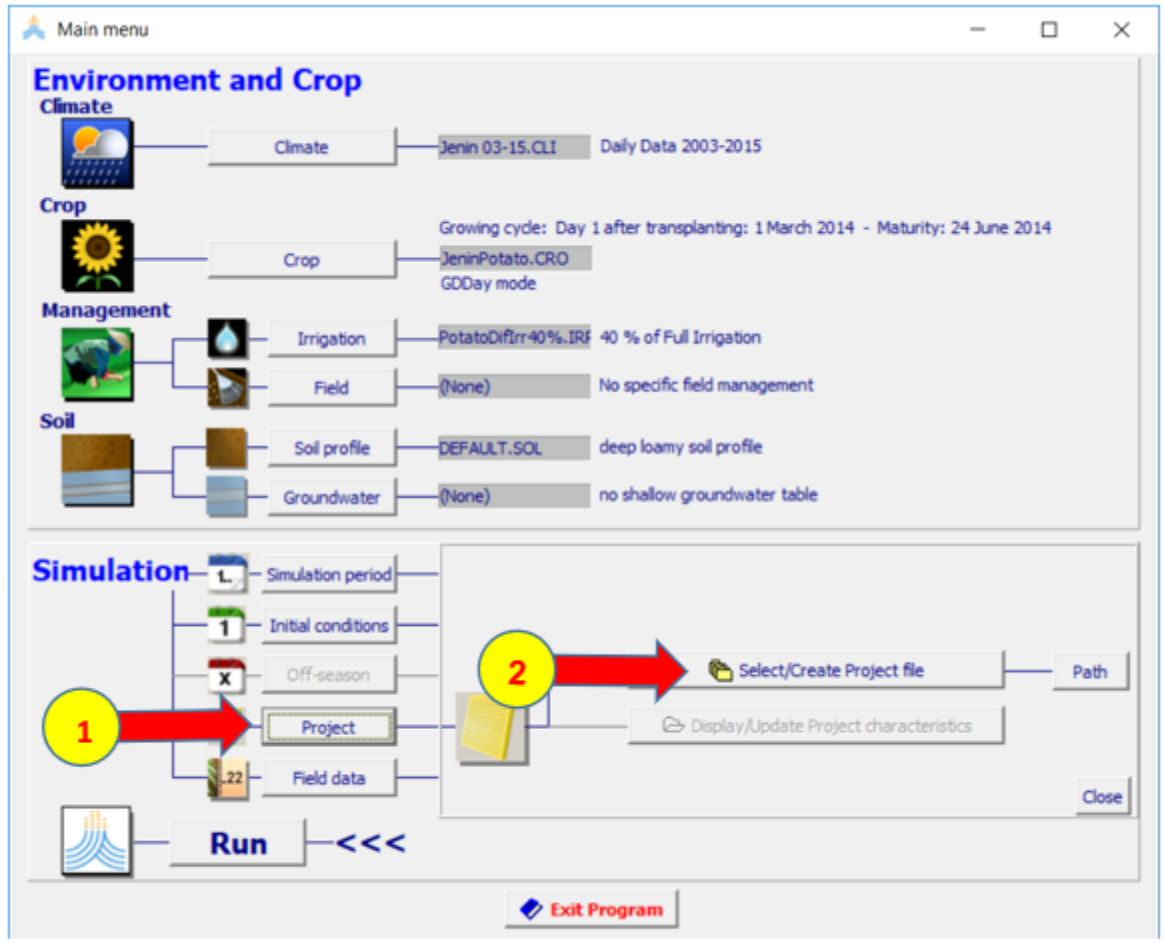

Create irrigation file (irrigation schedule)
File
toDifIrr80%
Type: Irrigation Schedule
Description
80 %of Full Irrigation
Irrigation method
Irrigation events
Irrigation method
Sprinkler irrigation
Surface irrigation
Basin irrigation
Border irrigation
Furrow irrigation
Drip irrigation
adjustment for partial wetting
Info ?
Percentage of soil surface wetted..
100
.. %
Cancel
Create
1
2
3
4

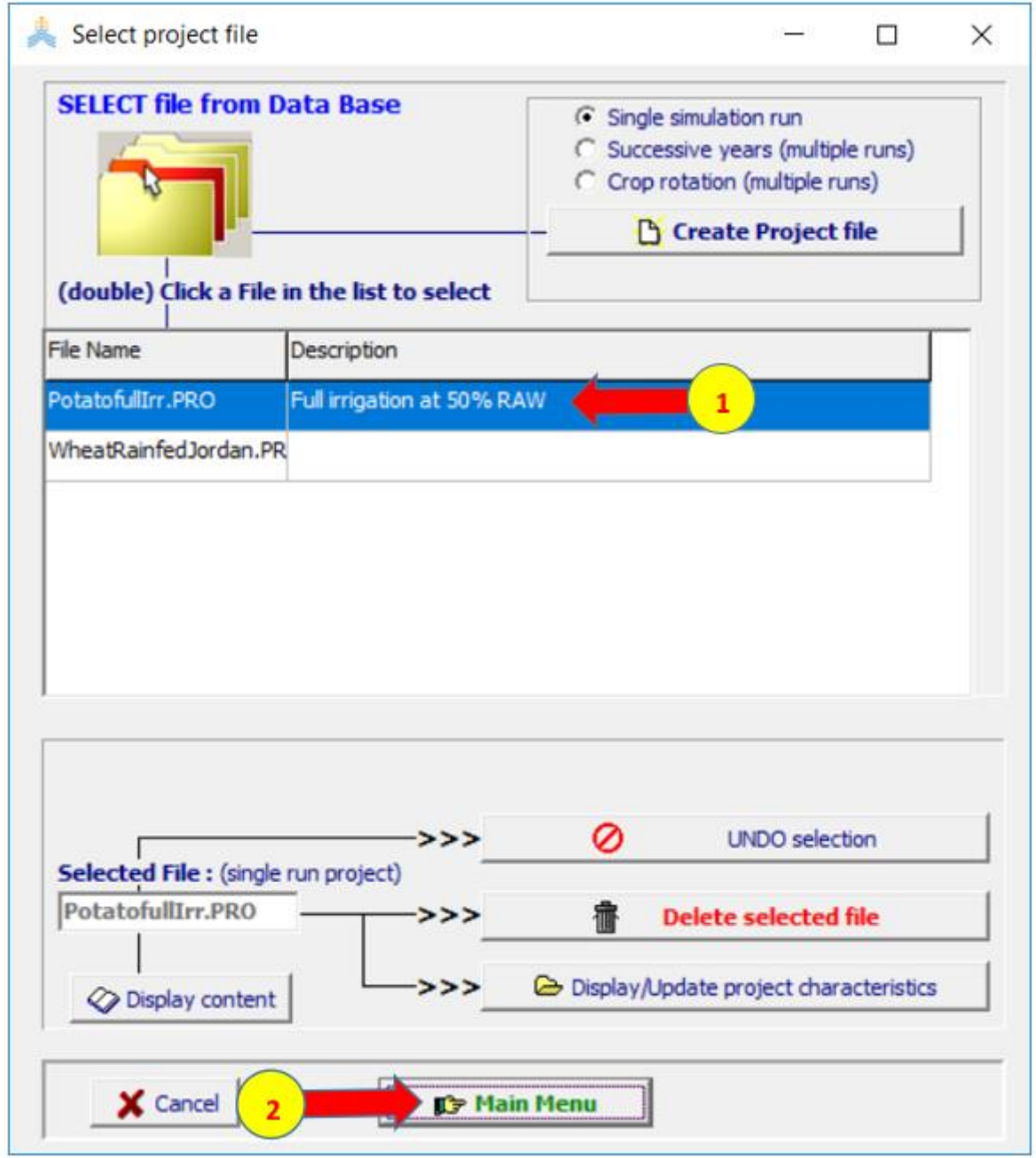

Create irrigation file (irrigation schedule)
File
IRR
Type: Irrigation Schedule
Description
80 %of Full Irrigation
Irrigation events
Irrigation events
Add
events
Irrigation water quality
assign
1
2
When?
Depth?
Quality
Day No. 1 - day 1 after planting: 1 March 2014
Event
Date
Day No.
Net application (mm)
dS/m
1 13 March 2014 13 18 0.0
2 19 March 2014 19 17 0.0
3 29 March 2014 29 17 0.0
4 7 April 2014 38 16 0.0
5 18 April 2014 49 18 0.0
6 25 April 2014 56 18 0.0
7 30 April 2014 61 22 0.0
8 5 May 2014 66 21 0.0
Growing cycle
Canopy Cover
Plot events
Clear All Events
Day No. 116 - maturity: 24 June 2014
Cancel
3
Create

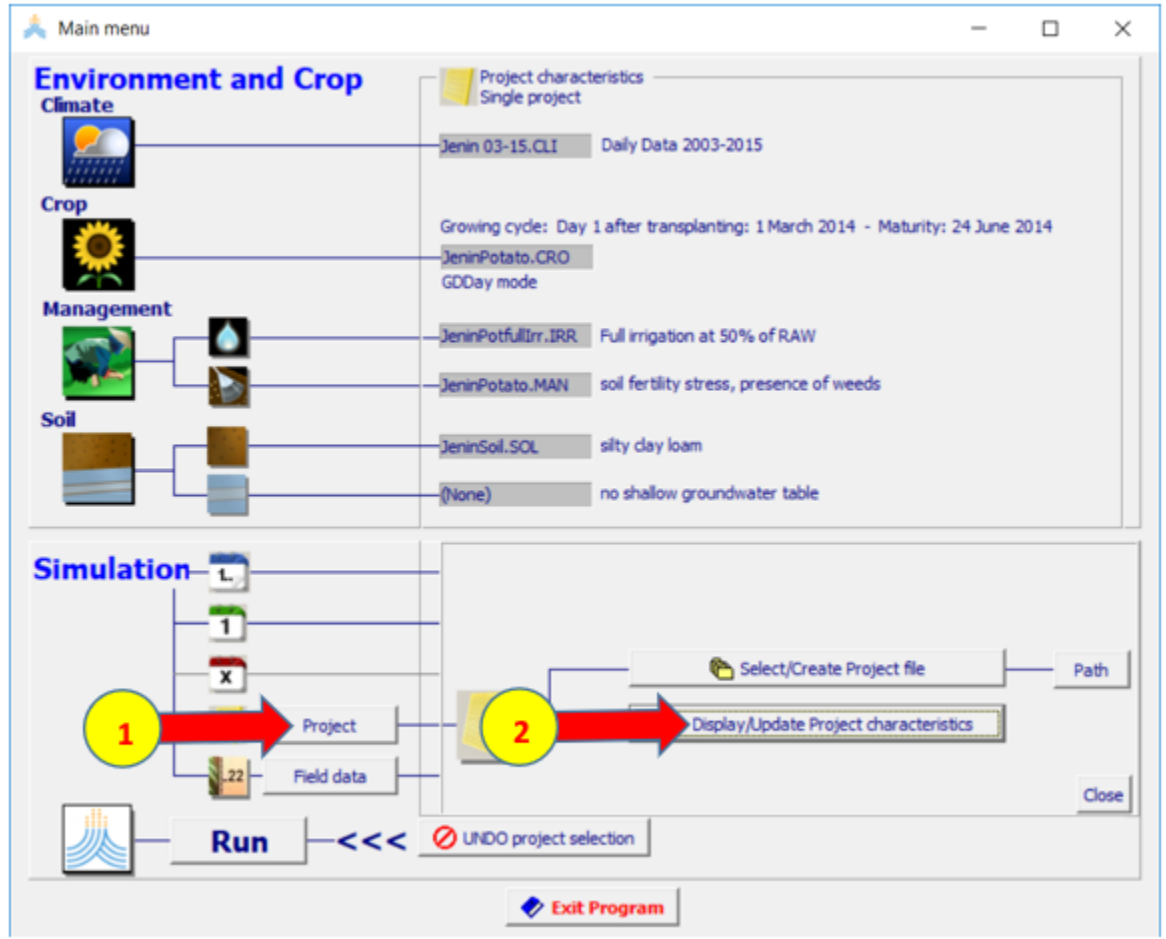

Irrigation management
Irrigation schedule
Mode
Irrigation method
Irrigation events
Mode (for growing cycle)
Irrigation schedule
Timing and Depth of each event are specified by the user
File
PotatoDI80%.IRR
Description
70 % of Full Irrigation
1
Cancel
Main Menu
Save as

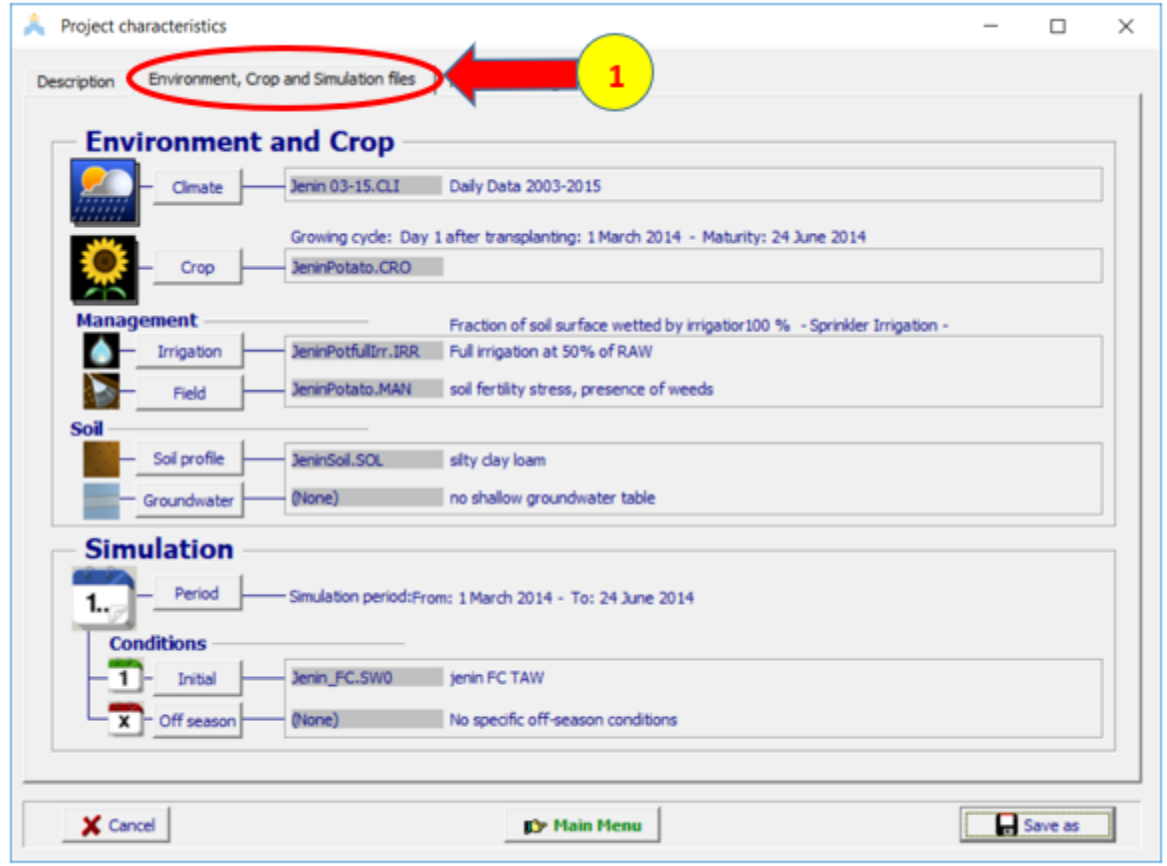

Irrigation management
Irrigation schedule
Mode
Irrigation method
Irrigation events
Irrigation events
Irrigation water quality
Excellent
EC w 0.0 dS/m
1
Add 1 events
assign
Day No. 1 - day 1 after planting: 1 March 2014
When?
Depth?
Quality
Event
Date
Day No.
Net application (mm)
dS/m
1 13 March 2014 13 16 0.0
2 19 March 2014 19 15 0.0
3 29 March 2014 29 15 0.0
4 7 April 2014 38 14 0.0
5 18 April 2014 49 15 0.0
6 25 April 2014 56 16 0.0
7 30 April 2014 61 20 0.0
8 5 May 2014 66 18 0.0
Growing cycle
Canopy Cover
Plot events
Clear All Events
Day No. 116 - maturity: 24 June 2014
Cancel
Main Menu
2
Save as
Save as
File
PotatoDI80%.IRR
Save as >>
potatoDI70%
IRR
Description
70 % of Full Irrigation
Cancel
3
Save

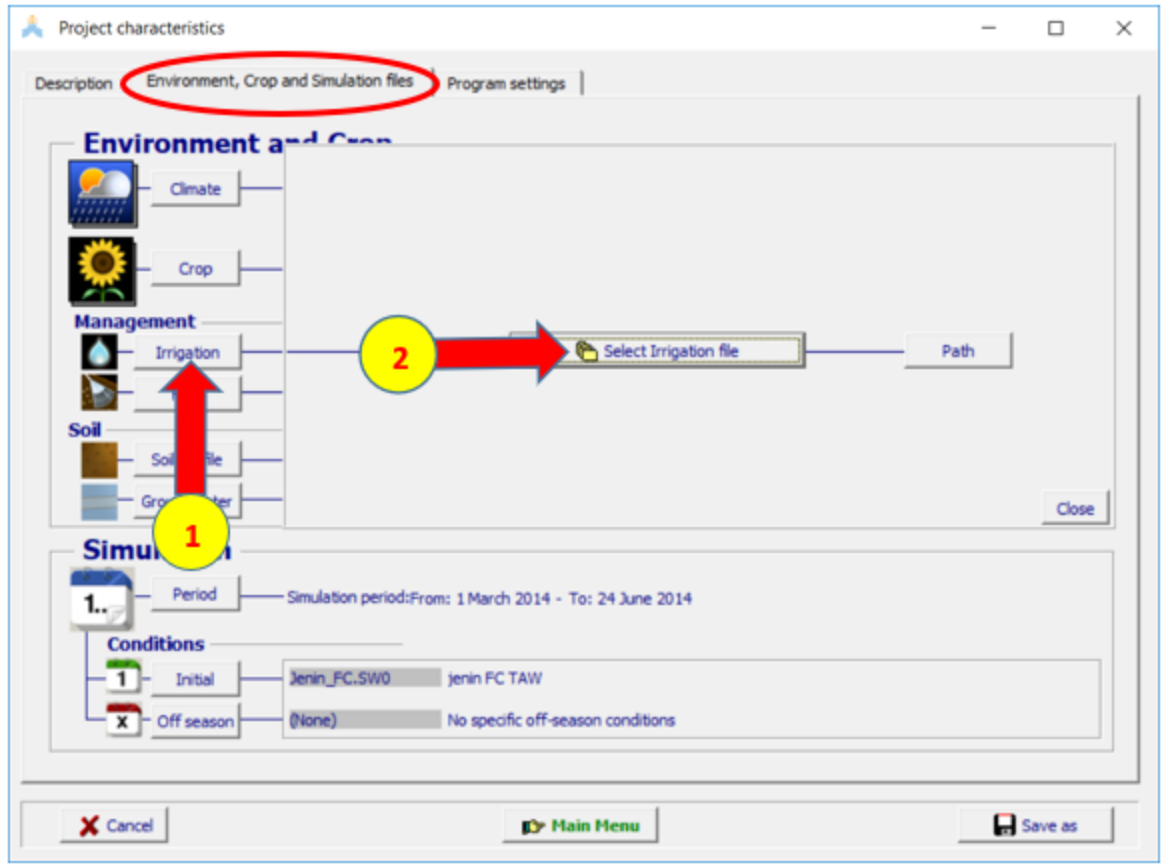

Main menu
Environment and Crop
Climate
Climate
Jenin 03-15.CLI
Daily Data 2003-2015
Crop
Growing cycle: Day 1 after transplanting: 1 March 2014 - Maturity: 24 June 2014
Crop
JeninPotato.CRO
GDDay mode
Management
Irrigation
potatoDI70%.IRR
70 % of Full Irrigation
Field
(None)
No specific field management
Soil
Soil profile
DEFAULT.SOL
deep loamy soil profile
Groundwater
(None)
no shallow groundwater table
Simulation
Simulation period
Simulation period: From: 1 March 2014 - To: 24 June 2014
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program

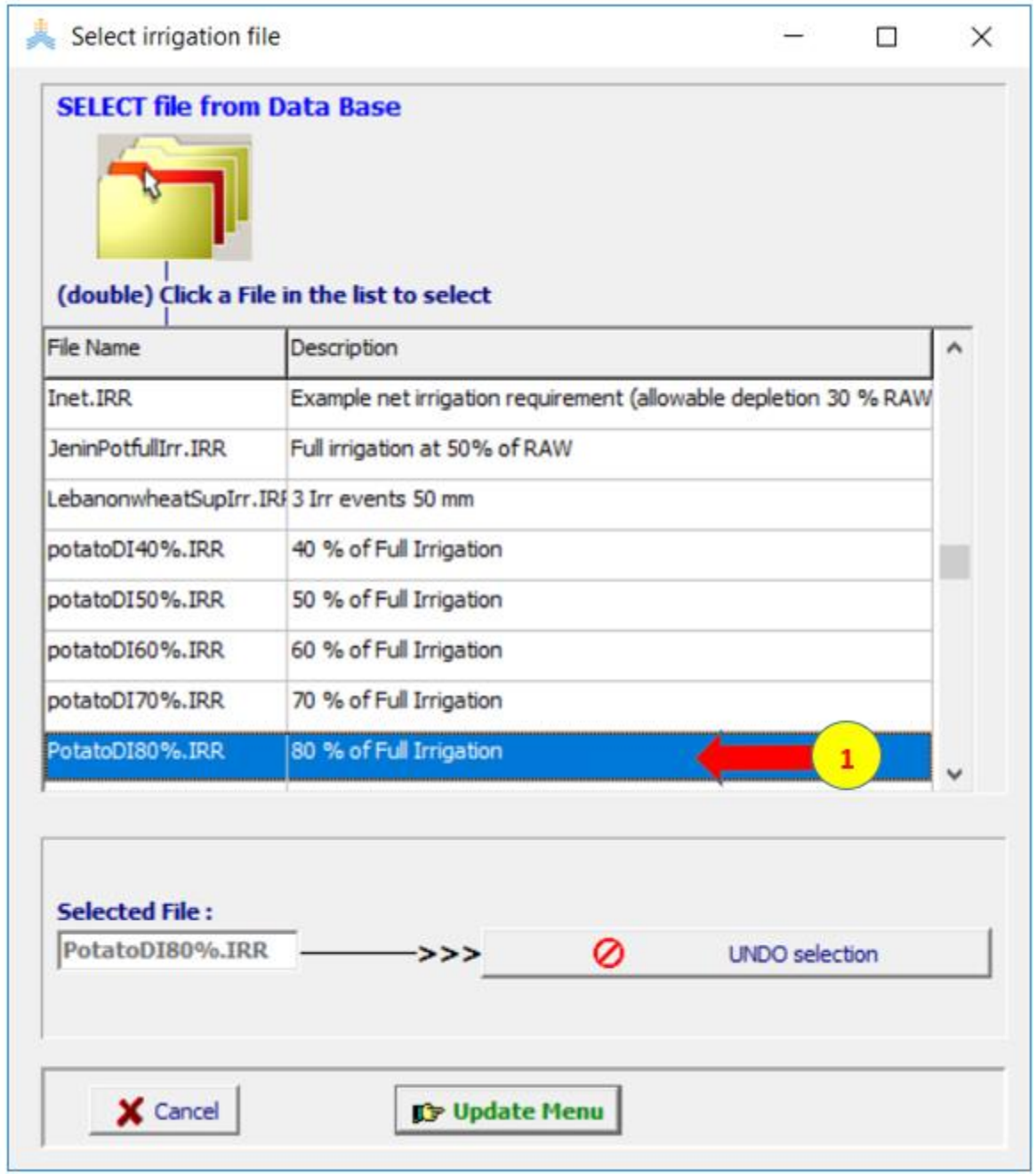

Main menu
Environment and Crop
Climate
Climate
Jenin 03-15.CLI
Daily Data 2003-2015
Crop
Growing cycle: Day 1 after transplanting: 1 March 2014 - Maturity: 24 June 2014
Crop
JeninPotato.CRO
GDDay mode
Management
Irrigation
PotatoDifIrr40%.IRF
40 % of Full Irrigation
Field
(None)
No specific field management
Soil
Soil profile
DEFAULT.SOL
deep loamy soil profile
Groundwater
(None)
no shallow groundwater table
Simulation
Simulation period
Initial conditions
Off-season
Project
Field data
1
2
Select/Create Project file
Path
Display/Update Project characteristics
Close
Run
<<<
Exit Program

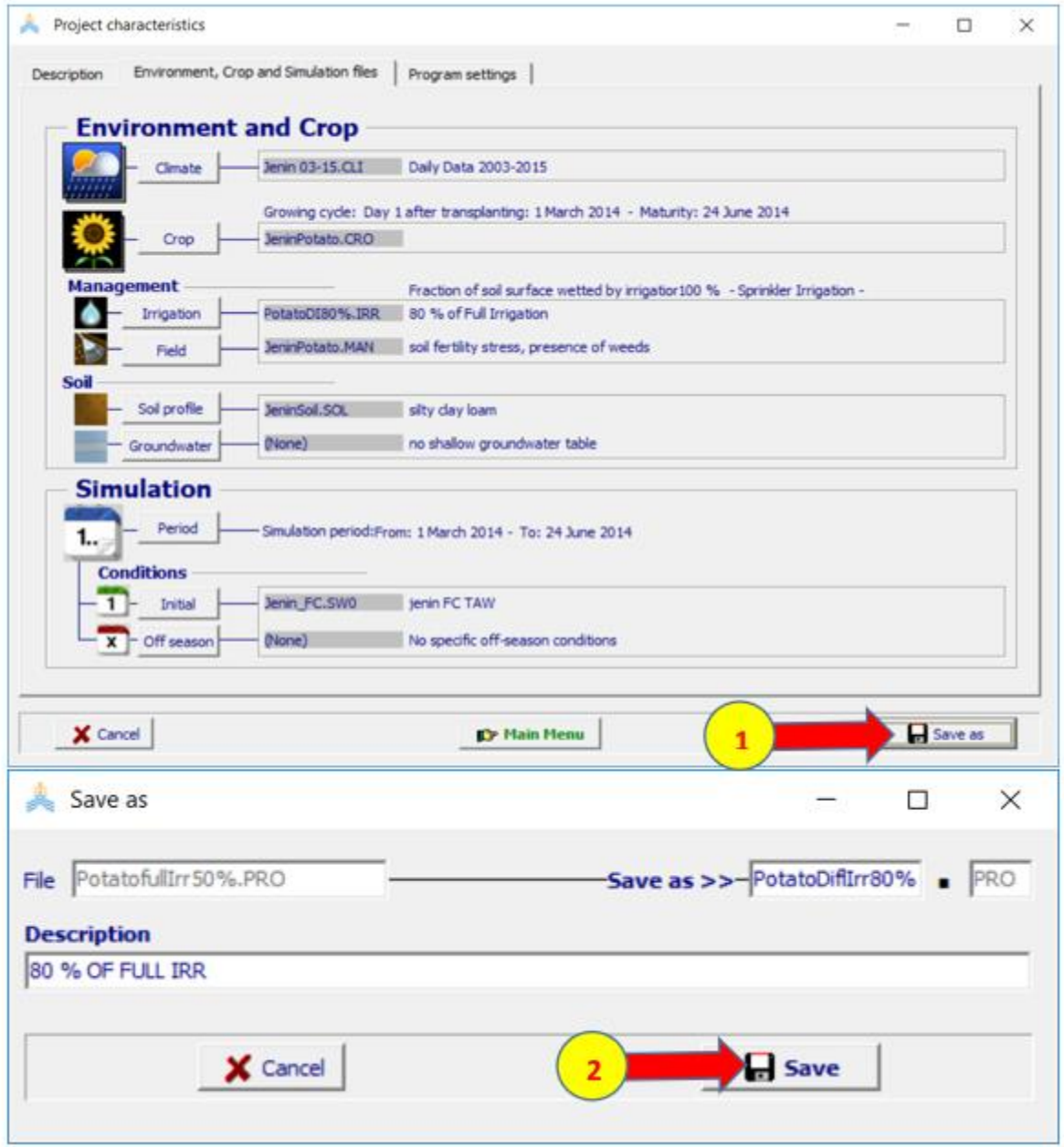

Select project file
SELECT file from Data Base
Single simulation run
Successive years (multiple runs)
Crop rotation (multiple runs)
Create Project file
(double) Click a File in the list to select
File Name
Description
PotatofullIrr.PRO
Full irrigation at 50% RAW
1
WheatRainfedJordan.PR
Selected File : (single run project)
PotatofullIrr.PRO
UNDO selection
Delete selected file
Display/Update project characteristics
Display content
Cancel
2
Main Menu

