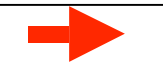
Practical Exercise on PC

Crop file tuning for local conditions

D

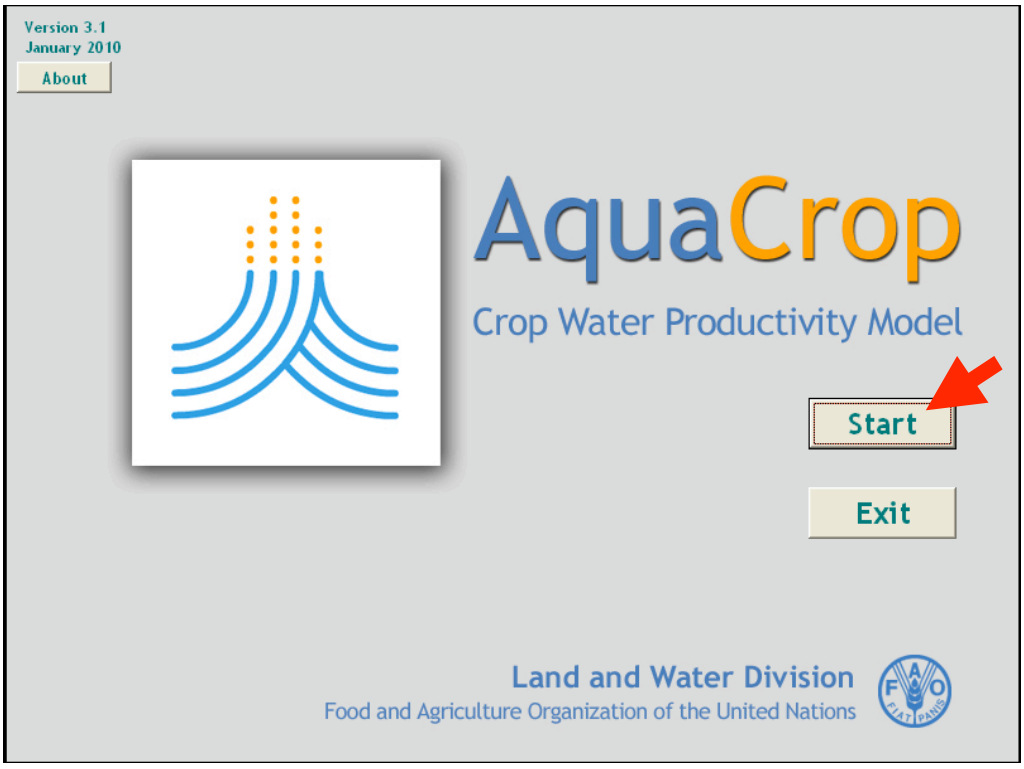
Solution of the exercise

Legend	Red flash		indicates buttons to click
	Red frame		indicates data to input
	Green frame		indicates output data