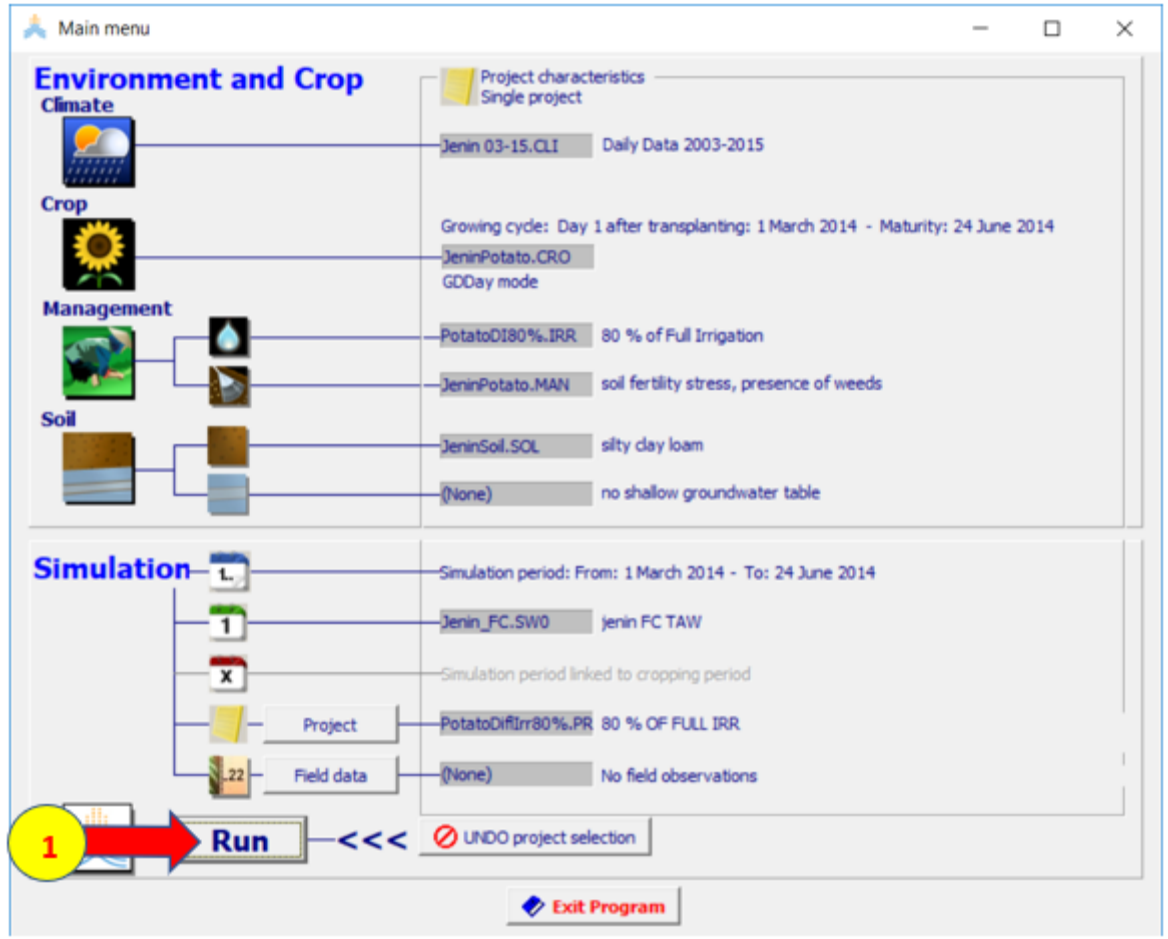

Main menu
Environment and Crop
Climate
Project characteristics
Single project
Jenin 03-15.CLI
Daily Data 2003-2015
Crop
Growing cycle: Day 1 after transplanting: 1 March 2014 - Maturity: 24 June 2014
JeninPotato.CRO
GDDay mode
Management
JeninPotfullIrr.IRR
Full irrigation at 50% of RAW
JeninPotato.MAN
soil fertility stress, presence of weeds
Soil
JeninSoil.SOL
silty clay loam
(None)
no shallow groundwater table
Simulation
1
Project
Field data
2
Select/Create Project file
Path
Display/Update Project characteristics
Close
Run
<<<
UNDO project selection
Exit Program

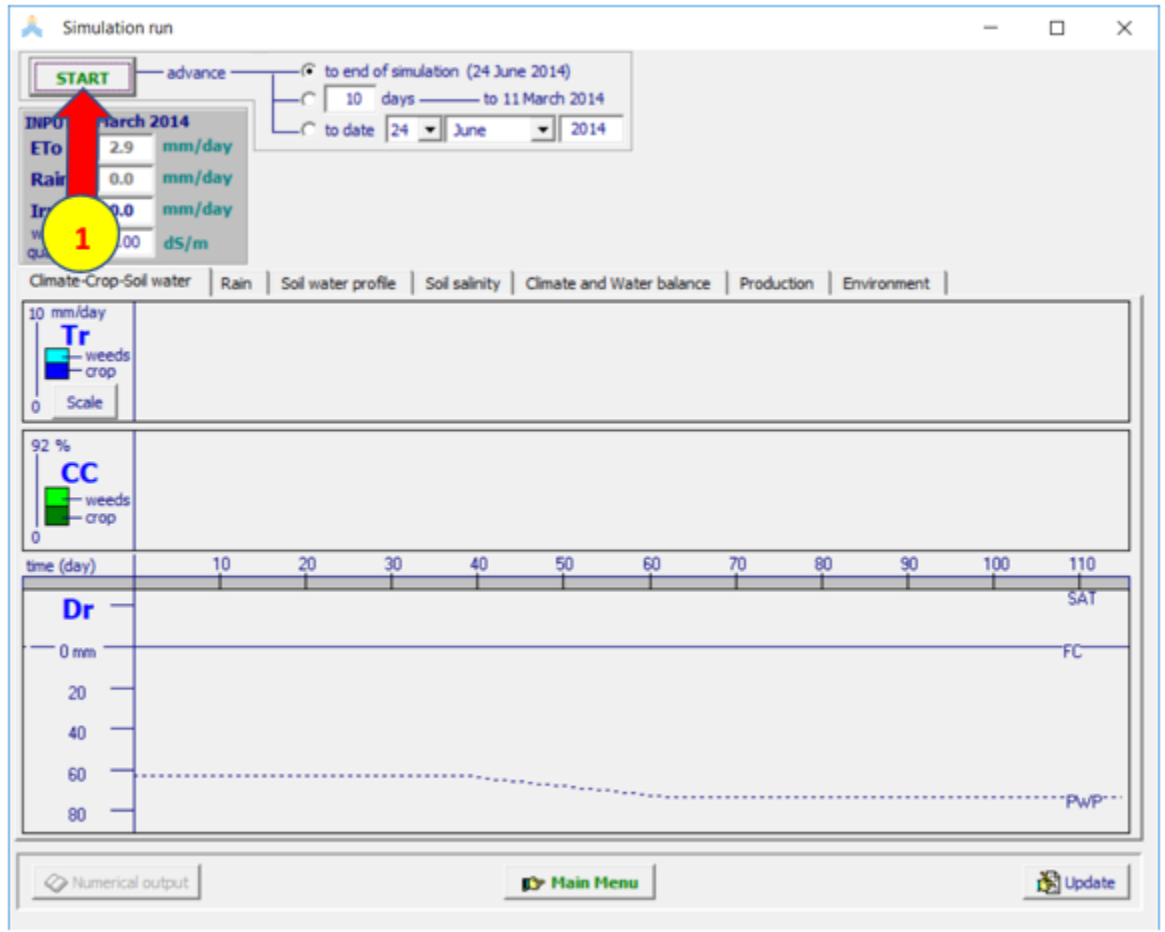

Project characteristics
Description
Environment, Crop and Simulation files
1
Environment and Crop
Climate
Jenin 03-15.CLI
Daily Data 2003-2015
Growing cycle: Day 1 after transplanting: 1 March 2014 - Maturity: 24 June 2014
Crop
JeninPotato.CRO
Management
Fraction of soil surface wetted by irrigation100 % - Sprinkler Irrigation -
Irrigation
JeninPotfullIrr.IRR
Full irrigation at 50% of RAW
Field
JeninPotato.MAN
soil fertility stress, presence of weeds
Soil
Soil profile
JeninSoil.SOL
silty clay loam
Groundwater
(None)
no shallow groundwater table
Simulation
Period
Simulation period:From: 1 March 2014 - To: 24 June 2014
Conditions
Initial
Jenin_FC.SW0
jenin FC TAW
Off season
(None)
No specific off-season conditions
Cancel
Main Menu
Save as

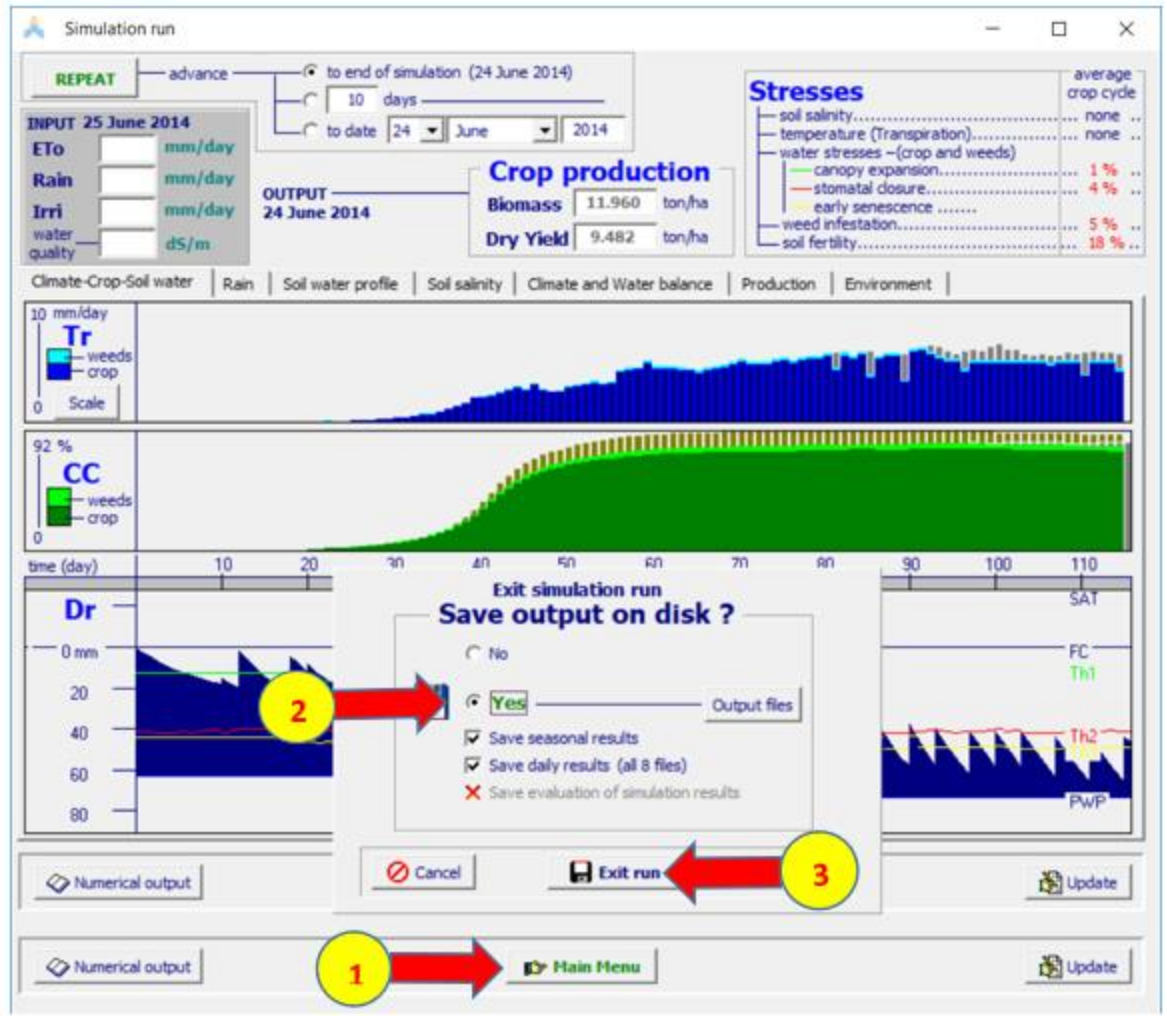

Project characteristics
Description
Environment, Crop and Simulation files
Program settings
Climate
Crop
Management
Irrigation
Soil
Select Irrigation file
Path
Close
1
2
Period
Simulation period:From: 1 March 2014 - To: 24 June 2014
Conditions
Initial
Jenin_FC.SW0
jenin FC TAW
Off season
(None)
No specific off-season conditions
Cancel
Main Menu
Save as


Select irrigation file
SELECT file from Data Base
(double) Click a File in the list to select
File Name
Description
Inet.IRR
Example net irrigation requirement (allowable depletion 30 % RAW
JeninPotfullIrr.IRR
Full irrigation at 50% of RAW
LebanonwheatSupIrr.IRR
3 Irr events 50 mm
potatoDI40%.IRR
40 % of Full Irrigation
potatoDI50%.IRR
50 % of Full Irrigation
potatoDI60%.IRR
60 % of Full Irrigation
potatoDI70%.IRR
70 % of Full Irrigation
PotatoDI80%.IRR
80 % of Full Irrigation
1
Selected File :
PotatoDI80%.IRR
>>>
UNDO selection
Cancel
Update Menu


Project characteristics
Description
Environment, Crop and Simulation files
Program settings
Environment and Crop
Climate
Jenin 03-15.CLI
Daily Data 2003-2015
Growing cycle: Day 1 after transplanting: 1 March 2014 - Maturity: 24 June 2014
Crop
JeninPotato.CRO
Management
Fraction of soil surface wetted by irrigation100 % - Sprinkler Irrigation -
Irrigation
PotatoDI80%.IRR
80 % of Full Irrigation
Field
JeninPotato.MAN
soil fertility stress, presence of weeds
Soil
Soil profile
JeninSoil.SOL
silty clay loam
Groundwater
(None)
no shallow groundwater table
Simulation
Period
Simulation period:From: 1 March 2014 - To: 24 June 2014
Conditions
Initial
Jenin_FC.SW0
jenin FC TAW
Off season
(None)
No specific off-season conditions
Cancel
Main Menu
1
Save as
Save as
File
PotatofullIrr50%.PRO
Save as >>
PotatoDifIIrr80%
PRO
Description
80 % OF FULL IRR
Cancel
2
Save


Main menu
Environment and Crop
Climate
Project characteristics
Single project
Jenin 03-15.CLI
Daily Data 2003-2015
Crop
Growing cycle: Day 1 after transplanting: 1 March 2014 - Maturity: 24 June 2014
JeninPotato.CRO
GDDay mode
Management
PotatoDI80%.IRR
80 % of Full Irrigation
JeninPotato.MAN
soil fertility stress, presence of weeds
Soil
JeninSoil.SOL
silty clay loam
(None)
no shallow groundwater table
Simulation
Simulation period: From: 1 March 2014 - To: 24 June 2014
Jenin_FC.SW0
jenin FC TAW
Simulation period linked to cropping period
Project
PotatoDifIrr80%.PR
80 % OF FULL IRR
Field data
(None)
No field observations
1
Run
<<<
UNDO project selection
Exit Program


Simulation run
START
advance
to end of simulation (24 June 2014)
10 days
to 11 March 2014
to date 24 June 2014
March 2014
ETo 2.9 mm/day
0.0 mm/day
mm/day
dS/m
1
Climate-Crop-Soil water
Rain
Soil water profile
Soil salinity
Climate and Water balance
Production
Environment
10 mm/day
Tr
weeds
crop
Scale
0
92 %
CC
weeds
crop
0
time (day)
10 20 30 40 50 60 70 80 90 100 110
Dr
0 mm
20
40
60
80
SAT
FC
PWP
Numerical output
Main Menu
Update


Simulation run
REPEAT
advance
to end of simulation (24 June 2014)
10 days
to date 24 June 2014
INPUT 25 June 2014
ETo mm/day
Rain mm/day
Irri mm/day
water quality dS/m
OUTPUT
24 June 2014
Crop production
Biomass 11.960 ton/ha
Dry Yield 9.482 ton/ha
Stresses
average crop cycle
soil salinity none
temperature (Transpiration) none
water stresses -(crop and weeds)
canopy expansion 1 %
stomatal closure 4 %
early senescence
weed infestation 5 %
soil fertility 18 %
Climate-Crop-Soil water
Rain
Soil water profile
Soil salinity
Climate and Water balance
Production
Environment
10 mm/day
Tr
weeds
crop
Scale
0
92 %
CC
weeds
crop
0
time (day)
10
20
90
100
110
Dr
0 mm
20
40
60
80
SAT
FC
Th1
Th2
PWP
Exit simulation run
Save output on disk ?
No
Yes
Output files
Save seasonal results
Save daily results (all 8 files)
Save evaluation of simulation results
2
Cancel
Exit run
3
Numerical output
Update
Numerical output
1
Main Menu
Update

يتم إنشاء بقية مشاريع الري الناقص بنفس الطريقة التي تم بها إنشاء المشروع
:PotatoDiflIrr80%.PRO

1- استبدال ملف الري (PotatoDI80%.IRR) في المشروع
(PotatoDiflIrr80%.PRO) بالملف (PotatoDI70%.IRR) وتعديل الوصف
إلى (70 % OF FULL IRR) وحفظ المشروع باسم
(PotatoDiflIrr70%.PRO) وتشغيله وحفظ النتائج.

2- استبدال ملف الري (PotatoDI70%.IRR) في المشروع
(PotatoDiflIrr70%.PRO) بالملف (PotatoDI60%.IRR) وتعديل الوصف
إلى (60 % OF FULL IRR) وحفظ المشروع باسم
(PotatoDiflIrr60%.PRO) وتشغيله وحفظ النتائج.

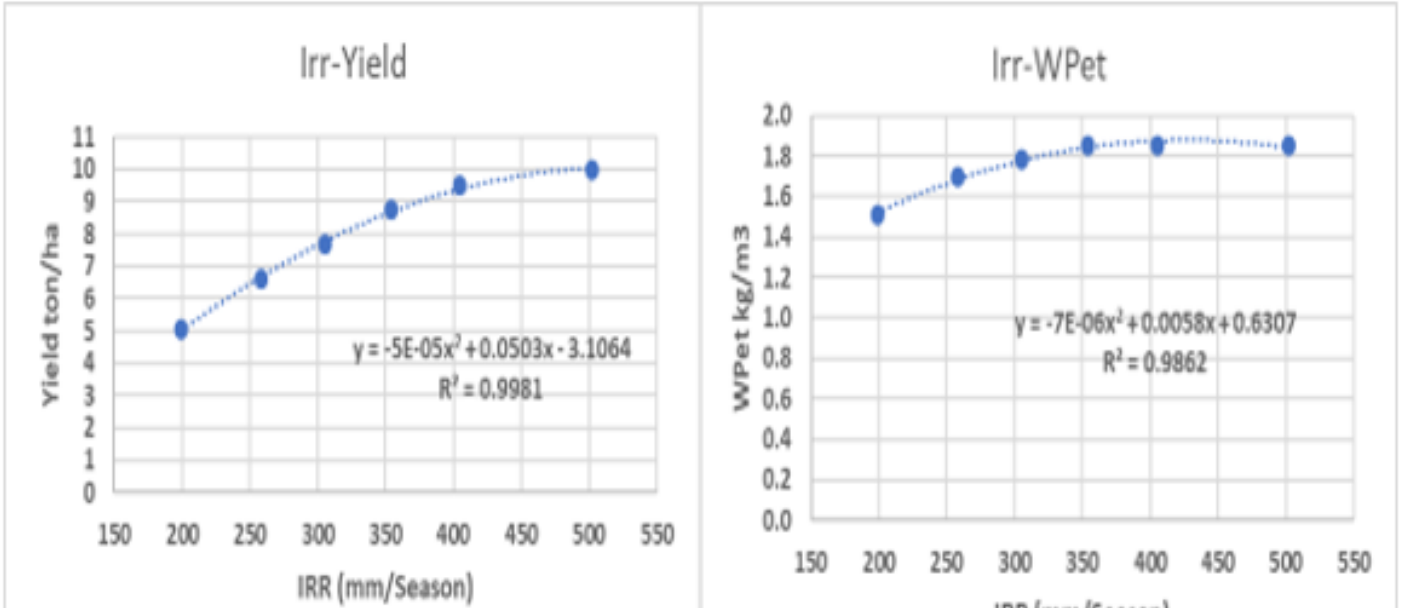
3- استبدال ملف الري (PotatoDI60%.IRR) في المشروع
(PotatoDiflIrr60%.PRO) بالملف (PotatoDI50%.IRR) وتعديل الوصف
إلى (50 % OF FULL IRR) وحفظ المشروع باسم
(PotatoDiflIrr50%.PRO) وتشغيله وحفظ النتائج.

4- استبدال ملف الري (PotatoDI50%.IRR) في المشروع
(PotatoDiflIrr50%.PRO) بالملف (PotatoDI40%.IRR) وتعديل الوصف
إلى (40 % OF FULL IRR) وحفظ المشروع باسم
(PotatoDiflIrr40%.PRO) وتشغيله وحفظ النتائج.

يمكن الحصول على نتائج المحاكاة لمشاريع الري الناقص من الملفات:
PotatoDiflIrr80%Run.OUT
PotatoDiflIrr70%Run.OUT
PotatoDiflIrr60%Run.OUT
PotatoDiflIrr50%Run.OUT
PotatoDiflIrr40%Run.OUT
المحفوظة في المكتبة الفرعية OUTP في مجلد AquaCropV60Nr26042017

Impact of deficit irrigation on potato crop

treatment	Irrigation depth	% of water saved	Yield T/Ha	Reduction in yield %	Wpet kg/m3
Full IRR	502		10.01		1.85
Dif Irr 80%	405	20	9.48	5	1.85
Dif Irr70%	354	30	8.74	13	1.85
Dif Irr 60%	305	40	7.68	23	1.78
Dif Irr 50%	258	50	6.59	34	1.7
Dif Irr 40%	199	60	5.07	49	1.51



Rainfed crop

المعطيات:

البيانات المناخية:
موجودة في الملف العام للمناخ TalAmara. CLI وفي الملفات التي تحتوي البيانات المناخية اليومية (TalAmara.TNX) (TalAmara.ETO)، (TalAmara.PLU) .
البيانات المناخية للهطول المطري يومية تغطي عشر سنوات من 2004 حتى 2013 ومتوسط الهطول المطري السنوي 596 مم/عام

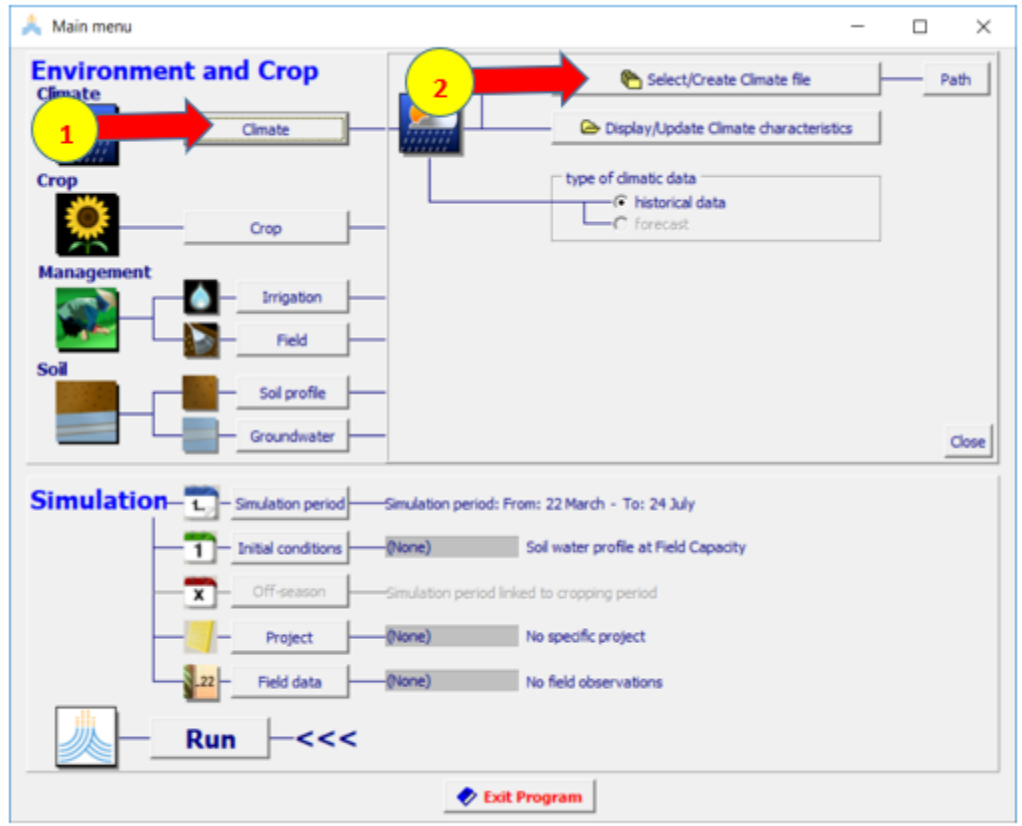
Year	observed
2004	689
2005	633
2006	488
2007	532
2008	338
2009	815
2010	479
2011	659
2012	846
2013	478
Avg	596

خصائص المحصول:
ملف محصول القمح LebanonWheatGDD.CRO الذي يعتمد تقويم حرارة النمو (GDD)، تاريخ الزراعة هو 1 كانون الاول/Dec.

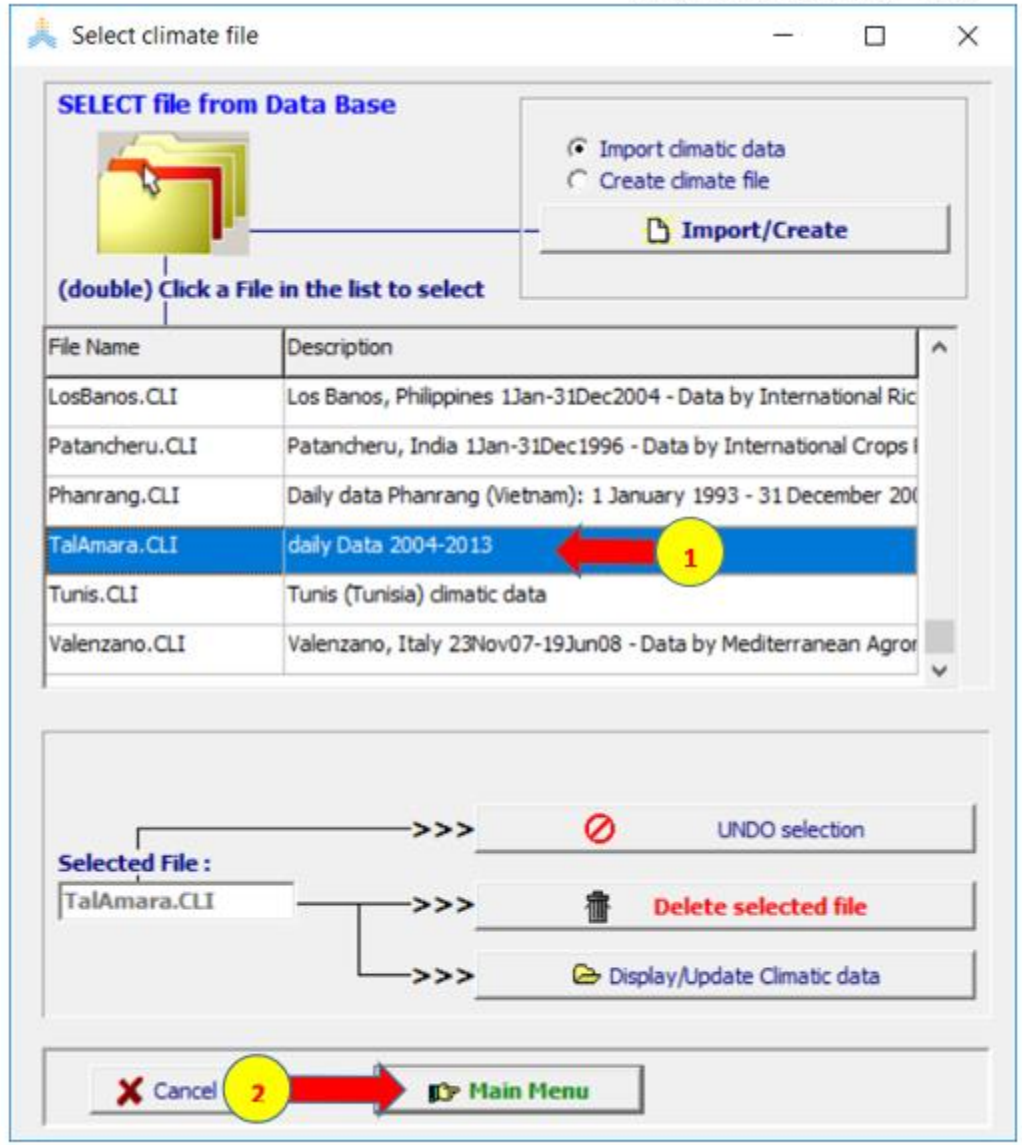
خصائص التربة:
ملف التربة Lebanon.SOL لتربة تل عمارة المؤلفة من طبقة واحدة قوامها clay loam وسماكتها 1.5 م.

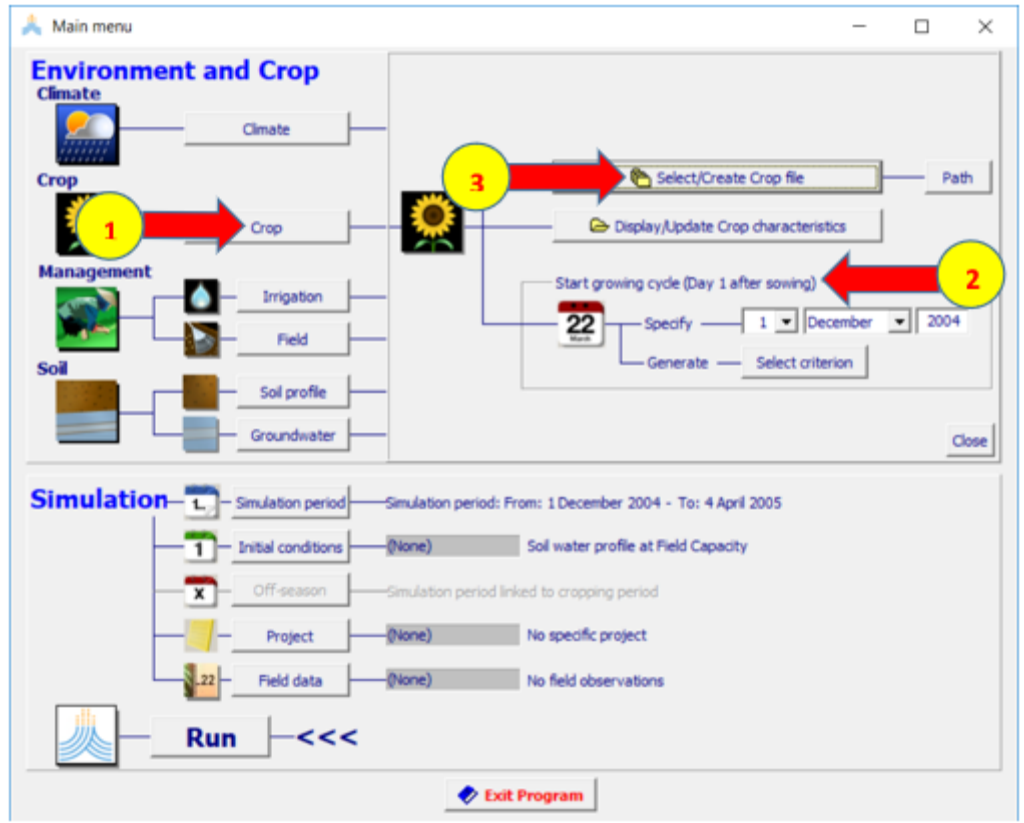
شروط إدارة الحقل:
ملف إدارة الحقل Wheat_Lebanon.MAN حيث خصوبة التربة مثالية Optimal 100% ومكافحة الأعشاب الضارة مثالية (الغطاء النسبي للأعشاب الضارة 0 %).

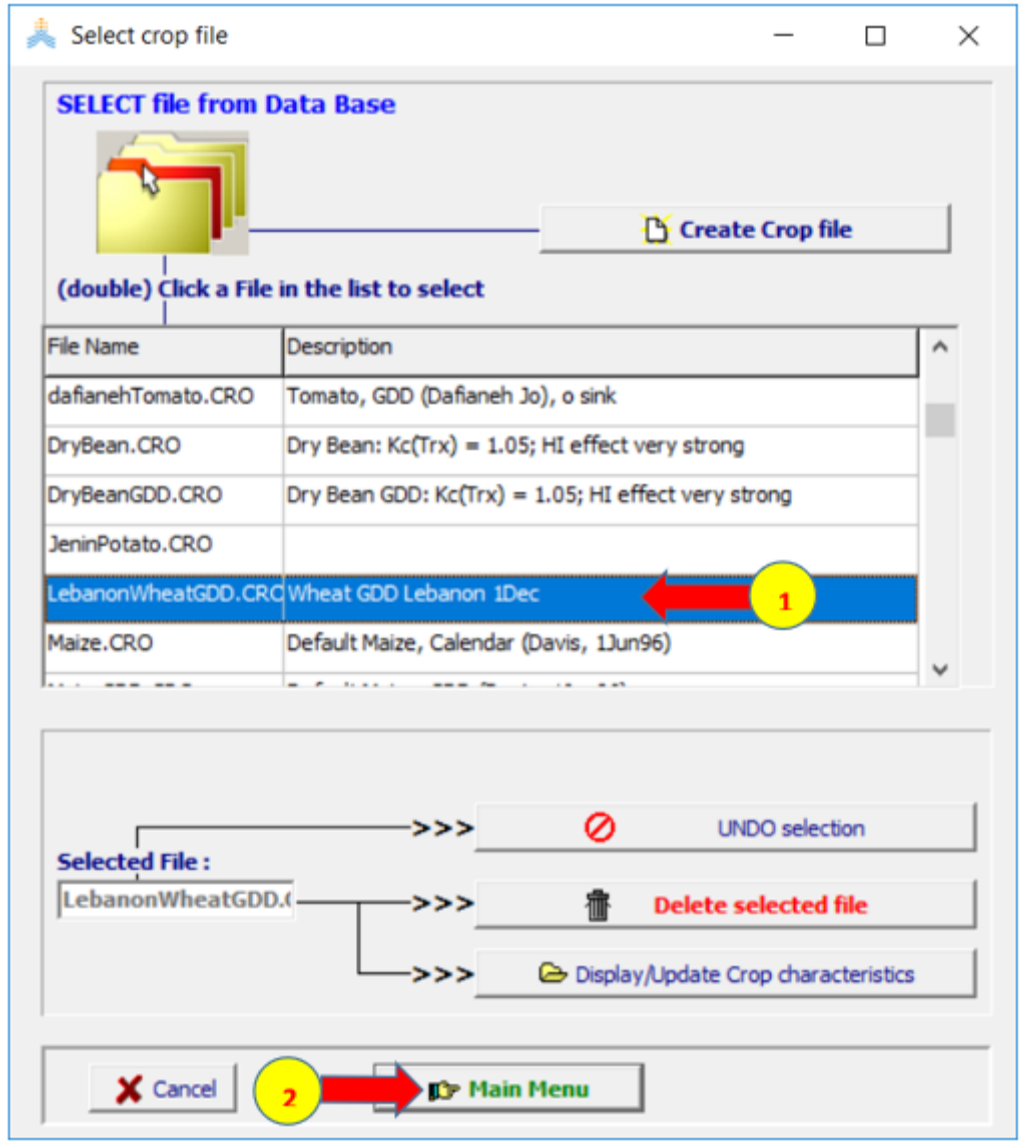
الشروط الابتدائية:
الملف talamara_fc.SW0 والذي تكون فيه رطوبة التربة مساوية للسعة الحقلية FC لتربة تل عمارة.

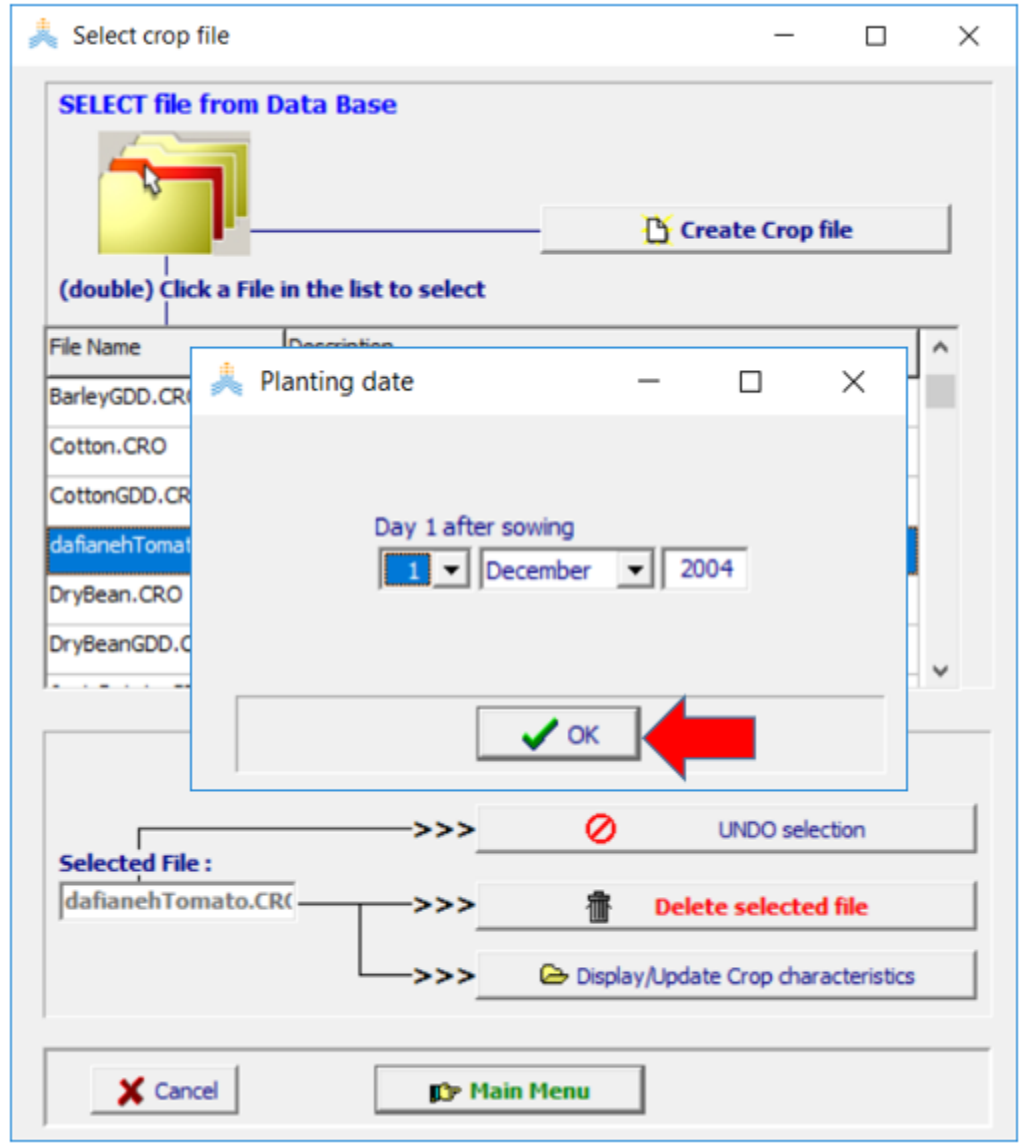

Main menu
Environment and Crop
Climate
Crop
Management
Soil
1
2
Climate
Crop
Irrigation
Field
Soil profile
Groundwater
Select/Create Climate file
Path
Display/Update Climate characteristics
type of climatic data
historical data
forecast
Close
Simulation
Simulation period
Simulation period: From: 22 March - To: 24 July
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program

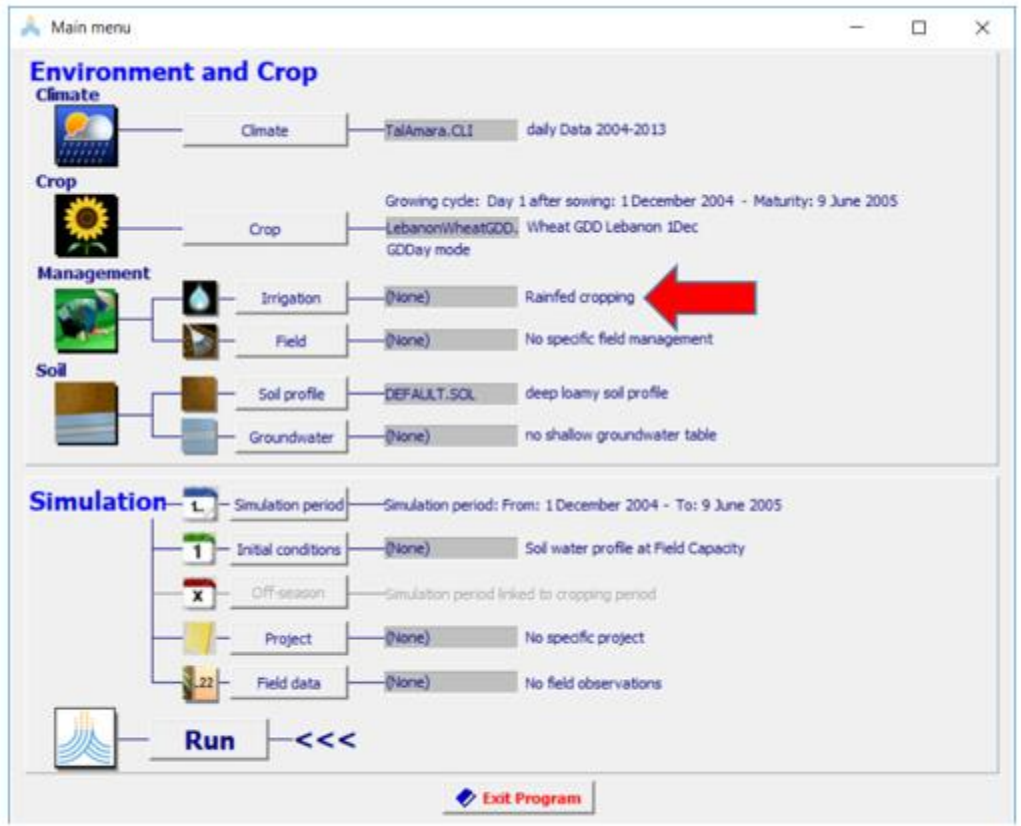
2- اختر الامر Main Menu.

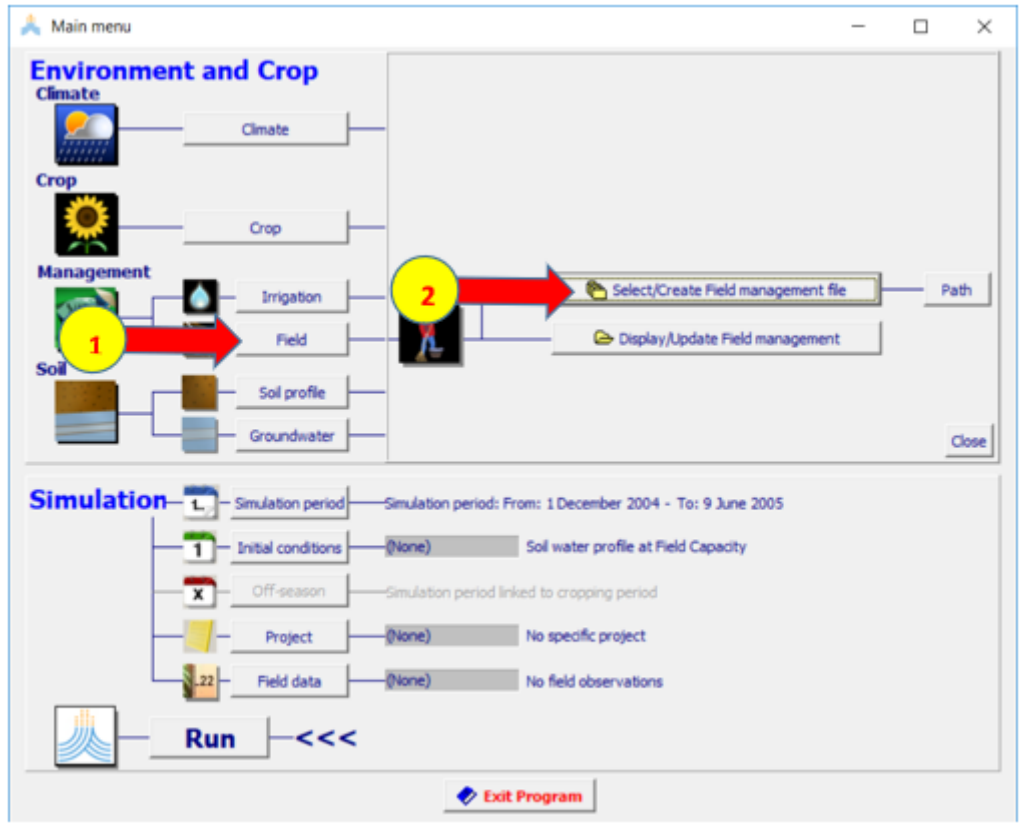


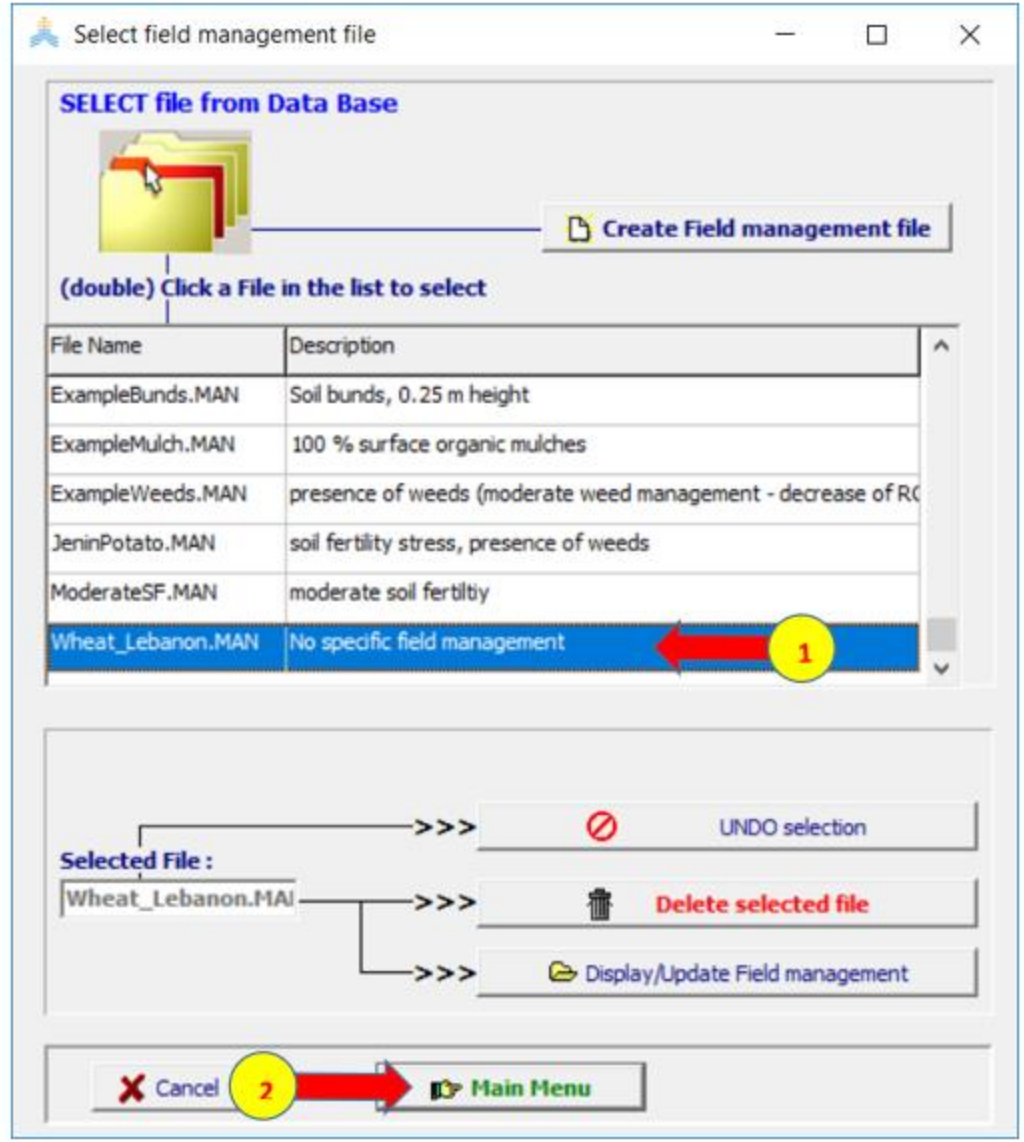

Main menu
Environment and Crop
Climate
Climate
Crop
1
Crop
Management
Irrigation
Field
Soil
Soil profile
Groundwater
3
Select/Create Crop file
Path
Display/Update Crop characteristics
Start growing cycle (Day 1 after sowing)
2
22
Specify
1
December
2004
Generate
Select criterion
Close
Simulation
Simulation period
Simulation period: From: 1 December 2004 - To: 4 April 2005
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program

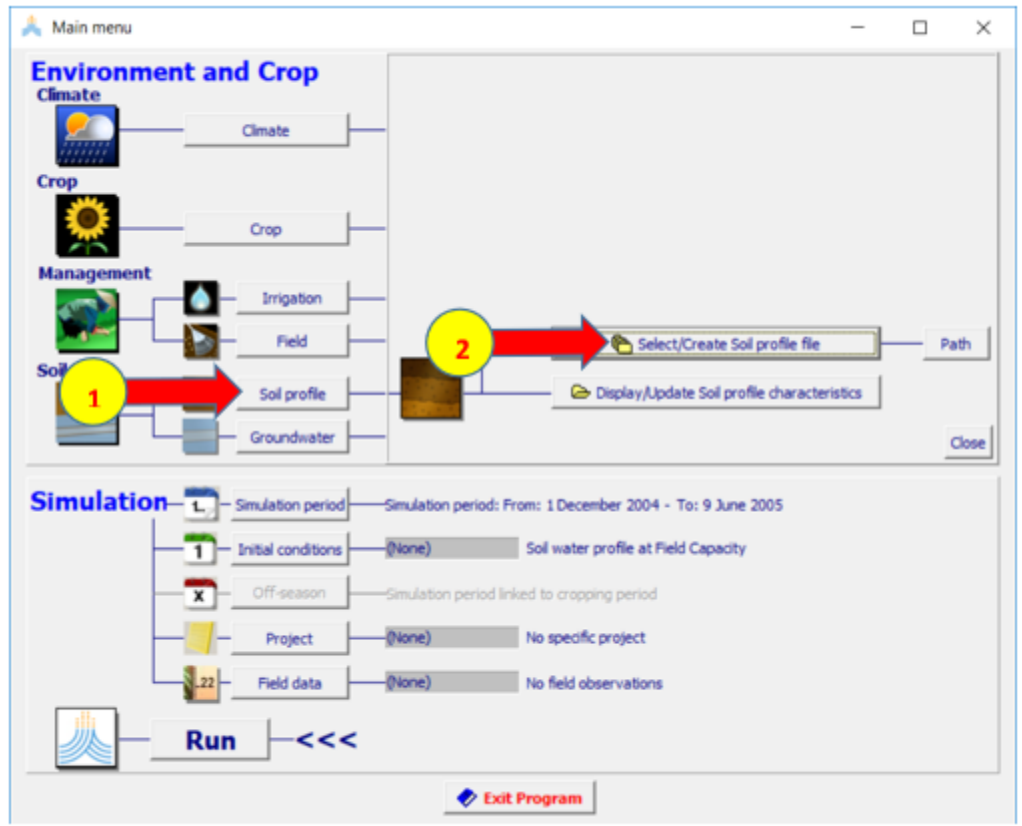

Select crop file
SELECT file from Data Base
Create Crop file
(double) Click a File in the list to select
File Name
Description
dafianehTomato.CRO
Tomato, GDD (Dafianeh Jo), o sink
DryBean.CRO
Dry Bean: Kc(Trx) = 1.05; HI effect very strong
DryBeanGDD.CRO
Dry Bean GDD: Kc(Trx) = 1.05; HI effect very strong
JeninPotato.CRO
LebanonWheatGDD.CRO
Wheat GDD Lebanon 1Dec
1
Maize.CRO
Default Maize, Calendar (Davis, 1Jun96)
Selected File :
LebanonWheatGDD.(
>>>
UNDO selection
>>>
Delete selected file
>>>
Display/Update Crop characteristics
Cancel
2
Main Menu

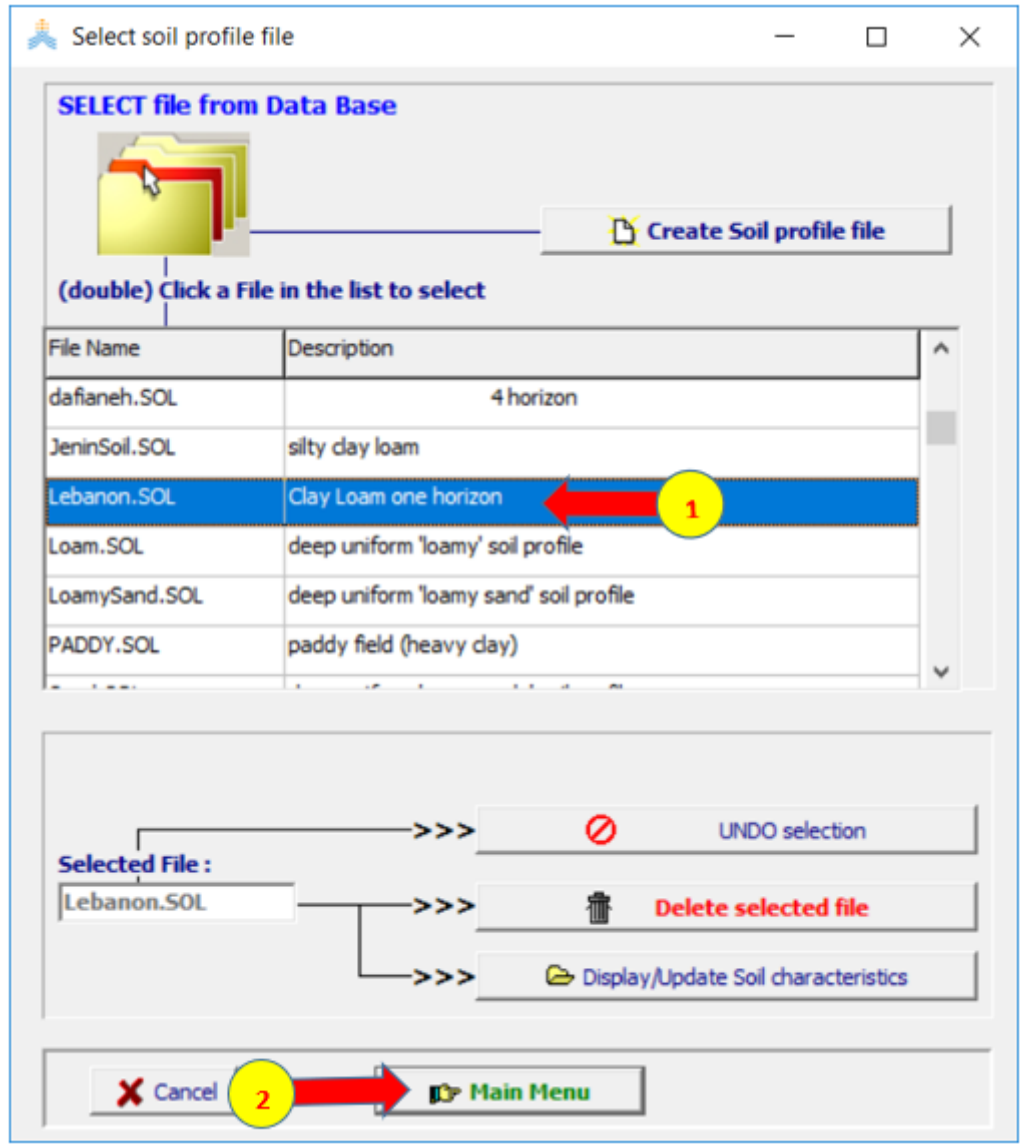

Select crop file
SELECT file from Data Base
Create Crop file
(double) Click a File in the list to select
File Name
BarleyGDD.CR
Cotton.CRO
CottonGDD.CR
dafianehTomat
DryBean.CRO
DryBeanGDD.C
Planting date
Day 1 after sowing
1
December
2004
OK
UNDO selection
Selected File :
dafianehTomato.CR
Delete selected file
Display/Update Crop characteristics
Cancel
Main Menu