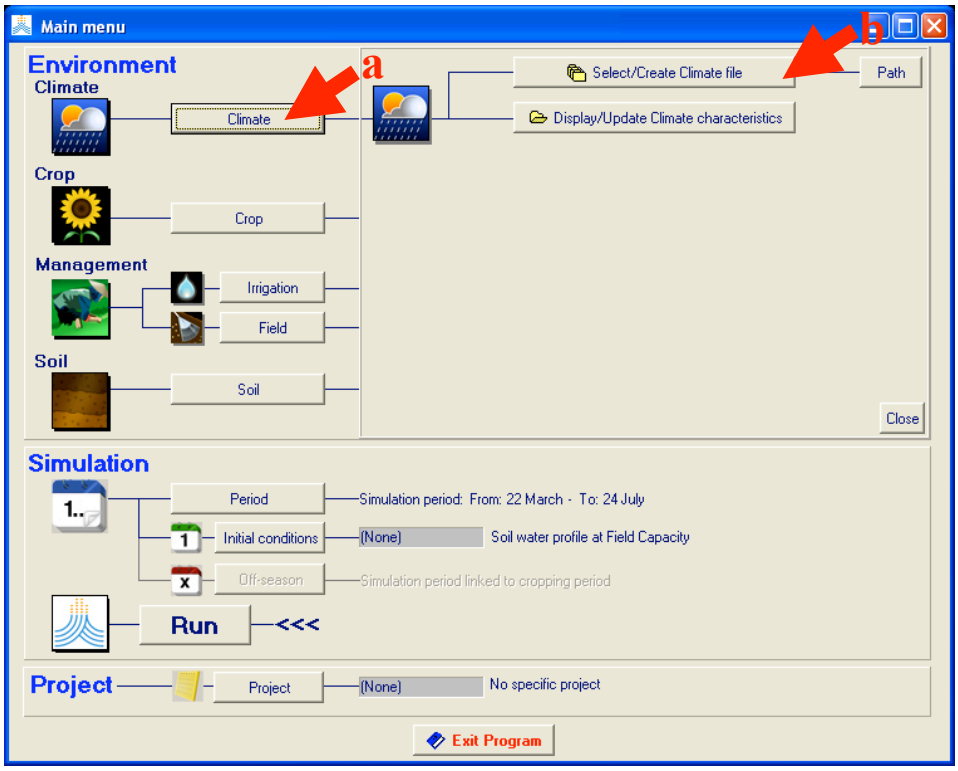
The objective of the exercise is to estimate how much grain a maize field would produce during a specific season. The maize field is located in Cordoba, Spain, for which the climate data are first required. Climate data are already available in AquaCrop. In order to account for the specific management practices, the general maize file has been modified to reflect the specific sowing date and the planting density. To simulate the characteristics of the specific maize cultivar, the phenology of the cultivar observed in the field **under no stress conditions (no water stress, no fertility stress)** has been used to modify the general maize file. In case of missing information, the default maize file values have been retained.

CLIMATE DATA

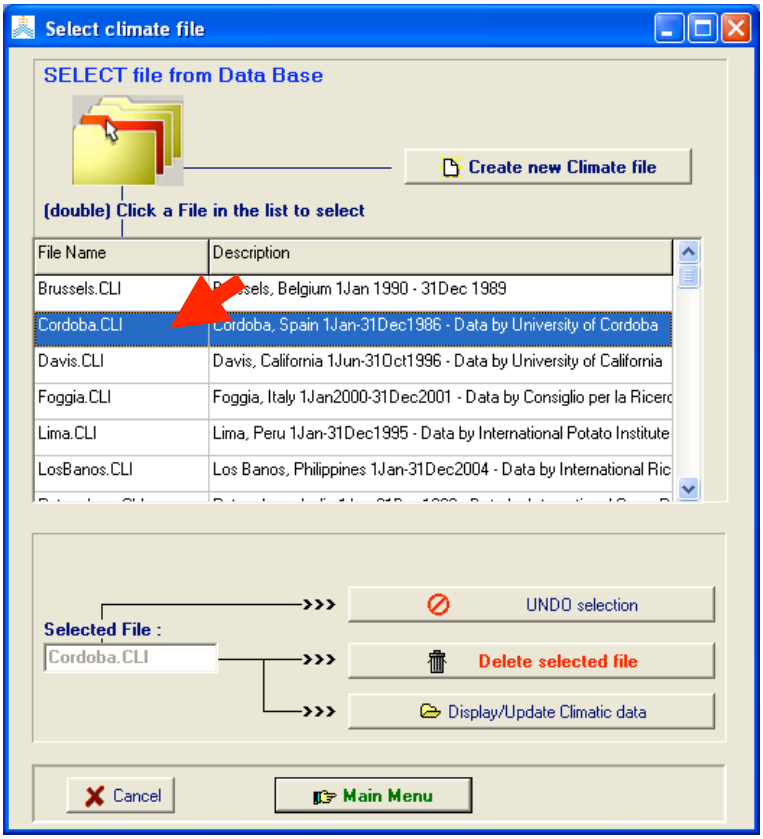
- *Start* AquaCrop.