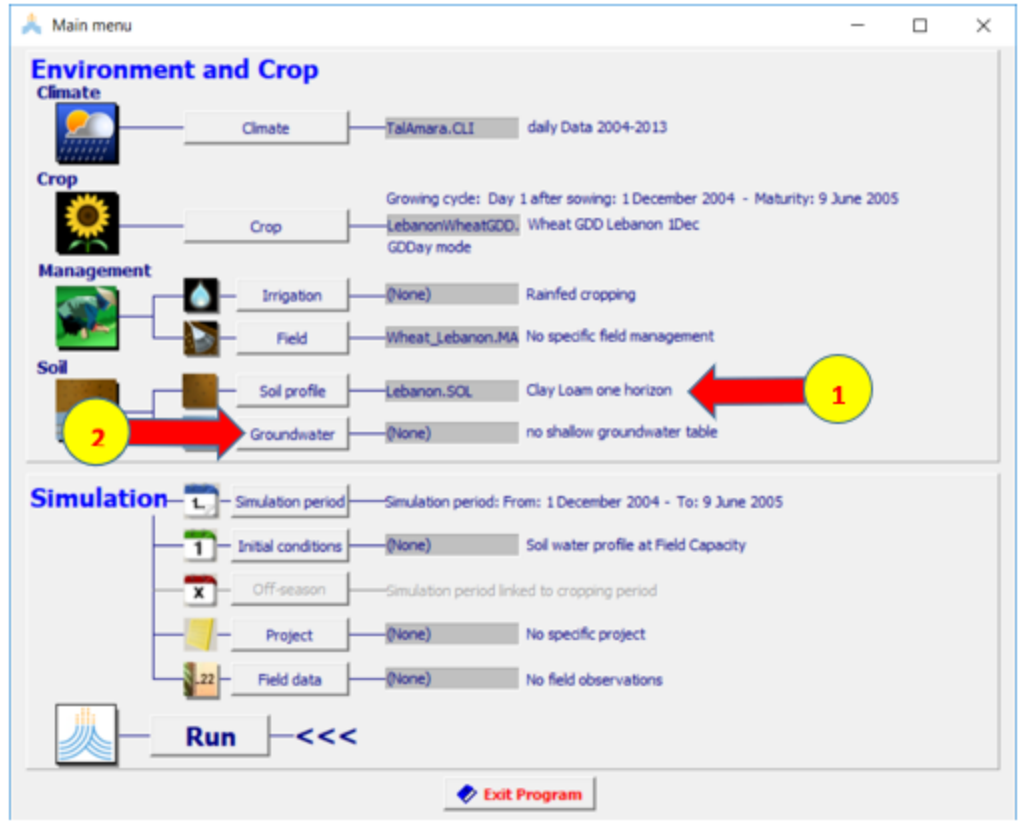

Main menu
Environment and Crop
Climate
Climate
TalAmara.CLI
daily Data 2004-2013
Crop
Growing cycle: Day 1 after sowing: 1 December 2004 - Maturity: 9 June 2005
Crop
LebanonWheatGDD.
Wheat GDD Lebanon 1Dec
GDDay mode
Management
Irrigation
(None)
Rainfed cropping
Field
(None)
No specific field management
Soil
Soil profile
DEFAULT.SOL
deep loamy soil profile
Groundwater
(None)
no shallow groundwater table
Simulation
Simulation period
Simulation period: From: 1 December 2004 - To: 9 June 2005
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program

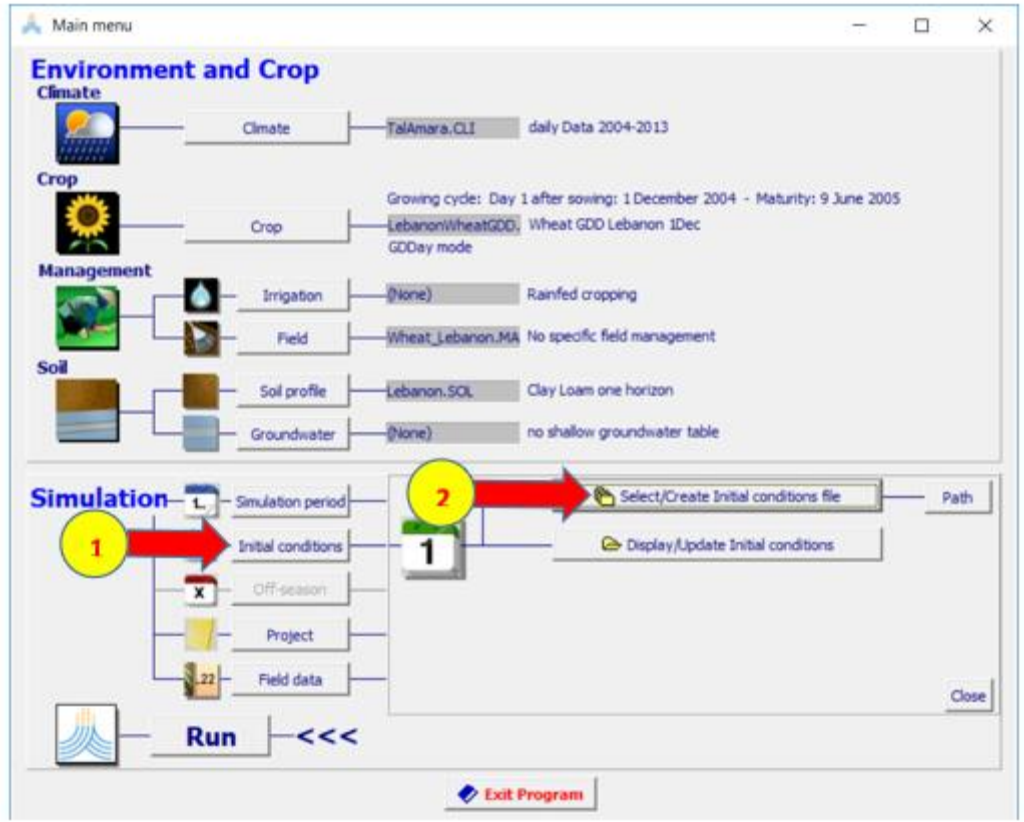

Main menu
Environment and Crop
Climate
Climate
Crop
Crop
Management
Irrigation
Field
Soil
Soil profile
Groundwater
1
2
Select/Create Field management file
Path
Display/Update Field management
Close
Simulation
Simulation period
Simulation period: From: 1 December 2004 - To: 9 June 2005
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program

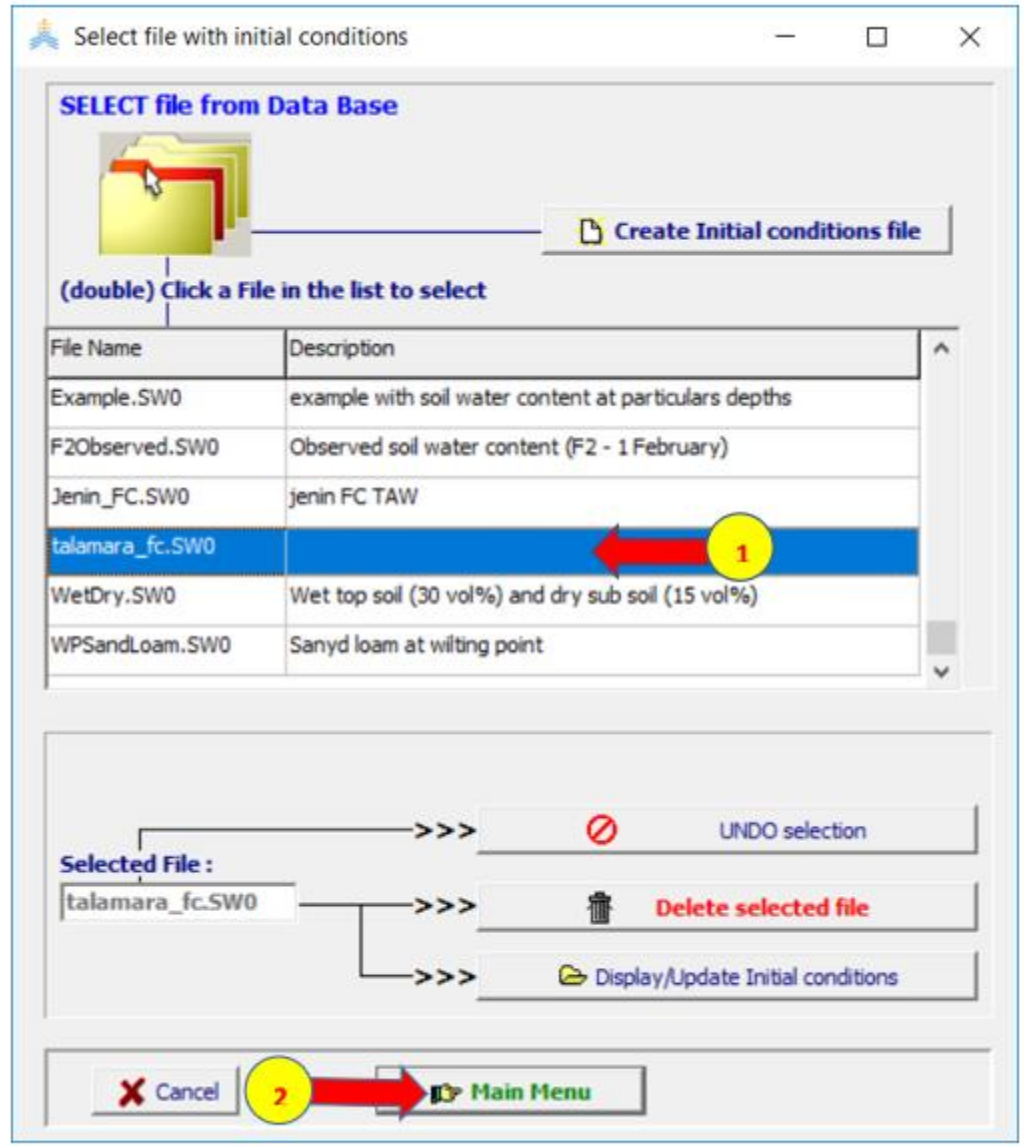

Select field management file
SELECT file from Data Base
Create Field management file
(double) Click a File in the list to select
File Name
Description
ExampleBunds.MAN
Soil bunds, 0.25 m height
ExampleMulch.MAN
100 % surface organic mulches
ExampleWeeds.MAN
presence of weeds (moderate weed management - decrease of RC
JeninPotato.MAN
soil fertility stress, presence of weeds
ModerateSF.MAN
moderate soil fertiltiy
Wheat_Lebanon.MAN
No specific field management
1
Selected File :
Wheat_Lebanon.MAI
UNDO selection
Delete selected file
Display/Update Field management
Cancel
2
Main Menu

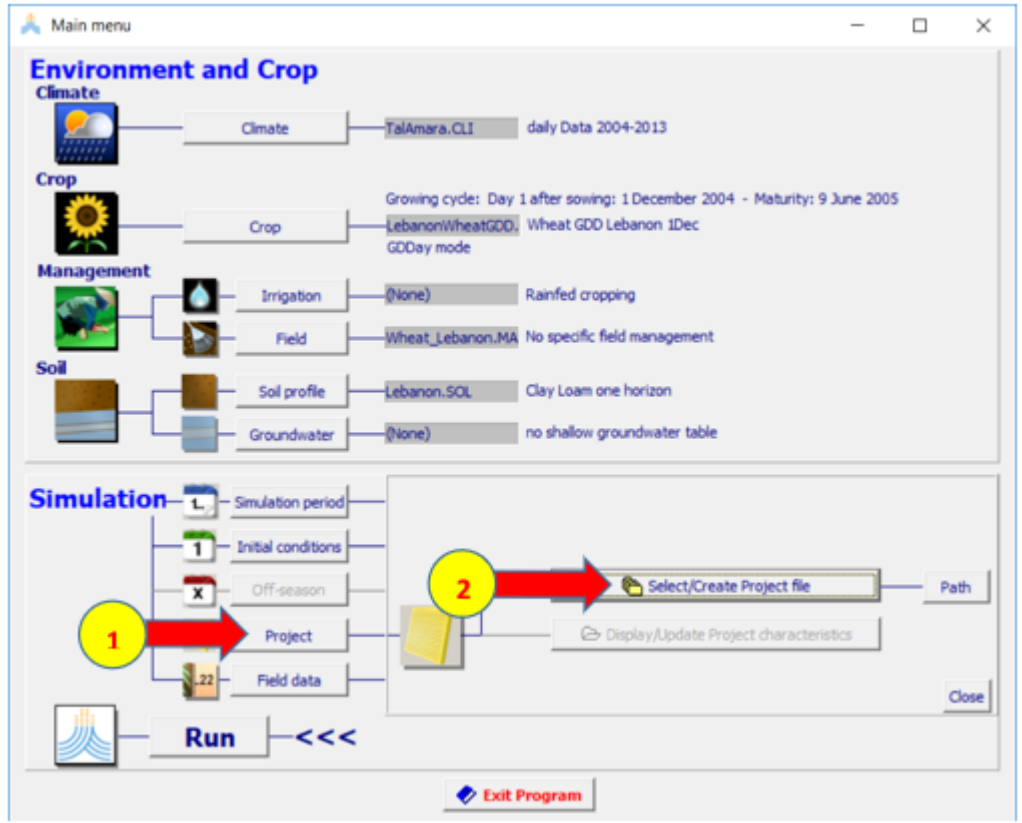

Main menu
Environment and Crop
Climate
Climate
Crop
Crop
Management
Irrigation
Field
Soil profile
Groundwater
1
2
Select/Create Soil profile file
Path
Display/Update Soil profile characteristics
Close
Simulation
Simulation period
Simulation period: From: 1 December 2004 - To: 9 June 2005
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program

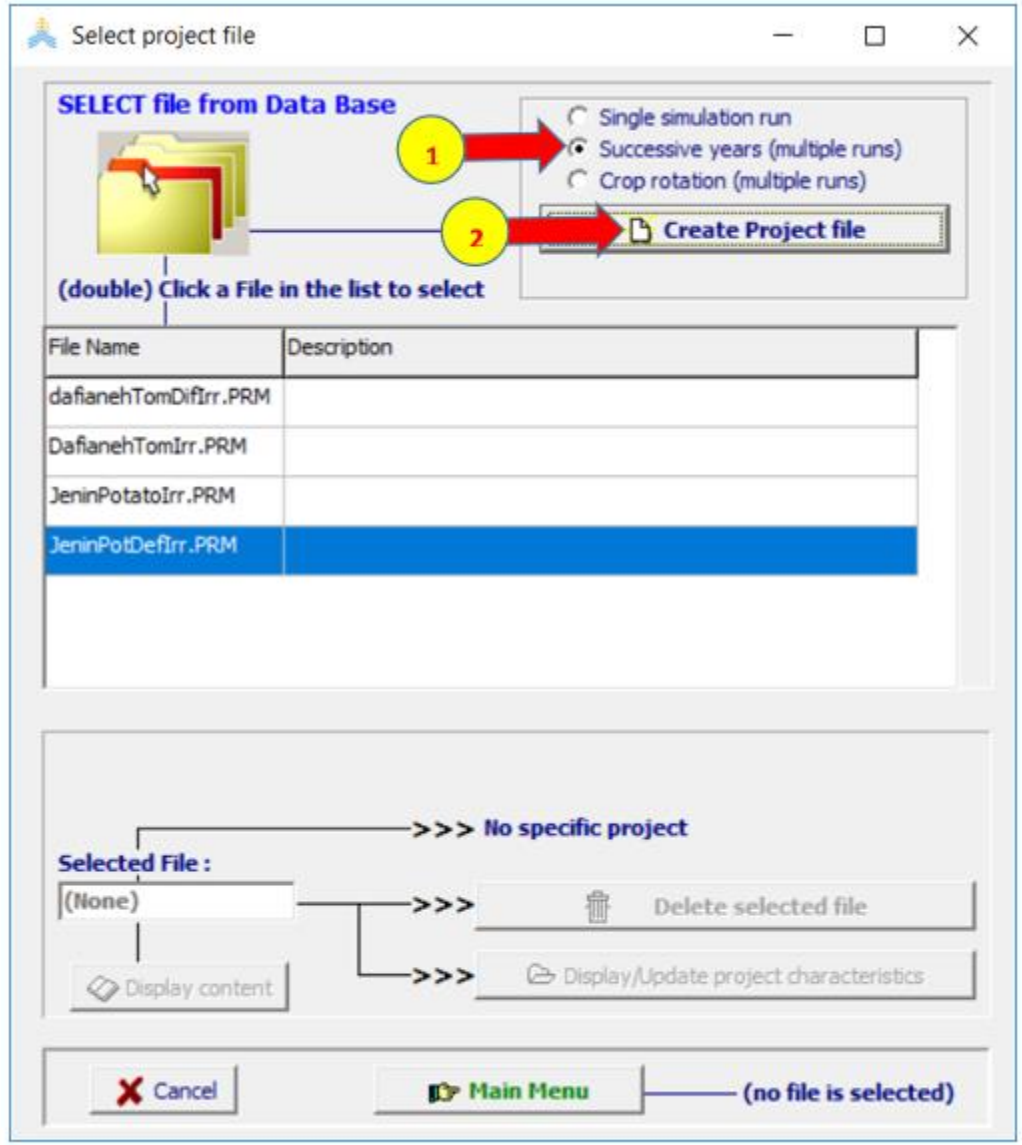

Select soil profile file
SELECT file from Data Base
Create Soil profile file
(double) Click a File in the list to select
File Name
Description
dafianeh.SOL
4 horizon
JeninSoil.SOL
silty clay loam
Lebanon.SOL
Clay Loam one horizon
1
Loam.SOL
deep uniform 'loamy' soil profile
LoamySand.SOL
deep uniform 'loamy sand' soil profile
PADDY.SOL
paddy field (heavy clay)
UNDO selection
Selected File :
Lebanon.SOL
Delete selected file
Display/Update Soil characteristics
Cancel
2
Main Menu

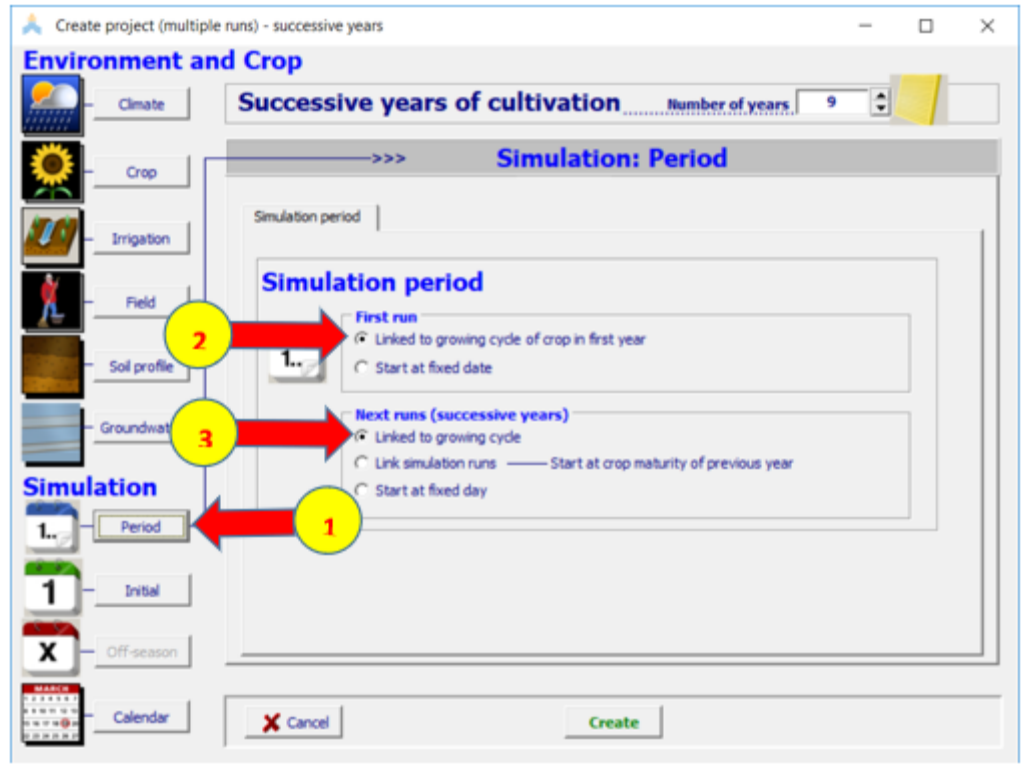

Main menu
Environment and Crop
Climate
Climate
TalAmara.CLI
daily Data 2004-2013
Crop
Growing cycle: Day 1 after sowing: 1 December 2004 - Maturity: 9 June 2005
Crop
LebanonWheatGDD.
Wheat GDD Lebanon 1Dec
GDDay mode
Management
Irrigation
(None)
Rainfed cropping
Field
Wheat_Lebanon.MA
No specific field management
Soil
Soil profile
Lebanon.SOL
Clay Loam one horizon
1
2
Groundwater
(None)
no shallow groundwater table
Simulation
Simulation period
Simulation period: From: 1 December 2004 - To: 9 June 2005
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program


Main menu
Environment and Crop
Climate
Climate
TalAmara.CLI
daily Data 2004-2013
Crop
Growing cycle: Day 1 after sowing: 1 December 2004 - Maturity: 9 June 2005
Crop
LebanonWheatGDD.
Wheat GDD Lebanon 1Dec
GDDay mode
Management
Irrigation
(None)
Rainfed cropping
Field
Wheat_Lebanon.MA
No specific field management
Soil
Soil profile
Lebanon.SOL
Clay Loam one horizon
Groundwater
(None)
no shallow groundwater table
Simulation
Simulation period
Initial conditions
Off-season
Project
Field data
1
2
Select/Create Initial conditions file
Path
Display/Update Initial conditions
Close
Run
<<<
Exit Program

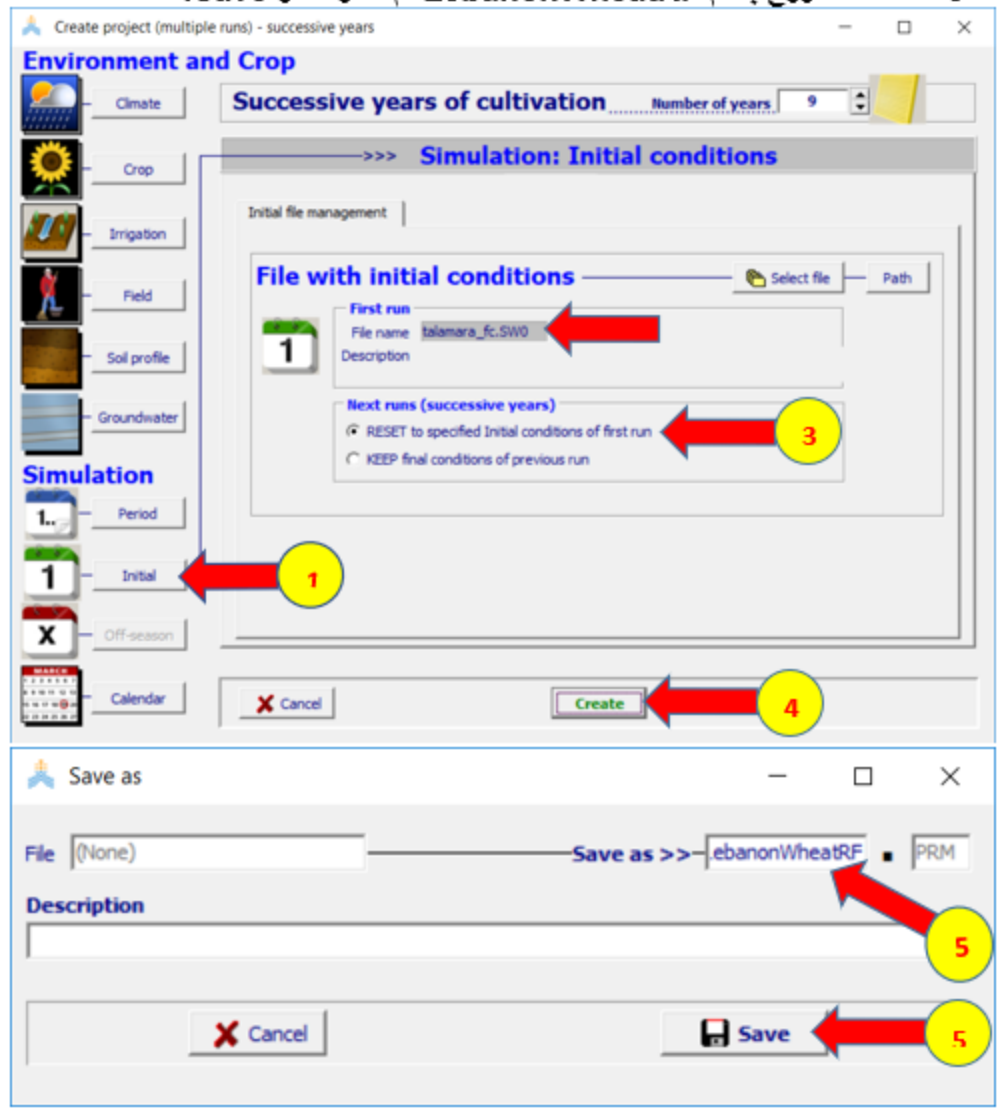

Select file with initial conditions
SELECT file from Data Base
Create Initial conditions file
(double) Click a File in the list to select
File Name
Description
Example.SW0
example with soil water content at particulars depths
F2Observed.SW0
Observed soil water content (F2 - 1 February)
Jenin_FC.SW0
jenin FC TAW
talamara_fc.SW0
1
WetDry.SW0
Wet top soil (30 vol%) and dry sub soil (15 vol%)
WPSandLoam.SW0
Sanyd loam at wilting point
Selected File :
talamara_fc.SW0
>>>
UNDO selection
>>>
Delete selected file
>>>
Display/Update Initial conditions
Cancel
2
Main Menu

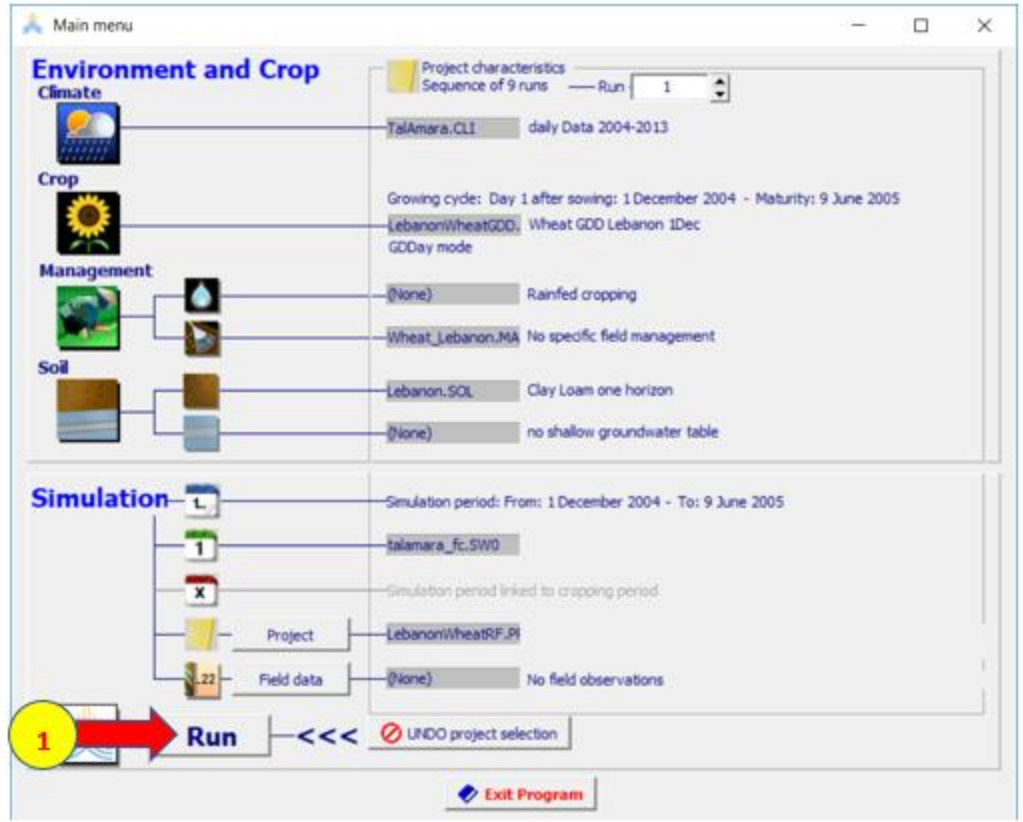

Main menu
Environment and Crop
Climate
Climate
TalAmara.CLI
daily Data 2004-2013
Crop
Growing cycle: Day 1 after sowing: 1 December 2004 - Maturity: 9 June 2005
Crop
LebanonWheatGDD.
Wheat GDD Lebanon 1Dec
GDDay mode
Management
Irrigation
(None)
Rainfed cropping
Field
Wheat_Lebanon.MA
No specific field management
Soil
Soil profile
Lebanon.SOL
Clay Loam one horizon
Groundwater
(None)
no shallow groundwater table
Simulation
Simulation period
Initial conditions
Off-season
Project
Field data
1
2
Select/Create Project file
Path
Display/Update Project characteristics
Close
Run
<<<
Exit Program

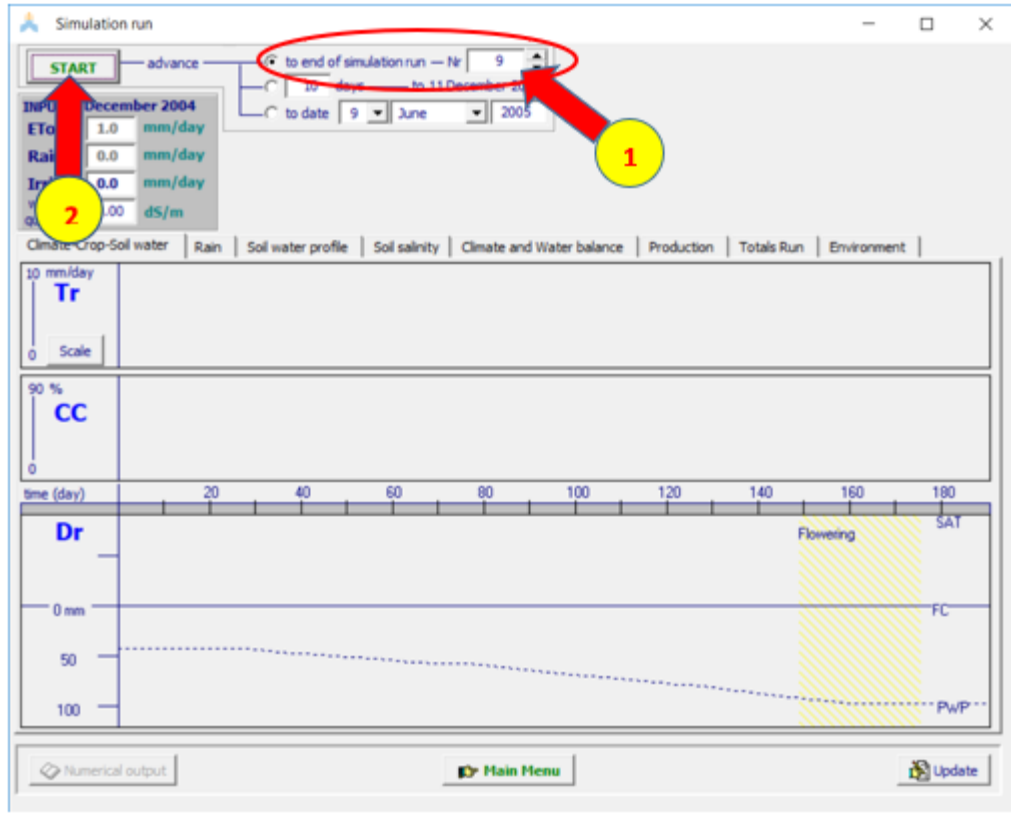

Select project file
SELECT file from Data Base
1
Single simulation run
Successive years (multiple runs)
Crop rotation (multiple runs)
2
Create Project file
(double) Click a File in the list to select
File Name
Description
dafianehTomDifIrr.PRM
DafianehTomIrr.PRM
JeninPotatoIrr.PRM
JeninPotDefIrr.PRM
>>> No specific project
Selected File :
(None)
>>>
Delete selected file
Display content
>>>
Display/Update project characteristics
Cancel
Main Menu
(no file is selected)

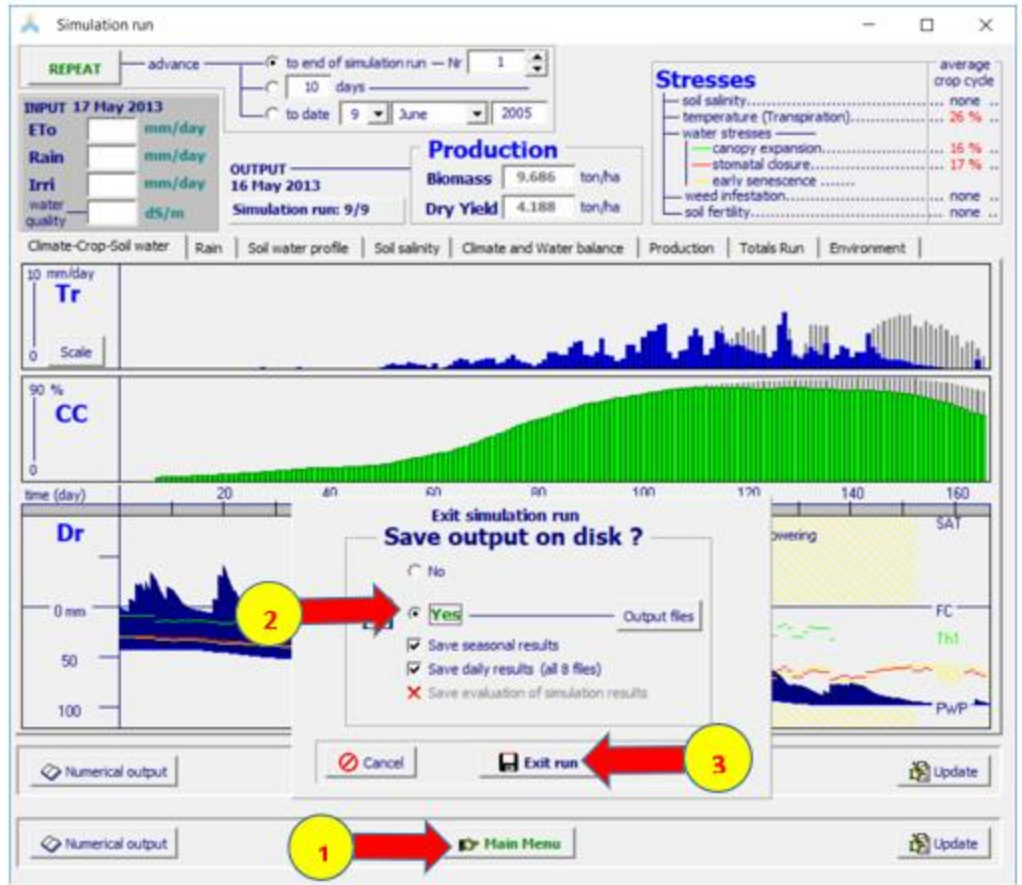

Create project (multiple runs) - successive years
Environment and Crop
Climate
Crop
Irrigation
Field
Soil profile
Groundwat
Simulation
Period
Initial
Off-season
Calendar
Successive years of cultivation
Number of years
9
>>>
Simulation: Period
Simulation period
Simulation period
First run
Linked to growing cycle of crop in first year
Start at fixed date
Next runs (successive years)
Linked to growing cycle
Link simulation runs
Start at crop maturity of previous year
Start at fixed day
1
2
3
Cancel
Create

-5 احفظ المشروع باسم LebanonWheatRF ثم اختر الأمر Save.



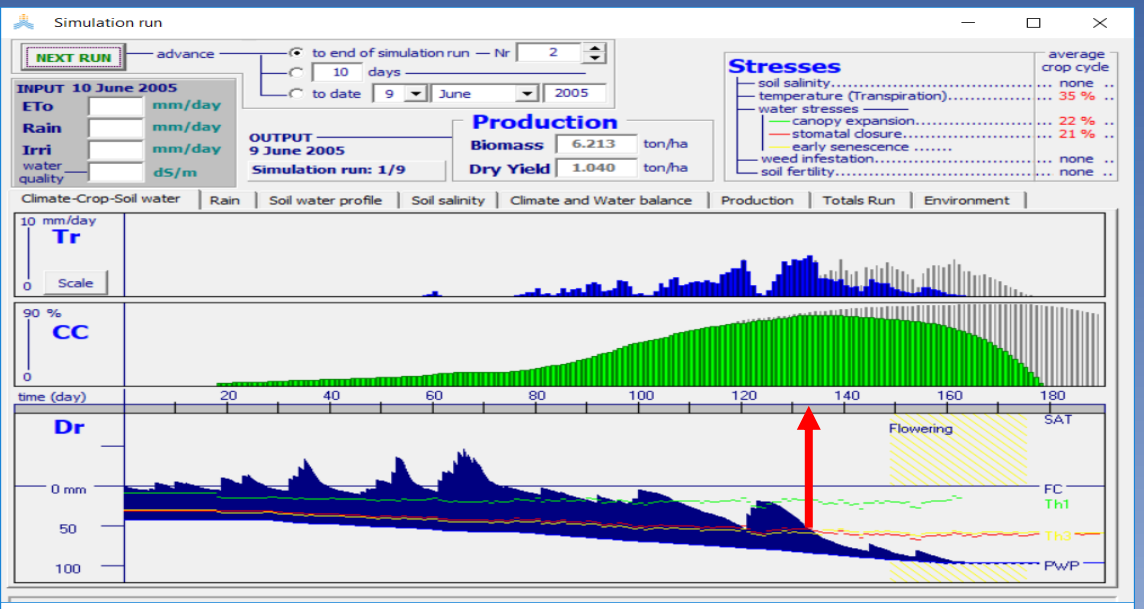

Main menu
Environment and Crop
Climate
Project characteristics
Sequence of 9 runs
Run
1
TalAmara.CLI
daily Data 2004-2013
Crop
Growing cycle: Day 1 after sowing: 1 December 2004 - Maturity: 9 June 2005
LebanonWheatGDD.
Wheat GDD Lebanon 1Dec
GDDay mode
Management
(None)
Rainfed cropping
Wheat_Lebanon.MA
No specific field management
Soil
Lebanon.SOL
Clay Loam one horizon
(None)
no shallow groundwater table
Simulation
Simulation period: From: 1 December 2004 - To: 9 June 2005
talamara_fc.SW0
Simulation period linked to cropping period
Project
LebanonWheatRF.PI
Field data
(None)
No field observations
1
Run
<<<
UNDO project selection
Exit Program

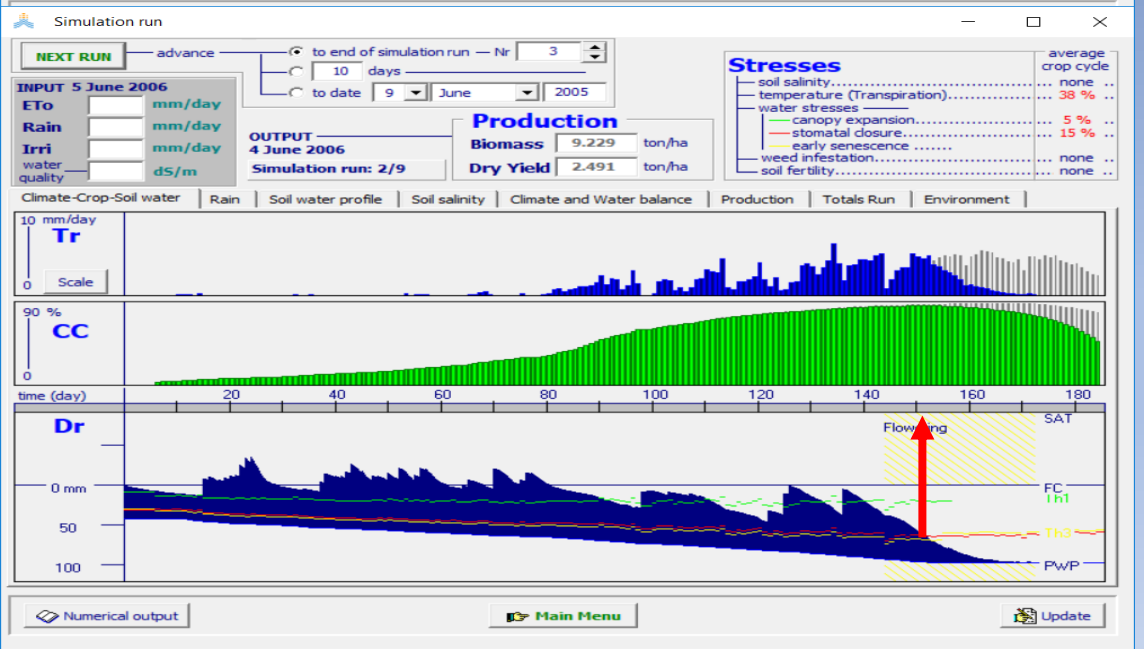

Simulation run
START
advance
to end of simulation run — Nr 9
to date 9 June 2005
December 2004
ETo 1.0 mm/day
Rai 0.0 mm/day
Ir 0.0 mm/day
dS/m
1
2
Climate-Crop-Soil water
Rain
Soil water profile
Soil salinity
Climate and Water balance
Production
Totals Run
Environment
10 mm/day
Tr
0
Scale
90 %
CC
0
time (day)
20 40 60 80 100 120 140 160 180
Dr
SAT
Flowering
0 mm
FC
50
100
PWP
Numerical output
Main Menu
Update


Simulation run
REPEAT
advance
to end of simulation run — Nr 1
10 days
to date 9 June 2005
INPUT 17 May 2013
ETo mm/day
Rain mm/day
Irri mm/day
water quality dS/m
OUTPUT
16 May 2013
Simulation run: 9/9
Production
Biomass 9.686 ton/ha
Dry Yield 4.188 ton/ha
Stresses
average crop cycle
soil salinity none
temperature (Transpiration) 26 %
water stresses
canopy expansion 16 %
stomatal closure 17 %
early senescence
weed infestation none
soil fertility none
Climate-Crop-Soil water
Rain
Soil water profile
Soil salinity
Climate and Water balance
Production
Totals Run
Environment
10 mm/day
Tr
Scale
90 %
CC
time (day)
20
40
60
80
100
120
140
160
Dr
0 mm
50
100
SAT
FC
Th1
PWP
Exit simulation run
Save output on disk ?
No
Yes
Output files
Save seasonal results
Save daily results (all 8 files)
Save evaluation of simulation results
Cancel
Exit run
Numerical output
Update
Main Menu
1
2
3

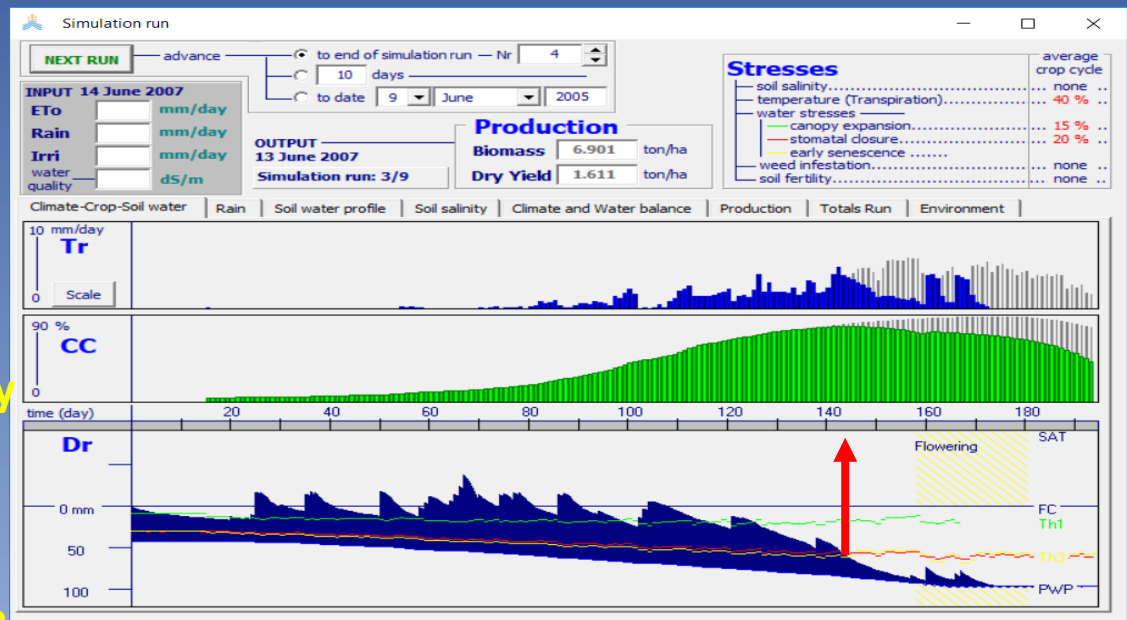
Year	Rain mm	Yield ton/ha	WPet kg/m3
2005	474	0.794	0.26
2006	444	1.801	0.56
2007	403	1.611	0.5
2008	303	0.072	0.03
2009	478	3.798	1.18
2010	521	1.291	0.53
2011	**591**	**4.569**	1.4
2012	**590**	**0.975**	0.38
2013	574	4.188	1.48
Average	**486**	**2.12**	**0.7**

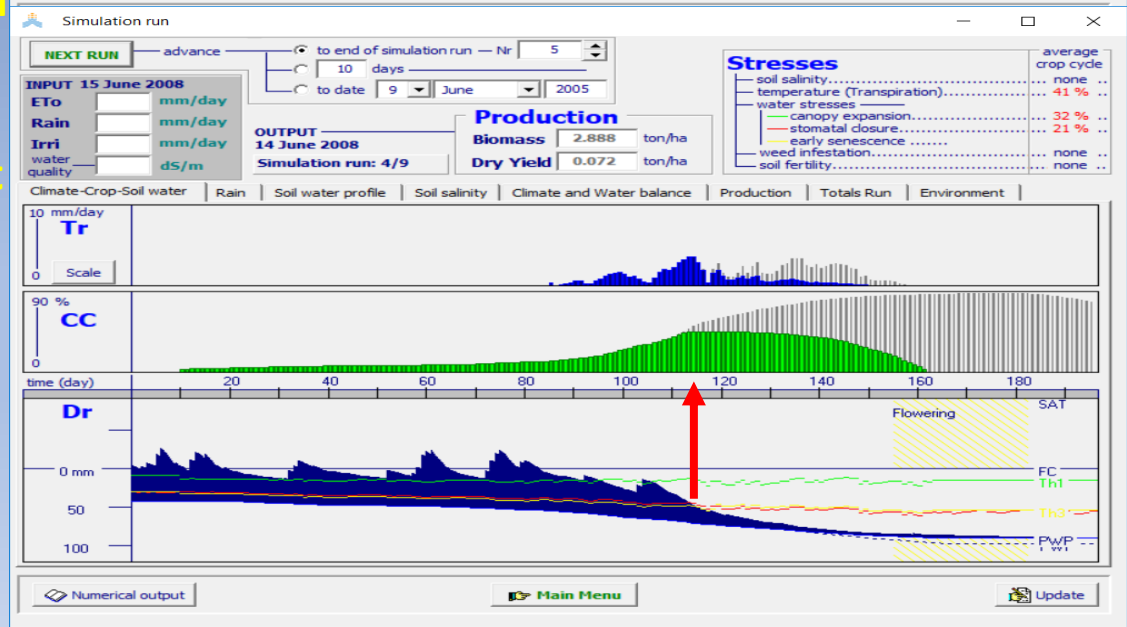
Supplementary Irrigation





Supplementary irrigation is used to improve productivity in cases where rainfall does not fully meet water requirements

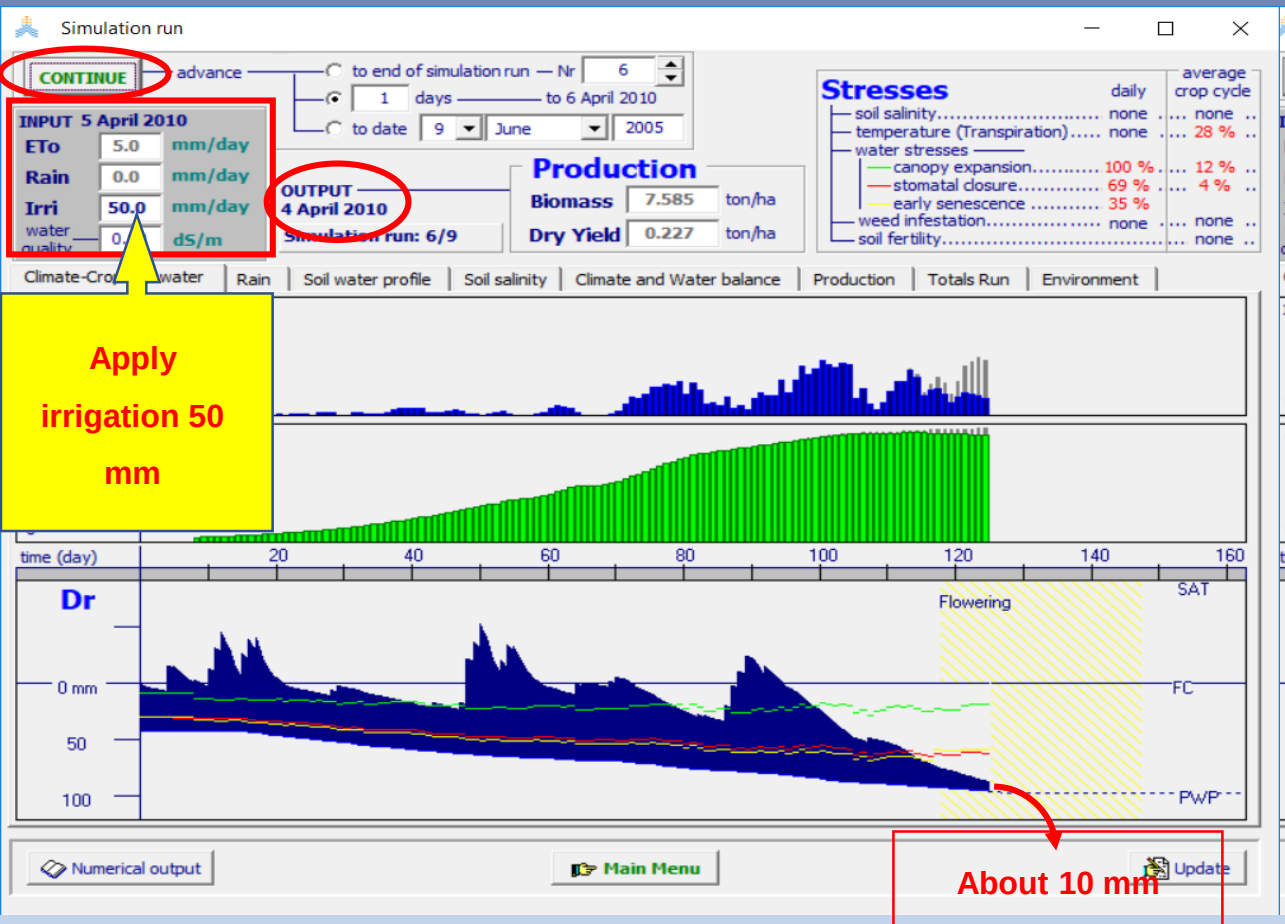


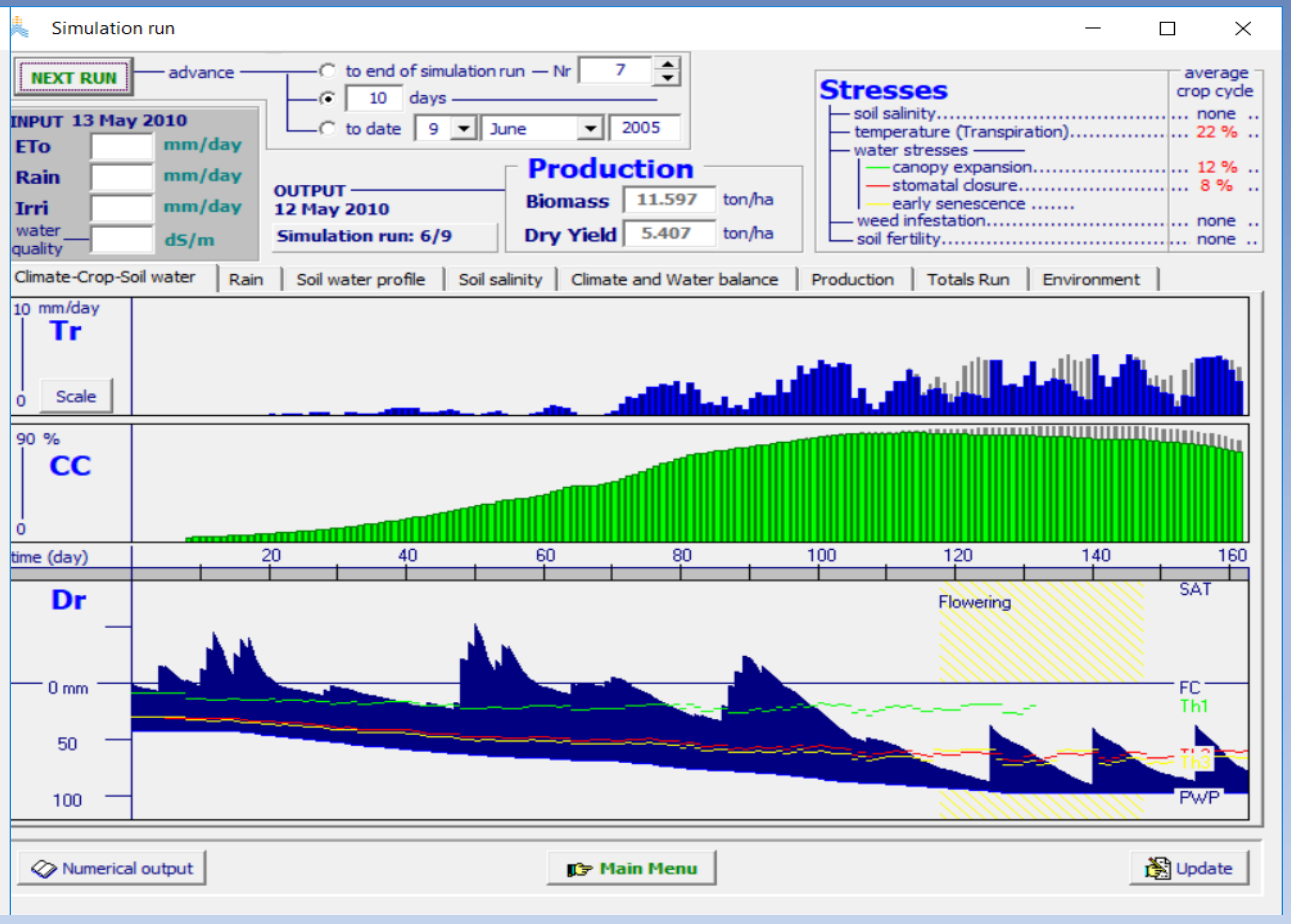


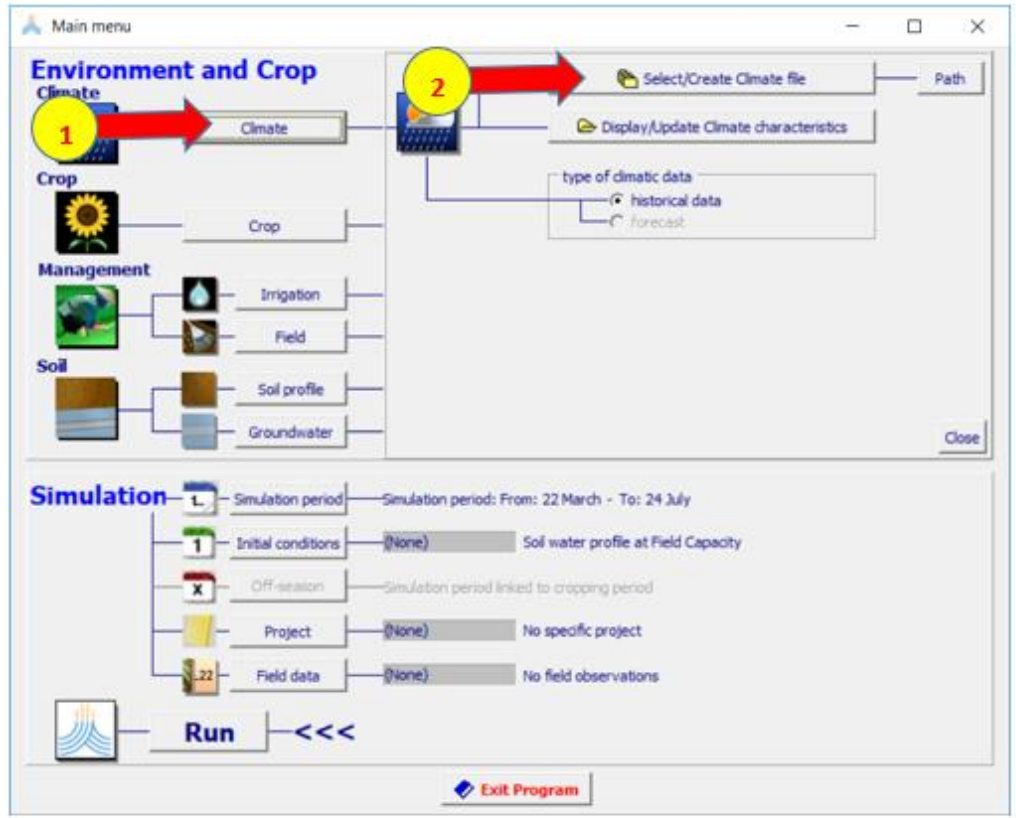
Irrigation Scheduling in AquaCrop

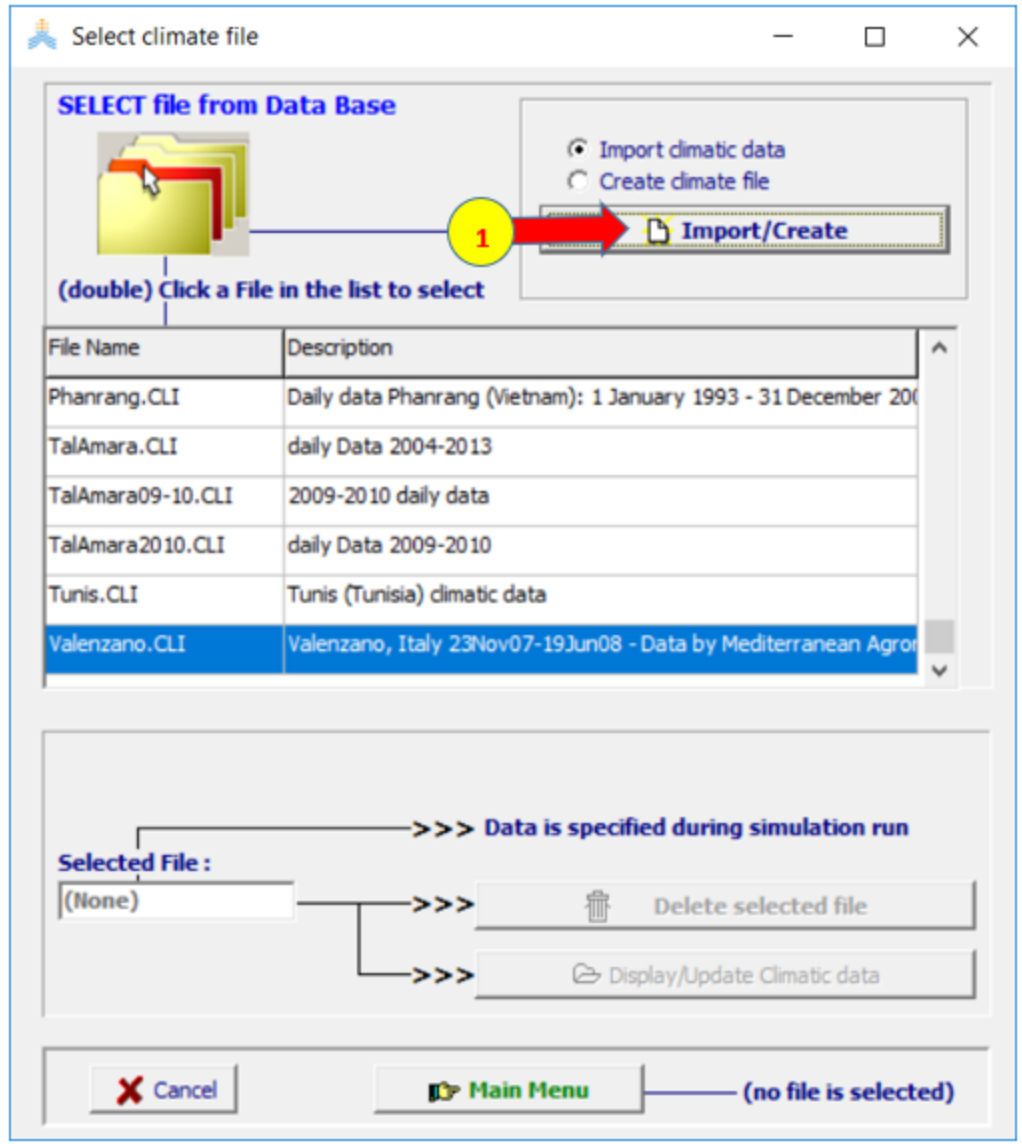
(Supplementary Irrigation)