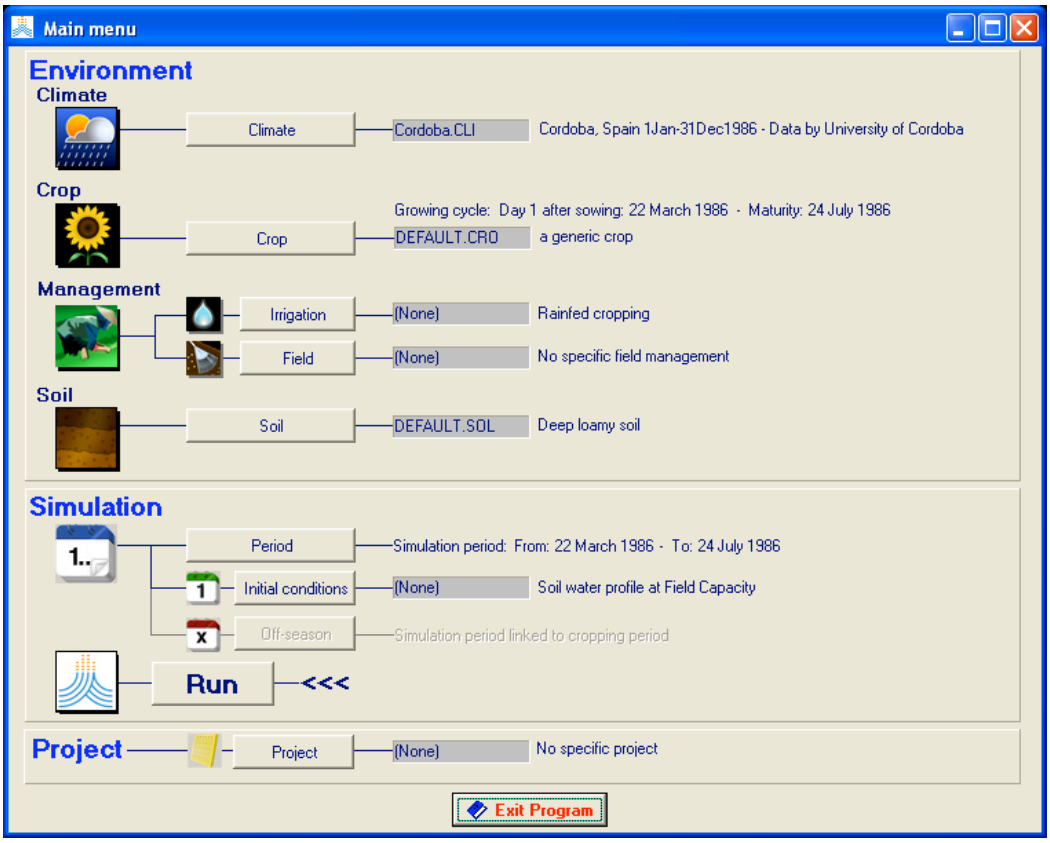
- In *Climate* (a), *Select/Create Climate file* (b).



- Select file from Data Base by double clicking on the file.