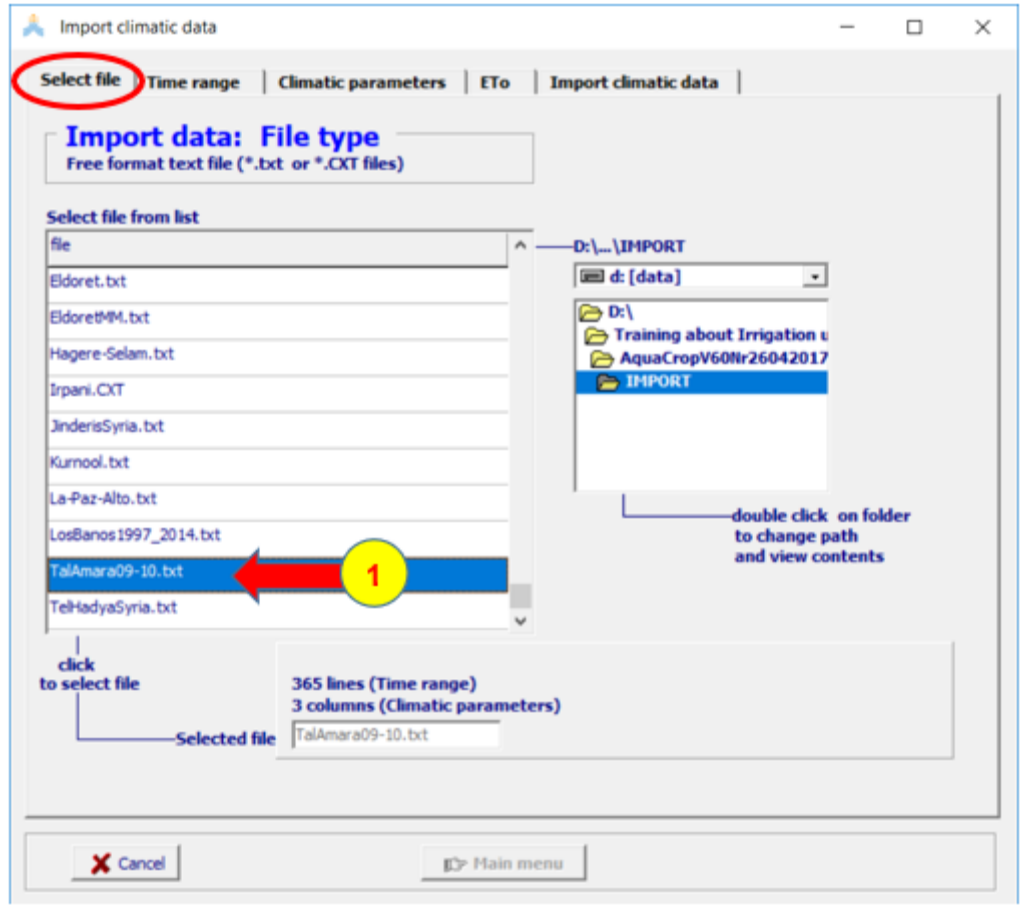
by Real Time Simulation: tracking soil moisture in the root zone so that 50 mm irrigation water is added when soil moisture is equal to 10 mm above the wilting point.

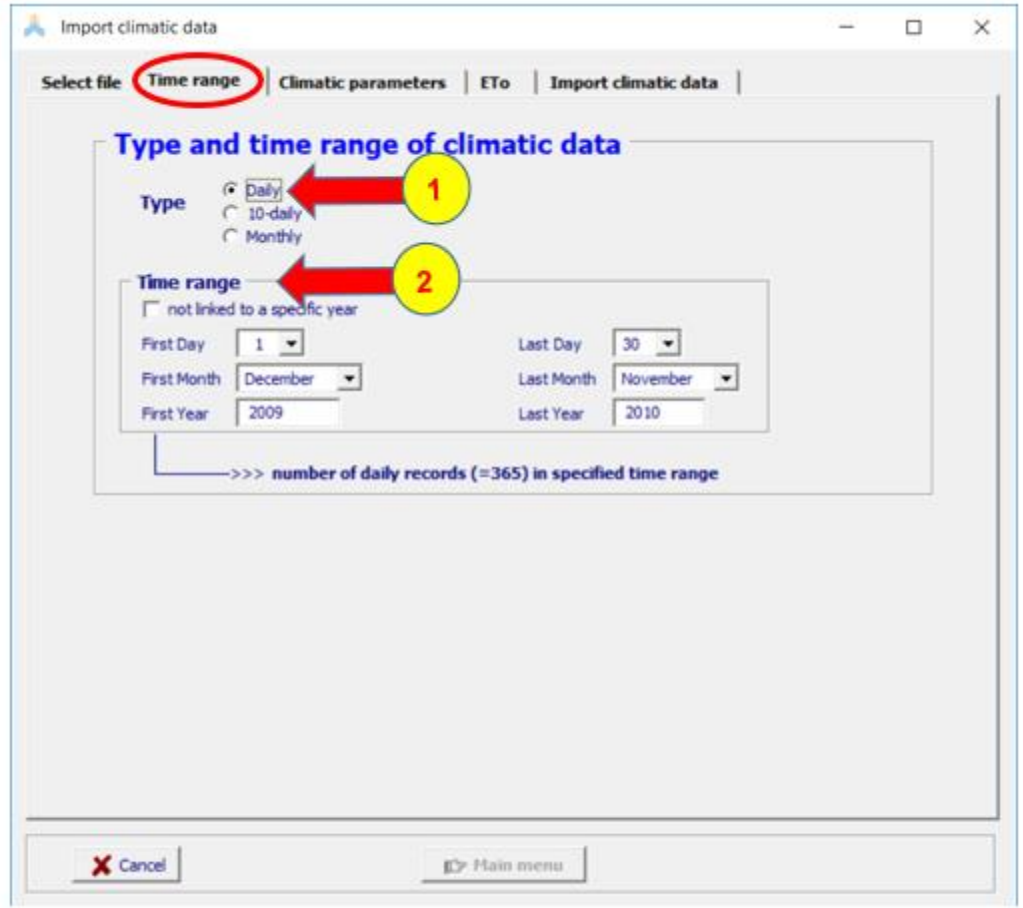


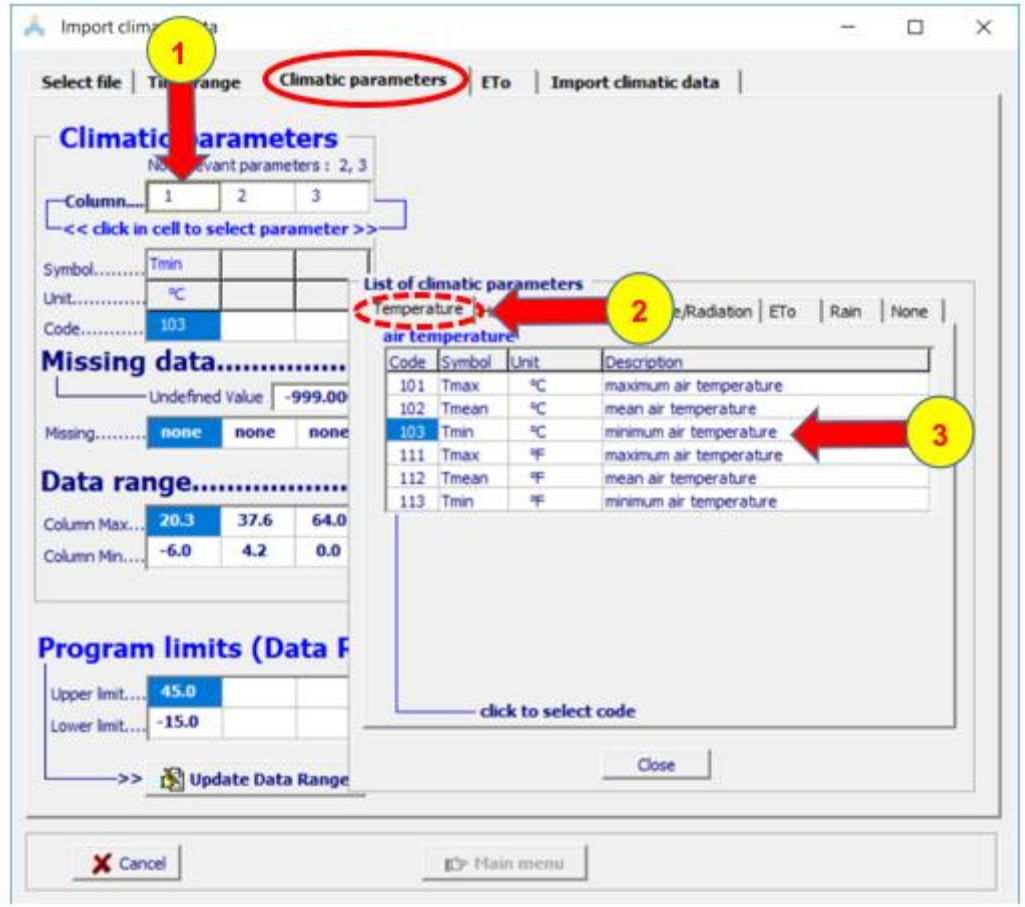


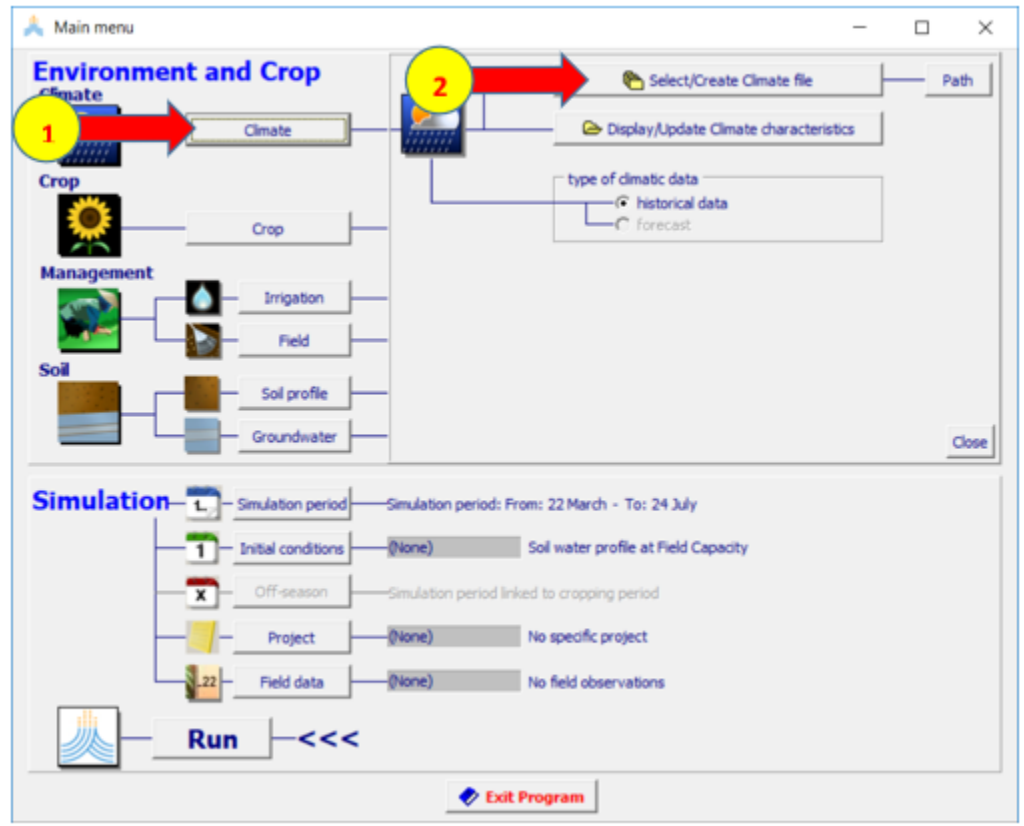

Main menu
Environment and Crop
Climate
1
Climate
2
Select/Create Climate file
Path
Display/Update Climate characteristics
type of climatic data
historical data
forecast
Crop
Crop
Management
Irrigation
Field
Soil
Soil profile
Groundwater
Close
Simulation
Simulation period
Simulation period: From: 22 March - To: 24 July
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program

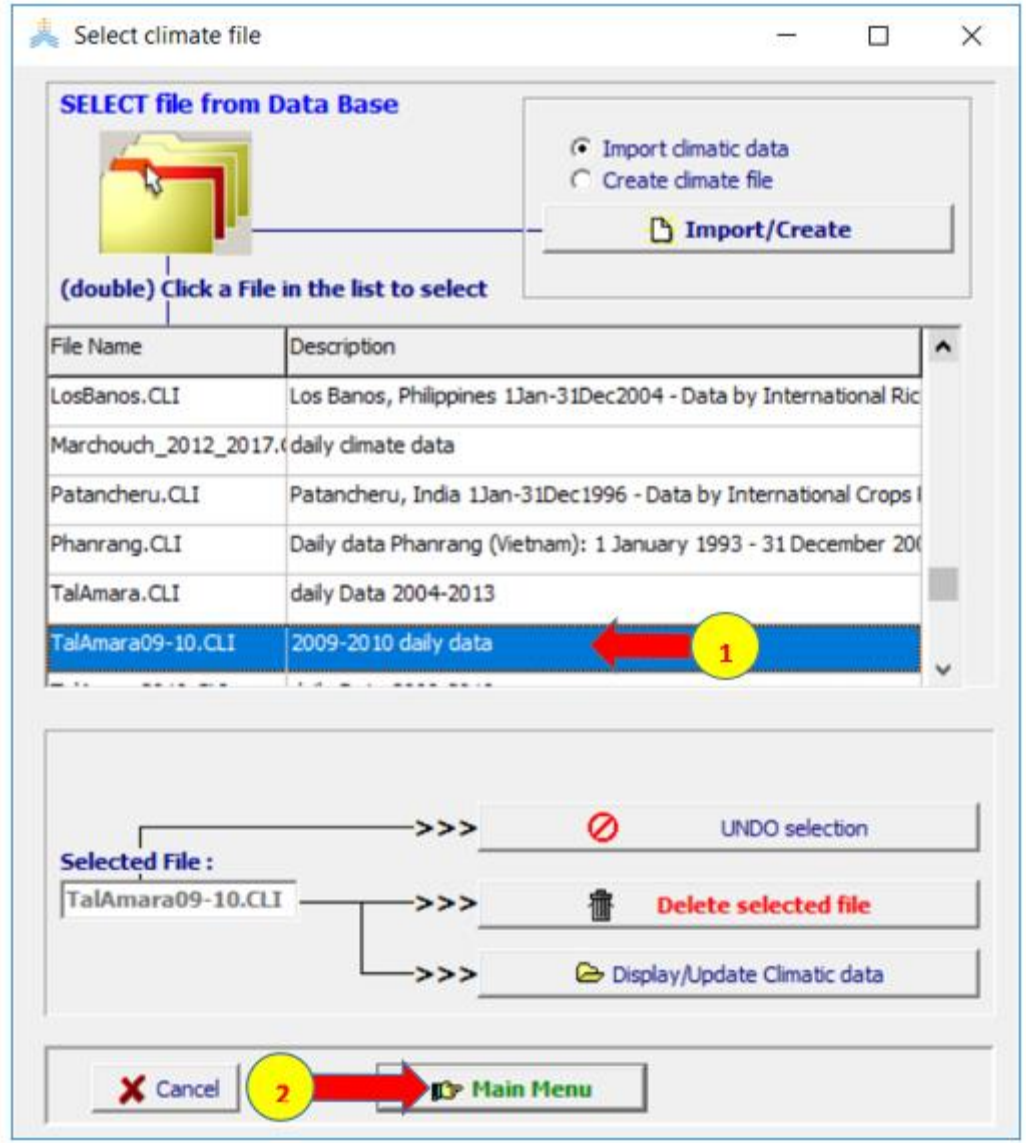

Select climate file
SELECT file from Data Base
Import climatic data
Create climate file
1
Import/Create
(double) Click a File in the list to select
File Name
Description
Phanrang.CLI
Daily data Phanrang (Vietnam): 1 January 1993 - 31 December 20
TalAmara.CLI
daily Data 2004-2013
TalAmara09-10.CLI
2009-2010 daily data
TalAmara2010.CLI
daily Data 2009-2010
Tunis.CLI
Tunis (Tunisia) climatic data
Valenzano.CLI
Valenzano, Italy 23Nov07-19Jun08 - Data by Mediterranean Agro
>>> Data is specified during simulation run
Selected File :
(None)
>>>
Delete selected file
>>>
Display/Update Climatic data
Cancel
Main Menu
(no file is selected)

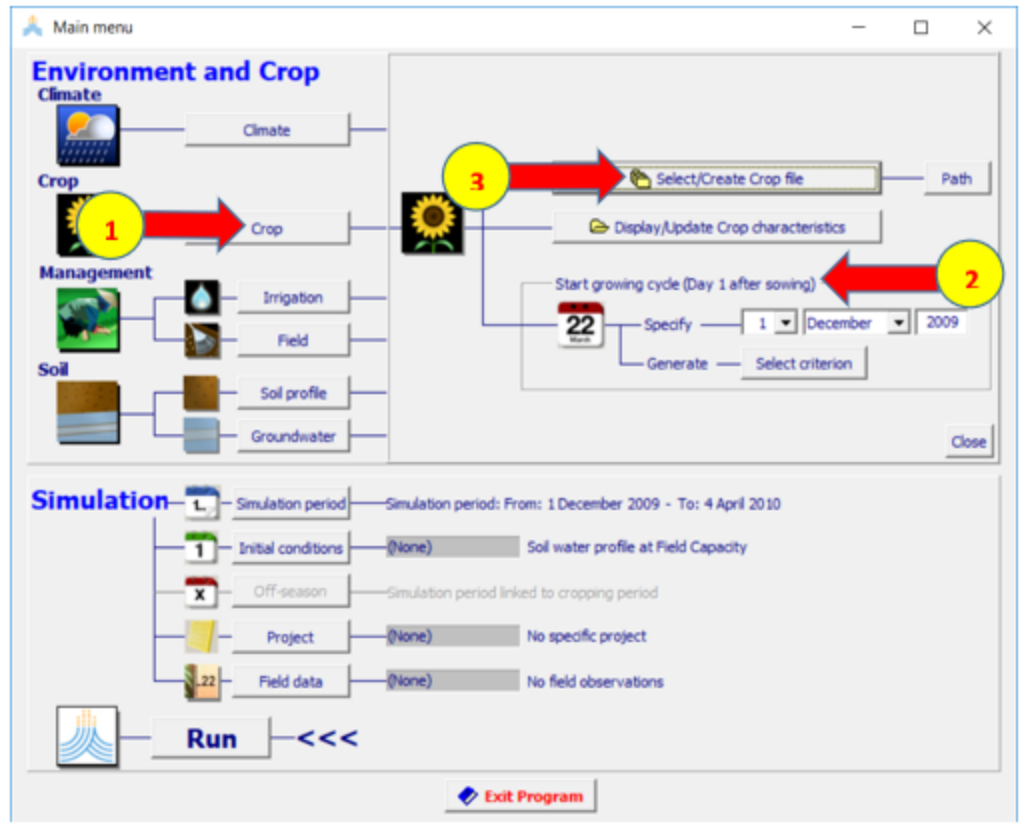

Import climatic data
Select file
Time range
Climatic parameters
ETo
Import climatic data
Import data: File type
Free format text file (*.txt or *.CXT files)
Select file from list
file
Eldoret.txt
EldoretMM.txt
Hagere-Selam.txt
Irpani.CXT
JinderisSyria.txt
Kurnool.txt
La-Paz-Alto.txt
LosBanos1997_2014.txt
TalAmara09-10.txt
TelHadyaSyria.txt
1
D:\...\IMPORT
d: [data]
D:\
Training about Irrigation u
AquaCropV60Nr26042017
IMPORT
double click on folder
to change path
and view contents
click
to select file
Selected file
365 lines (Time range)
3 columns (Climatic parameters)
TalAmara09-10.txt
Cancel
Main menu

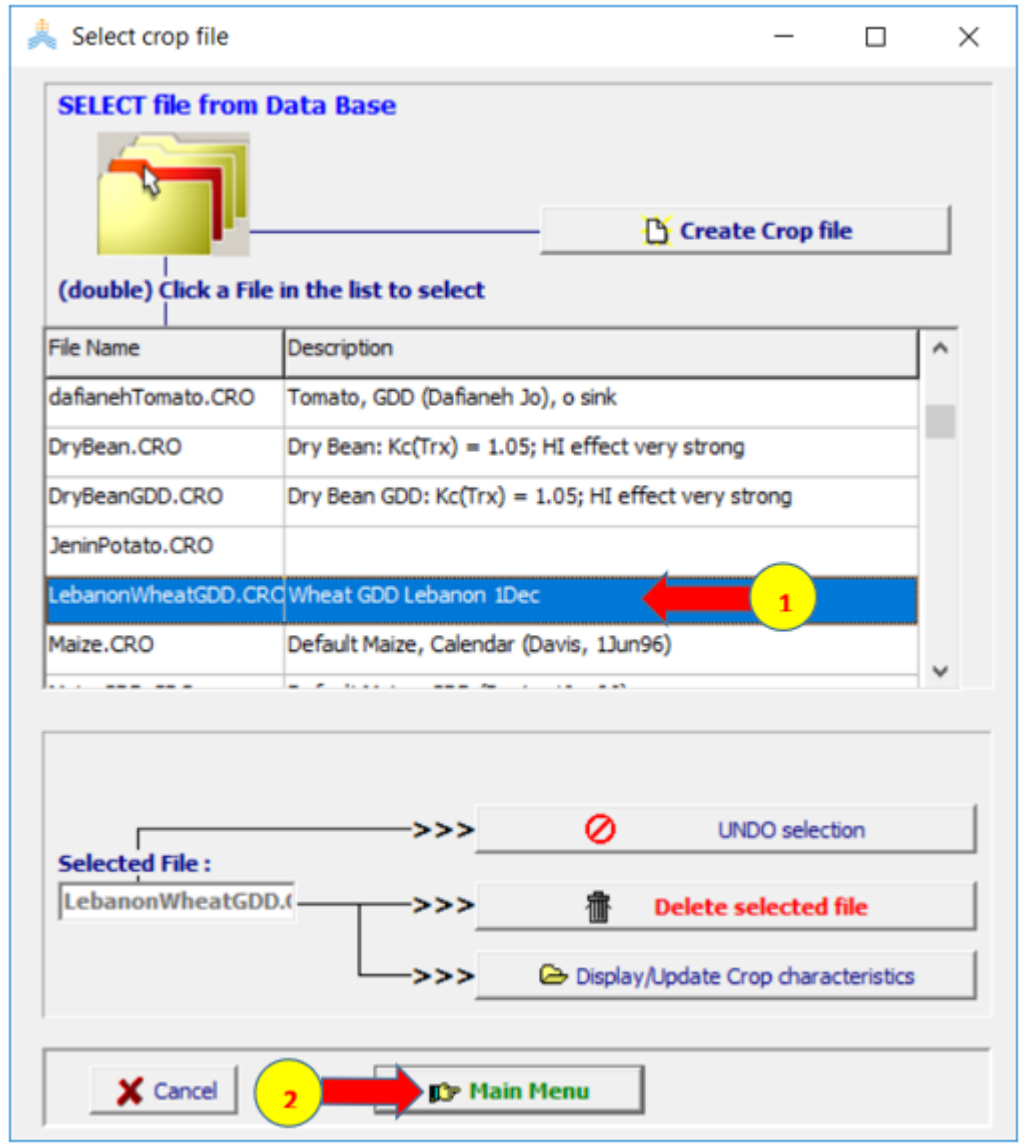

Import climatic data
Select file
Time range
Climatic parameters
ETo
Import climatic data
Type and time range of climatic data
Type
Daily
10-daily
Monthly
1
Time range
2
not linked to a specific year
First Day
1
Last Day
30
First Month
December
Last Month
November
First Year
2009
Last Year
2010
>>> number of daily records (=365) in specified time range
Cancel
Main menu

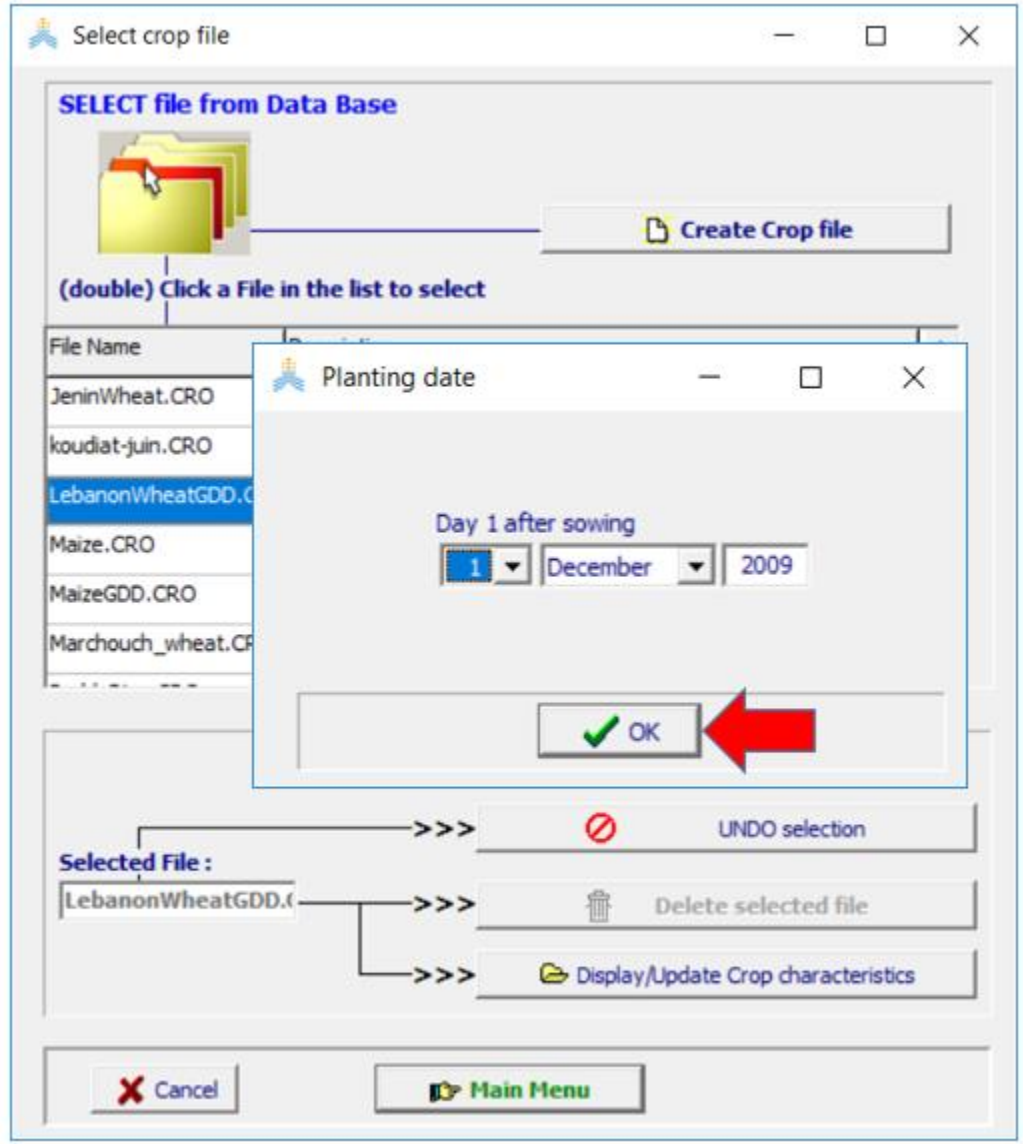

Select file
Climatic parameters
ETo
Import climatic data
1
Climatic parameters
Column....
1
2
3
<< click in cell to select parameter >>
Symbol.....
Tmin
Unit.....
°C
Code.....
103
Missing data.....
Undefined Value
-999.00
Missing.....
none
none
none
Data range.....
Column Max...
20.3
37.6
64.0
Column Min....
-6.0
4.2
0.0
Program limits (Data F
Upper limit....
45.0
Lower limit....
-15.0
>>
Update Data Range
List of climatic parameters
Temperature
2
e/Radiation
ETo
Rain
None
air temperature
Code
Symbol
Unit
Description
101
Tmax
°C
maximum air temperature
102
Tmean
°C
mean air temperature
103
Tmin
°C
minimum air temperature
111
Tmax
°F
maximum air temperature
112
Tmean
°F
mean air temperature
113
Tmin
°F
minimum air temperature
3
click to select code
Close
Cancel
Main menu

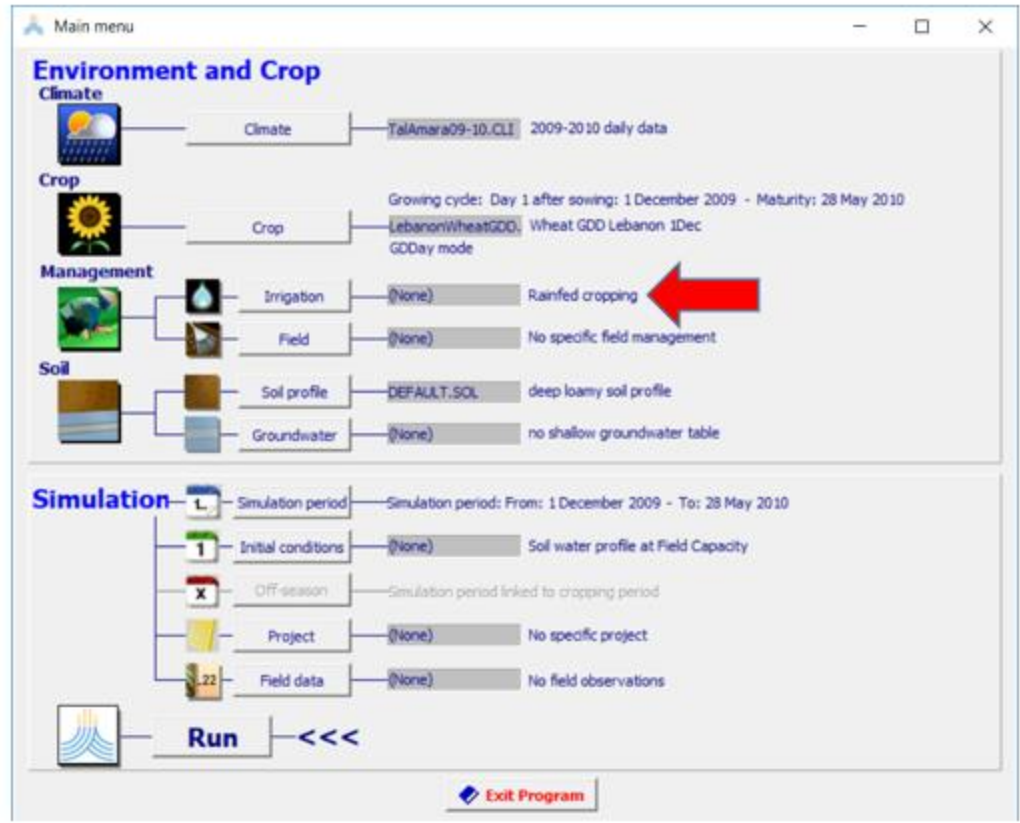

Main menu
Environment and Crop
Climate
Crop
Management
Soil
1
2
Climate
Crop
Irrigation
Field
Soil profile
Groundwater
Select/Create Climate file
Path
Display/Update Climate characteristics
type of climatic data
historical data
Forecast
Close
Simulation
Simulation period
Simulation period: From: 22 March - To: 24 July
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program

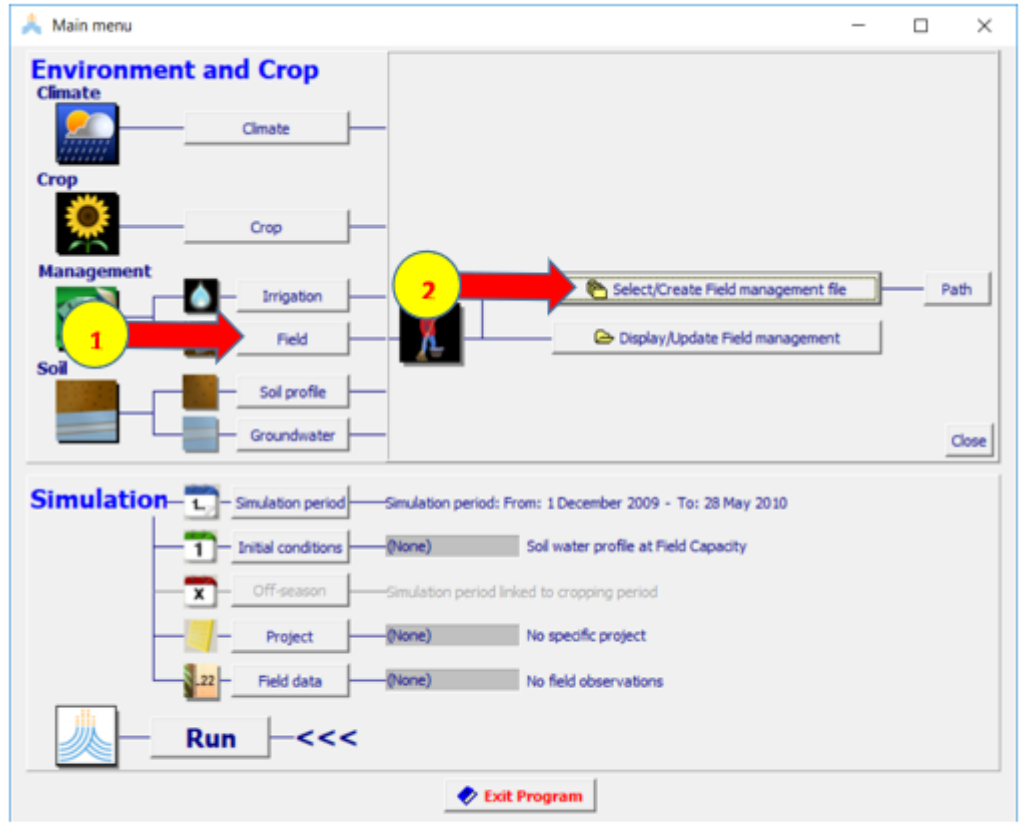

Select climate file
SELECT file from Data Base
Import climatic data
Create climate file
Import/Create
(double) Click a File in the list to select
File Name
Description
LosBanos.CLI
Los Banos, Philippines 1Jan-31Dec2004 - Data by International Ric
Marchouch_2012_2017.(
daily climate data
Patancheru.CLI
Patancheru, India 1Jan-31Dec1996 - Data by International Crops
Phanrang.CLI
Daily data Phanrang (Vietnam): 1 January 1993 - 31 December 20(
TalAmara.CLI
daily Data 2004-2013
TalAmara09-10.CLI
2009-2010 daily data
1
Selected File :
TalAmara09-10.CLI
>>>
UNDO selection
>>>
Delete selected file
>>>
Display/Update Climatic data
Cancel
2
Main Menu

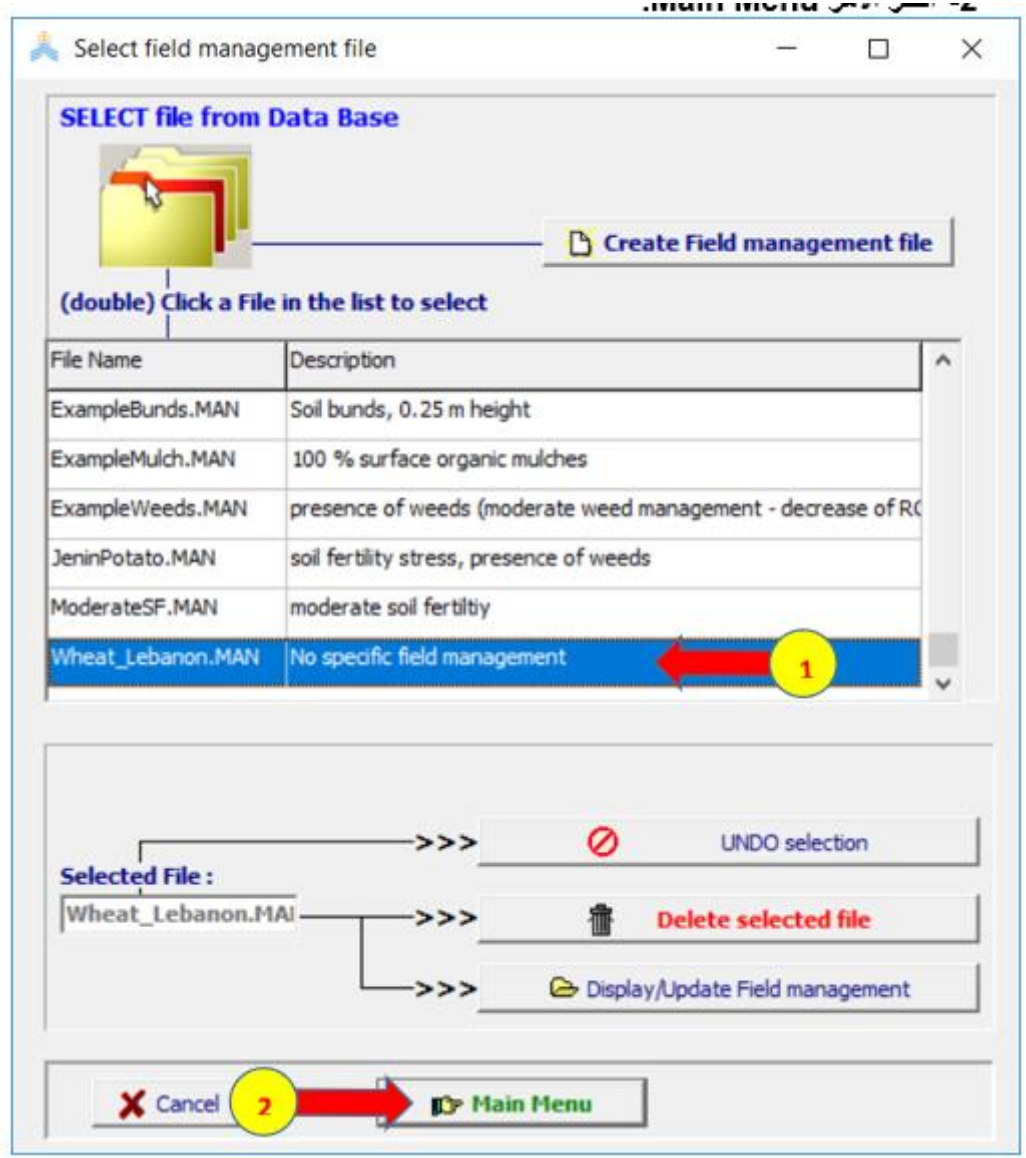

Main menu
Environment and Crop
Climate
Climate
Crop
Crop
1
Management
Irrigation
Field
Soil
Soil profile
Groundwater
3
Select/Create Crop file
Path
Display/Update Crop characteristics
Start growing cycle (Day 1 after sowing)
2
22
Specify
1
December
2009
Generate
Select criterion
Close
Simulation
Simulation period
Simulation period: From: 1 December 2009 - To: 4 April 2010
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program

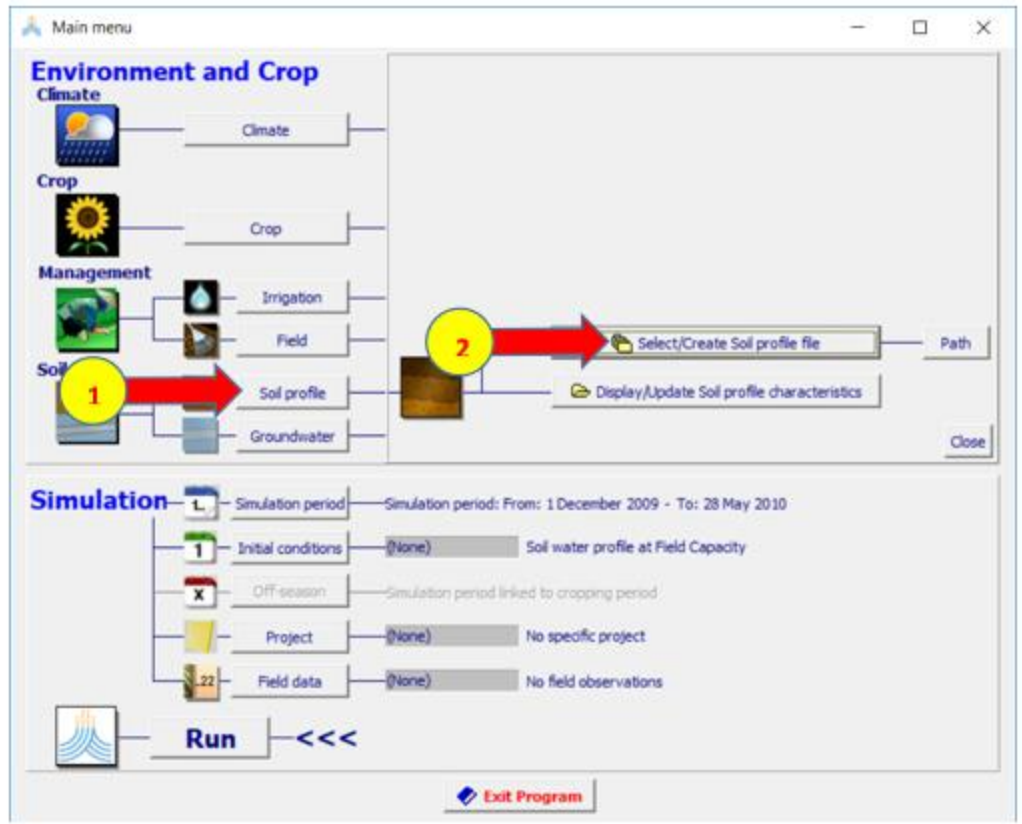

Select crop file
SELECT file from Data Base
Create Crop file
(double) Click a File in the list to select
File Name
Description
dafianehTomato.CRO
Tomato, GDD (Dafianeh Jo), o sink
DryBean.CRO
Dry Bean: Kc(Trx) = 1.05; HI effect very strong
DryBeanGDD.CRO
Dry Bean GDD: Kc(Trx) = 1.05; HI effect very strong
JeninPotato.CRO
LebanonWheatGDD.CRO
Wheat GDD Lebanon 1Dec
1
Maize.CRO
Default Maize, Calendar (Davis, 1Jun96)
Selected File :
LebanonWheatGDD.(
>>>
UNDO selection
>>>
Delete selected file
>>>
Display/Update Crop characteristics
Cancel
2
Main Menu

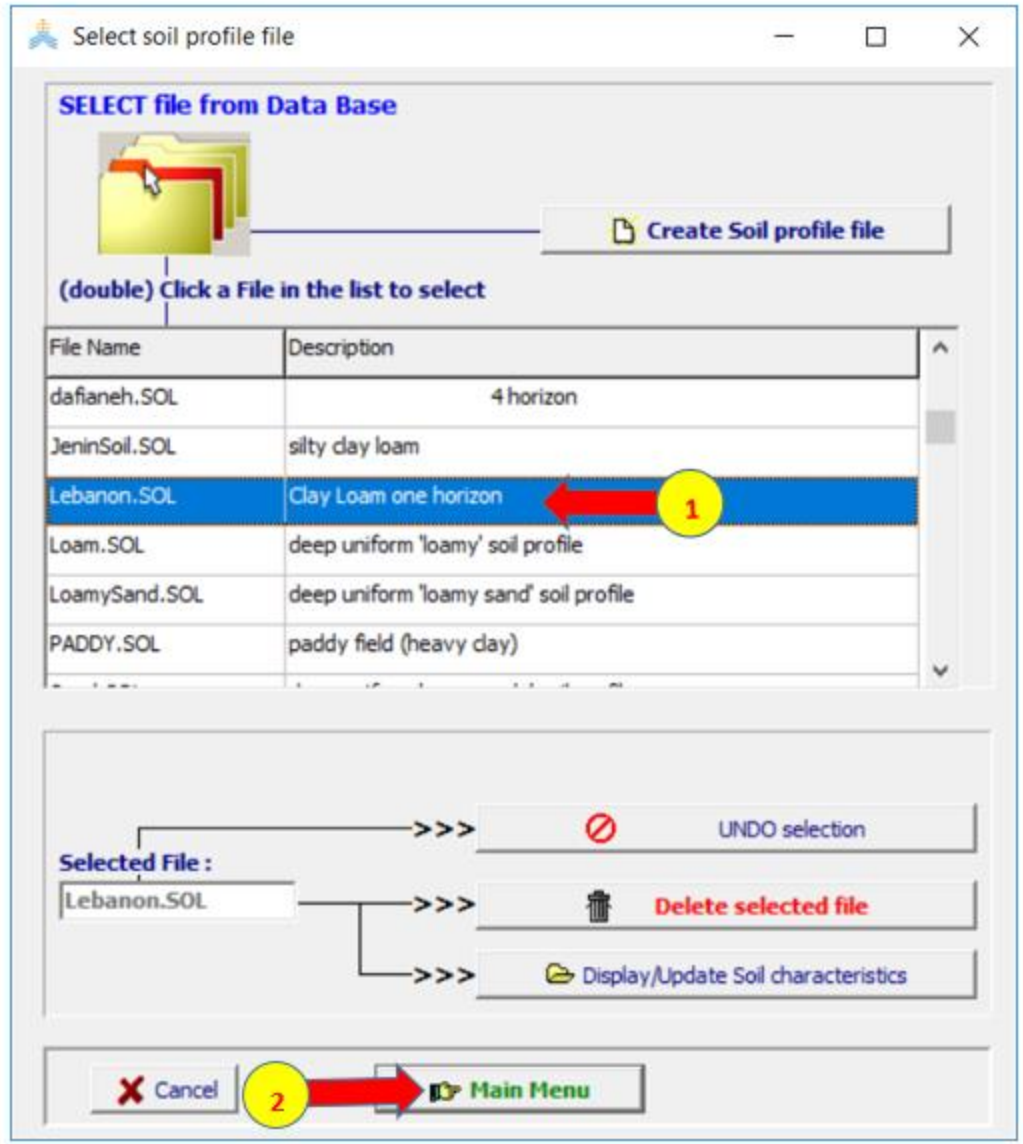

Select crop file
SELECT file from Data Base
Create Crop file
(double) Click a File in the list to select
File Name
JeninWheat.CRO
koudiat-juin.CRO
LebanonWheatGDD.C
Maize.CRO
MaizeGDD.CRO
Marchouch_wheat.CR
Planting date
Day 1 after sowing
1
December
2009
OK
UNDO selection
Selected File :
LebanonWheatGDD.C
Delete selected file
Display/Update Crop characteristics
Cancel
Main Menu

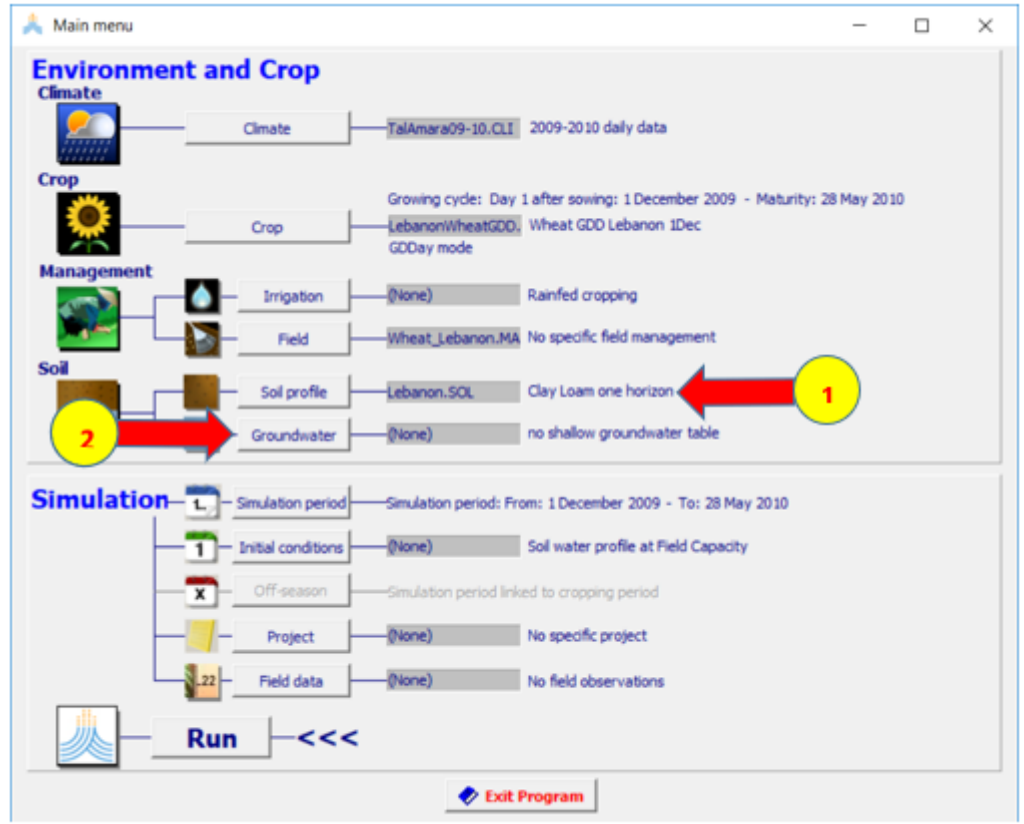

Main menu
Environment and Crop
Climate
Climate
TalAmara09-10.CLI
2009-2010 daily data
Crop
Growing cycle: Day 1 after sowing: 1 December 2009 - Maturity: 28 May 2010
Crop
LebanonWheatGDD.
Wheat GDD Lebanon 1Dec
GDDay mode
Management
Irrigation
(None)
Rainfed cropping
Field
(None)
No specific field management
Soil
Soil profile
DEFAULT.SOL
deep loamy soil profile
Groundwater
(None)
no shallow groundwater table
Simulation
Simulation period
Simulation period: From: 1 December 2009 - To: 28 May 2010
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program

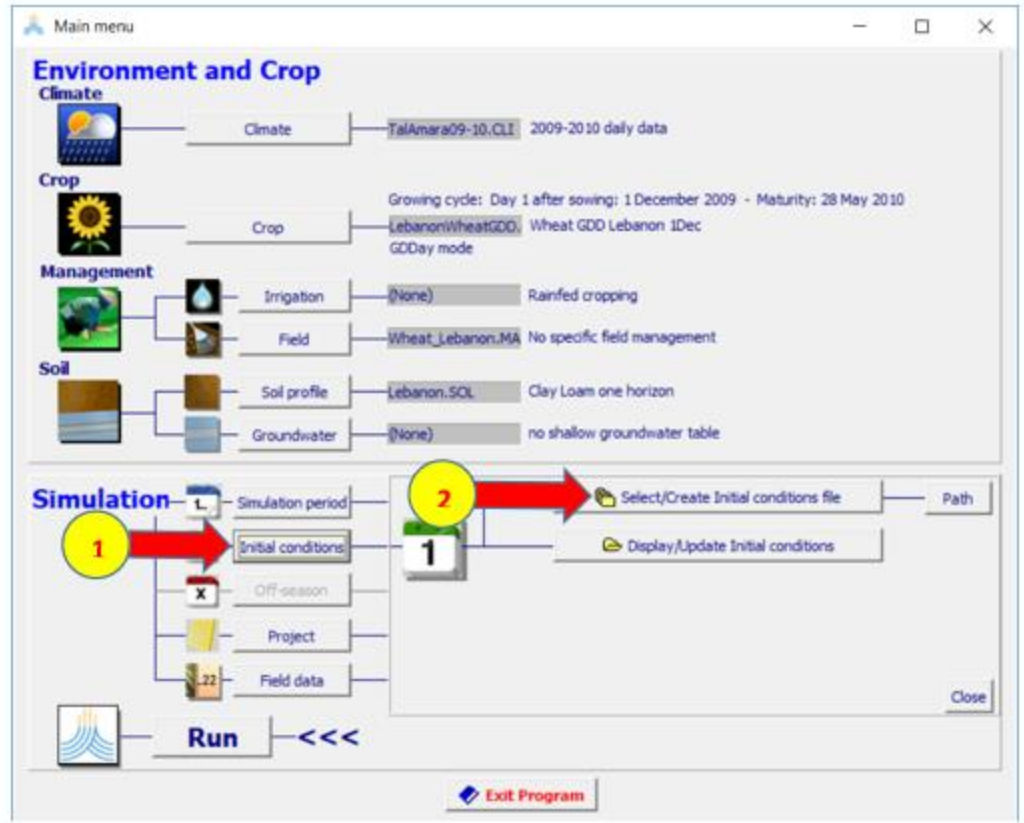

Main menu
Environment and Crop
Climate
Climate
Crop
Crop
Management
Irrigation
Field
Soil
Soil profile
Groundwater
1
2
Select/Create Field management file
Path
Display/Update Field management
Close
Simulation
Simulation period
Simulation period: From: 1 December 2009 - To: 28 May 2010
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program

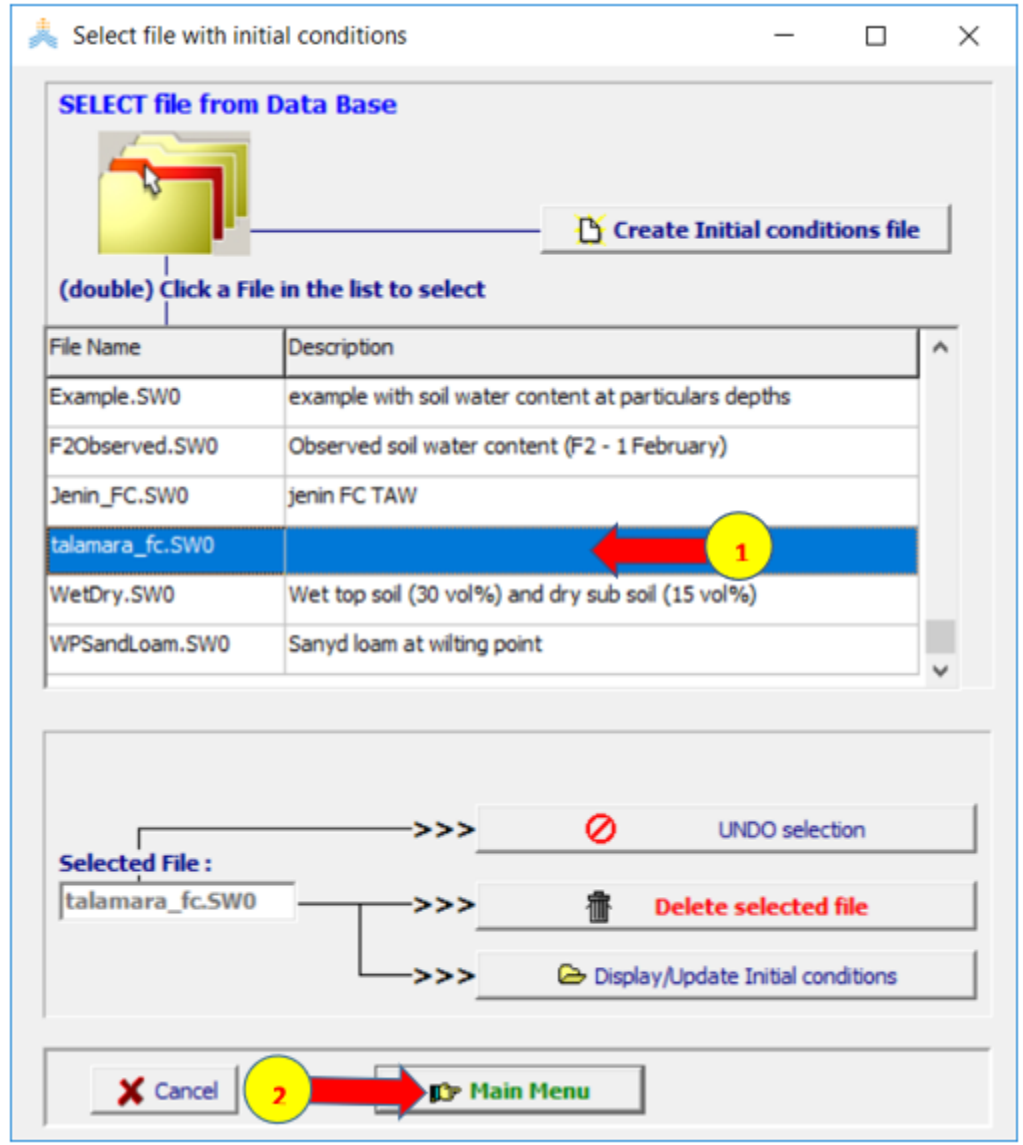

Select field management file
SELECT file from Data Base
Create Field management file
(double) Click a File in the list to select
File Name
Description
ExampleBunds.MAN
Soil bunds, 0.25 m height
ExampleMulch.MAN
100 % surface organic mulches
ExampleWeeds.MAN
presence of weeds (moderate weed management - decrease of RC
JeninPotato.MAN
soil fertility stress, presence of weeds
ModerateSF.MAN
moderate soil fertiltiy
Wheat_Lebanon.MAN
No specific field management
1
UNDO selection
Selected File :
Wheat_Lebanon.MAI
Delete selected file
Display/Update Field management
Cancel
2
Main Menu

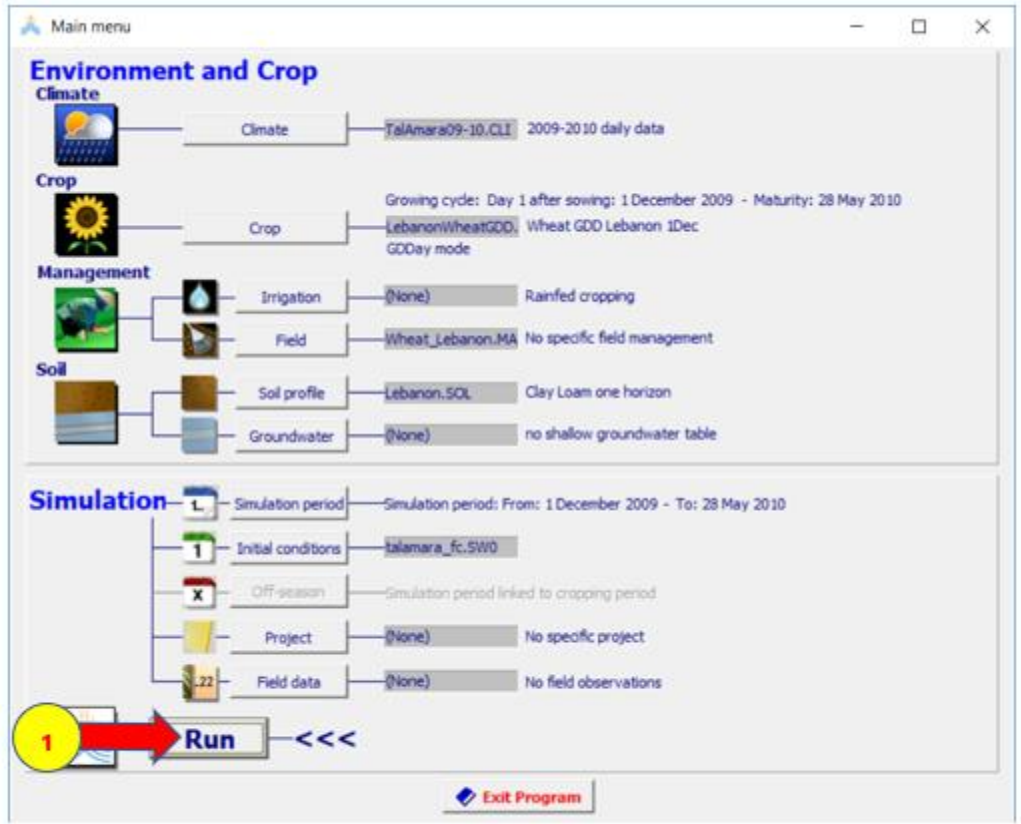

Main menu
Environment and Crop
Climate
Climate
Crop
Crop
Management
Irrigation
Field
Soil
Soil profile
Groundwater
1
2
Select/Create Soil profile file
Path
Display/Update Soil profile characteristics
Close
Simulation
Simulation period
Simulation period: From: 1 December 2009 - To: 28 May 2010
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program


Select soil profile file
SELECT file from Data Base
Create Soil profile file
(double) Click a File in the list to select
File Name
Description
dafianeh.SOL
4 horizon
JeninSoil.SOL
silty clay loam
Lebanon.SOL
Clay Loam one horizon
1
Loam.SOL
deep uniform 'loamy' soil profile
LoamySand.SOL
deep uniform 'loamy sand' soil profile
PADDY.SOL
paddy field (heavy clay)
UNDO selection
Selected File :
Lebanon.SOL
Delete selected file
Display/Update Soil characteristics
Cancel
2
Main Menu

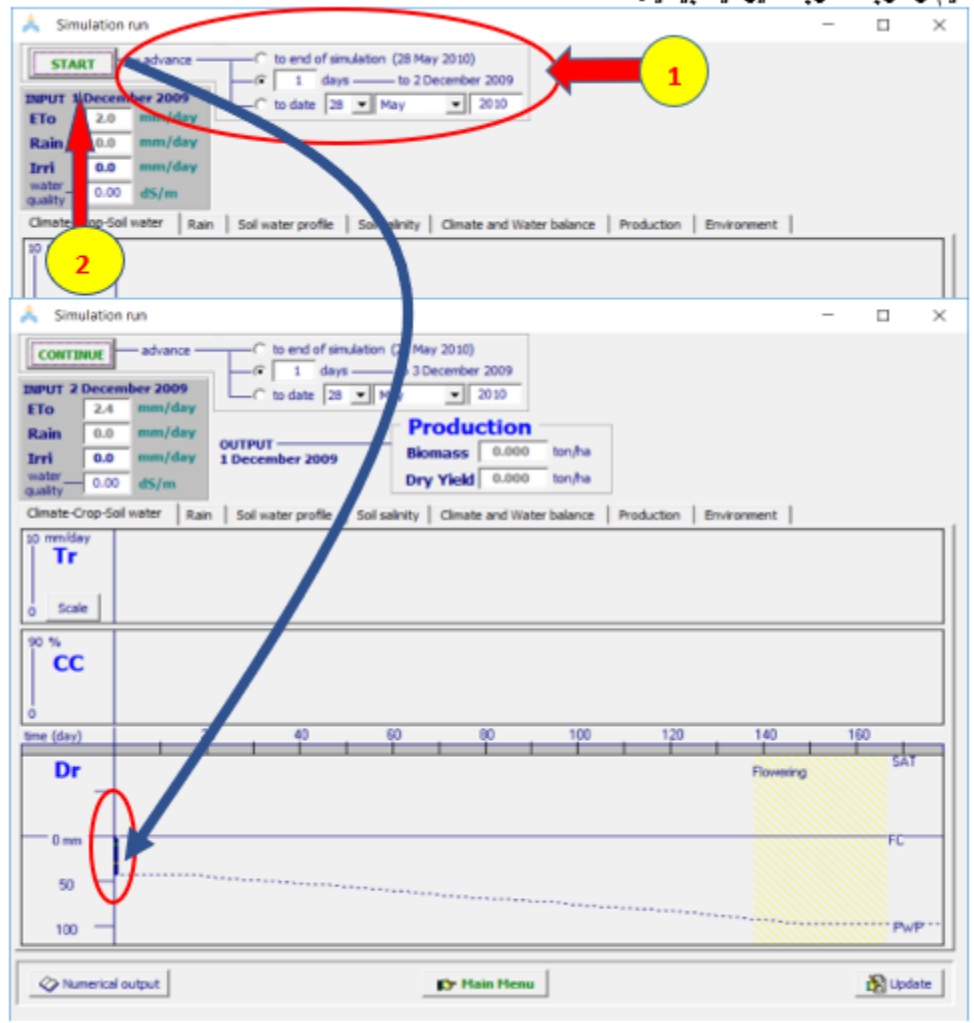

Main menu
Environment and Crop
Climate
Climate
TalAmara09-10.CLI
2009-2010 daily data
Crop
Growing cycle: Day 1 after sowing: 1 December 2009 - Maturity: 28 May 2010
Crop
LebanonWheatGDD.
Wheat GDD Lebanon 1Dec
GDDay mode
Management
Irrigation
(None)
Rainfed cropping
Field
Wheat_Lebanon.MA
No specific field management
Soil
Soil profile
Lebanon.SOL
Clay Loam one horizon
1
2
Groundwater
(None)
no shallow groundwater table
Simulation
Simulation period
Simulation period: From: 1 December 2009 - To: 28 May 2010
Initial conditions
(None)
Soil water profile at Field Capacity
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
Run
<<<
Exit Program


Main menu
Environment and Crop
Climate
Climate
TalAmara09-10.CLI
2009-2010 daily data
Crop
Crop
Growing cycle: Day 1 after sowing: 1 December 2009 - Maturity: 28 May 2010
LebanonWheatGDD.
Wheat GDD Lebanon 1Dec
GDDay mode
Management
Irrigation
(None)
Rainfed cropping
Field
Wheat_Lebanon.MA
No specific field management
Soil
Soil profile
Lebanon.SOL
Clay Loam one horizon
Groundwater
(None)
no shallow groundwater table
Simulation
Simulation period
Initial conditions
Off-season
Project
Field data
Run
<<<
1
2
Select/Create Initial conditions file
Path
Display/Update Initial conditions
1
Close
Exit Program


Select file with initial conditions
SELECT file from Data Base
Create Initial conditions file
(double) Click a File in the list to select
File Name
Description
Example.SW0
example with soil water content at particulars depths
F2Observed.SW0
Observed soil water content (F2 - 1 February)
Jenin_FC.SW0
jenin FC TAW
talamara_fc.SW0
1
WetDry.SW0
Wet top soil (30 vol%) and dry sub soil (15 vol%)
WPSandLoam.SW0
Sanyd loam at wilting point
UNDO selection
Selected File :
talamara_fc.SW0
Delete selected file
Display/Update Initial conditions
Cancel
2
Main Menu


Main menu
Environment and Crop
Climate
Climate
TalAmara09-10.CLI
2009-2010 daily data
Crop
Growing cycle: Day 1 after sowing: 1 December 2009 - Maturity: 28 May 2010
Crop
LebanonWheatGDD
Wheat GDD Lebanon 1Dec
GDDay mode
Management
Irrigation
(None)
Rainfed cropping
Field
Wheat_Lebanon.MA
No specific field management
Soil
Soil profile
Lebanon.SOL
Clay Loam one horizon
Groundwater
(None)
no shallow groundwater table
Simulation
Simulation period
Simulation period: From: 1 December 2009 - To: 28 May 2010
Initial conditions
talamara_fc.SW0
Off-season
Simulation period linked to cropping period
Project
(None)
No specific project
Field data
(None)
No field observations
1
Run
<<<
Exit Program

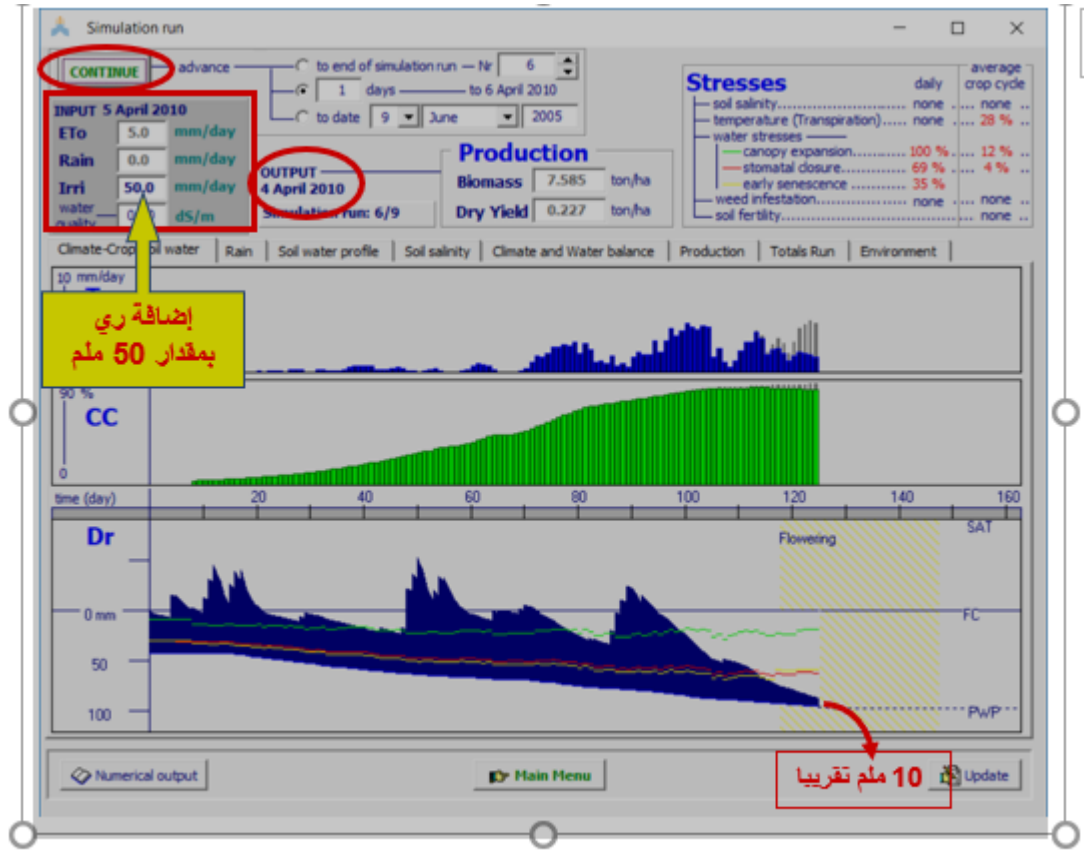
قيم رطوبه التربه اليوميه بيانيا.

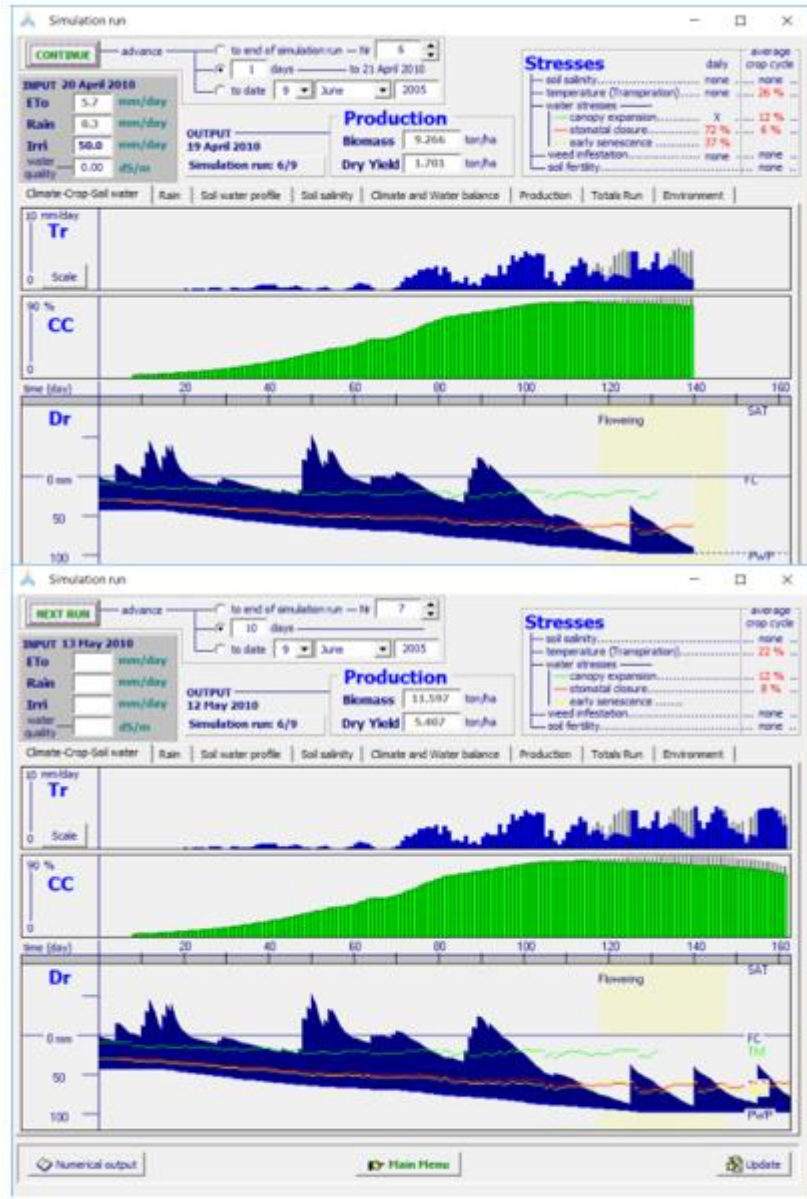


11-تتبع رطوبة التربة فوق حد الذبول في منطقة الجذور:

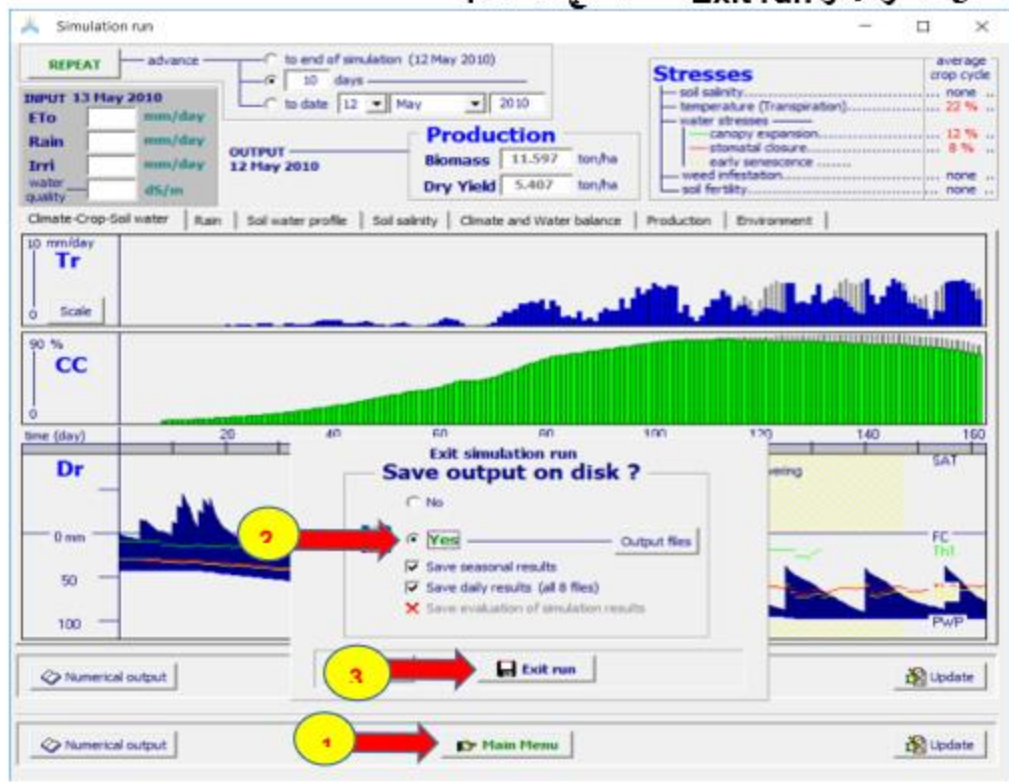
يمكن تتبع رطوبة التربة بيانيا من خلال لوحة Dr.

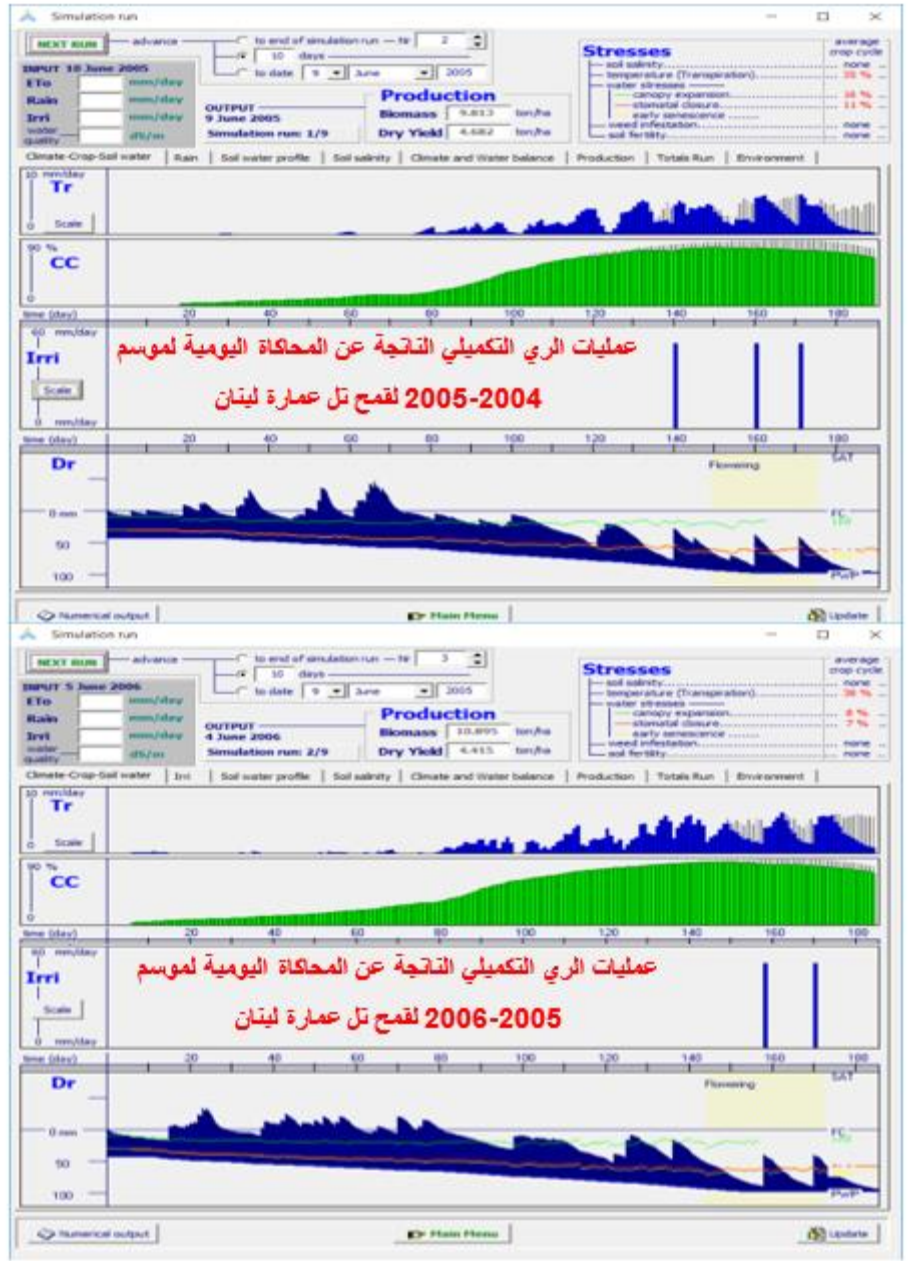
مثلا, في الشكل أدناه قيمة رطوبة منطقة الجذور تساوي حوالي 40 ملم فوق حد الذبول في نهاية اليوم الأول للمحاكاة 1 Dec 2009.


Simulation run
CONTINUE
advance
to end of simulation run — Nr 6
1 days to 6 April 2010
to date 9 June 2005
INPUT 5 April 2010
ETo 5.0 mm/day
Rain 0.0 mm/day
Irri 50.0 mm/day
water quality dS/m
OUTPUT 4 April 2010
Simulation Run: 6/9
Production
Biomass 7.585 ton/ha
Dry Yield 0.227 ton/ha
Stresses
daily
average crop cycle
soil salinity none none
temperature (Transpiration) none 28 %
water stresses
canopy expansion 100 % 12 %
stomatal closure 69 % 4 %
early senescence 35 %
weed infestation none none
soil fertility none none
Climate-Crop
Soil water
Rain
Soil water profile
Soil salinity
Climate and Water balance
Production
Totals Run
Environment
10 mm/day
إضافة ري
بمقدار 50 ملم
90 %
CC
0
time (day)
20
40
60
80
100
120
140
160
Dr
Flowering
SAT
FC
PWP
0 mm
50
100
Numerical output
Main Menu
10 ملم تقريبا
Update


Simulation run
CONTINUE
advance
to end of simulation run — hr
days
to date
to 21 April 2010
INPUT 20 April 2010
ETo
Rain
Irri
water quality
OUTPUT
19 April 2010
Simulation run: 6/9
Production
Biomass
Dry Yield
Stresses
daily
average crop cycle
soil salinity
temperature (Transpiration)
water stresses
canopy expansion
stomatal closure
early senescence
weed infestation
soil fertility
Climate-Crop-Soil water
Rain
Soil water profile
Soil salinity
Climate and Water balance
Production
Totals Run
Environment
Tr
CC
Dr
Flowering
SAT
FC
PWP
NEXT RUN
INPUT 13 May 2010
OUTPUT
12 May 2010
Simulation run: 6/9
Numerical output
Main Menu
Update

3- اختر الامر Exit run لحفظ نتائج المحاكاة.




Simulation run
Production
Stresses
Tr
CC
Irri
Dr
عمليات الري التكميلي الناتجة عن المحاكاة اليومية لموسم
2005-2004 لقمح تل عمارة لبنان
Simulation run
Production
Stresses
Tr
CC
Irri
Dr
عمليات الري التكميلي الناتجة عن المحاكاة اليومية لموسم
2006-2005 لقمح تل عمارة لبنان

مقارنة الإنتاجية لمحصول القمح في تل عمارة - لبنان لحالة الري التكميلي مع حالتي الري الكامل والري المطري(الزراعة البعلية)

Year	Rain fed		Full Irr (80 % RAW)			Sup Irr		
	Yield	WPet	Irri	Yield	WPet	Irri	Yield	WPet
	ton/ha	kg/m3	mm	ton/ha	kg/m3	mm	ton/ha	kg/m3
2005	**0.794**	0.26	348	**6.2**	1.12	150	**4.682**	1.03
2006	**1.801**	0.56	308	**5.791**	1.15	100	**4.415**	1.07
2007	**1.611**	0.5	304	**5.839**	1.07	150	**4.744**	1.03
2008	**0.072**	0.03	485	**6.079**	0.96	200	**3.405**	0.77
2009	**3.798**	1.18	212	**6.068**	1.4	100	**5.413**	1.36
2010	**1.291**	0.53	261	**6.383**	1.48	150	**5.407**	1.46
2011	**4.569**	1.4	161	**6.414**	1.54	50	**5.463**	1.49
2012	**0.975**	0.38	299	**5.674**	1.17	150	**4.41**	1.1
2013	**4.188**	1.48	207	**6.458**	1.57	100	**5.851**	1.59
Average	**2.12**	**0.70**	**287**	**6.10**	**1.27**	**128**	**4.87**	**1.21**

من الجدول السابق يتبين أن تطبيق الري التكميلي عند وصول رطوبة التربة إلى **10** ملم تقريبا فوق حد الذبول حقق أرتفاعا بالأنتاجية **229%** مقارنة بالزراعة البعلية, كما حقق إنتاجية تعادل **80%** من الإ نتاجية لحالة الري الكامل باستخدام **44%** من كمية المياه اللازمة للري الكامل.