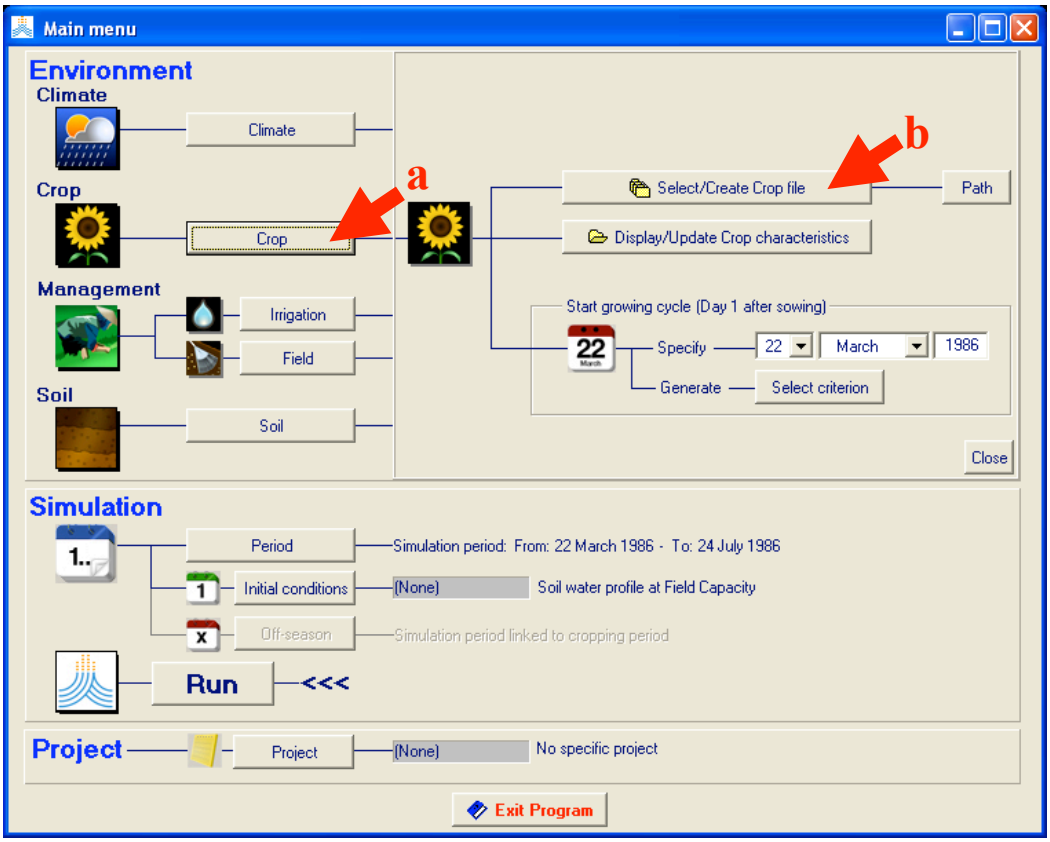


- The name of the selected Climate file is displayed.

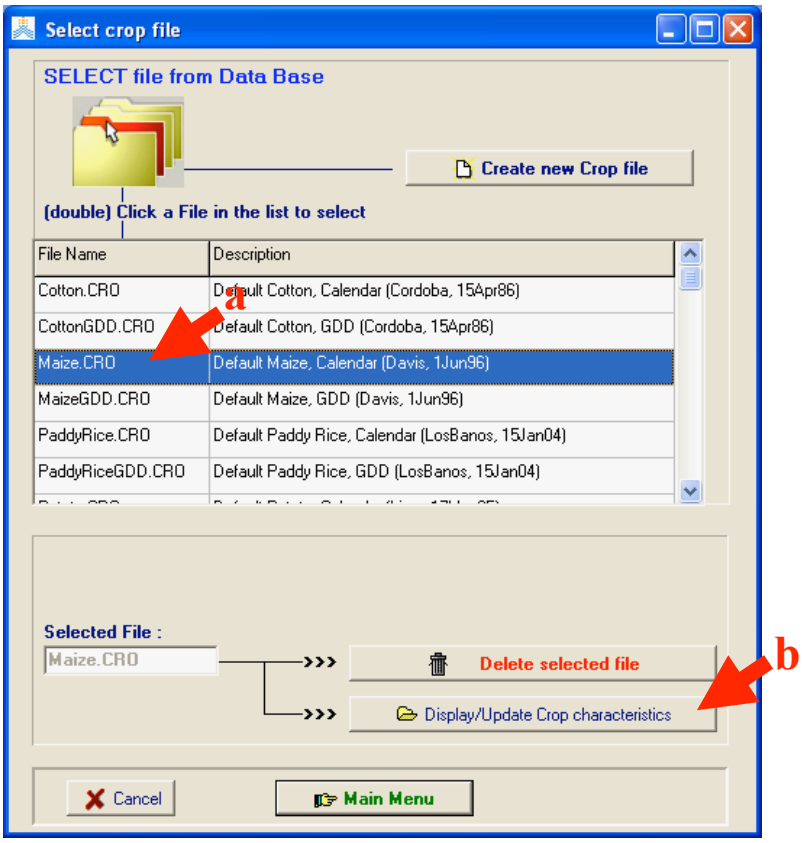


TUNING CROP FILE FOR LOCAL CONDITIONS

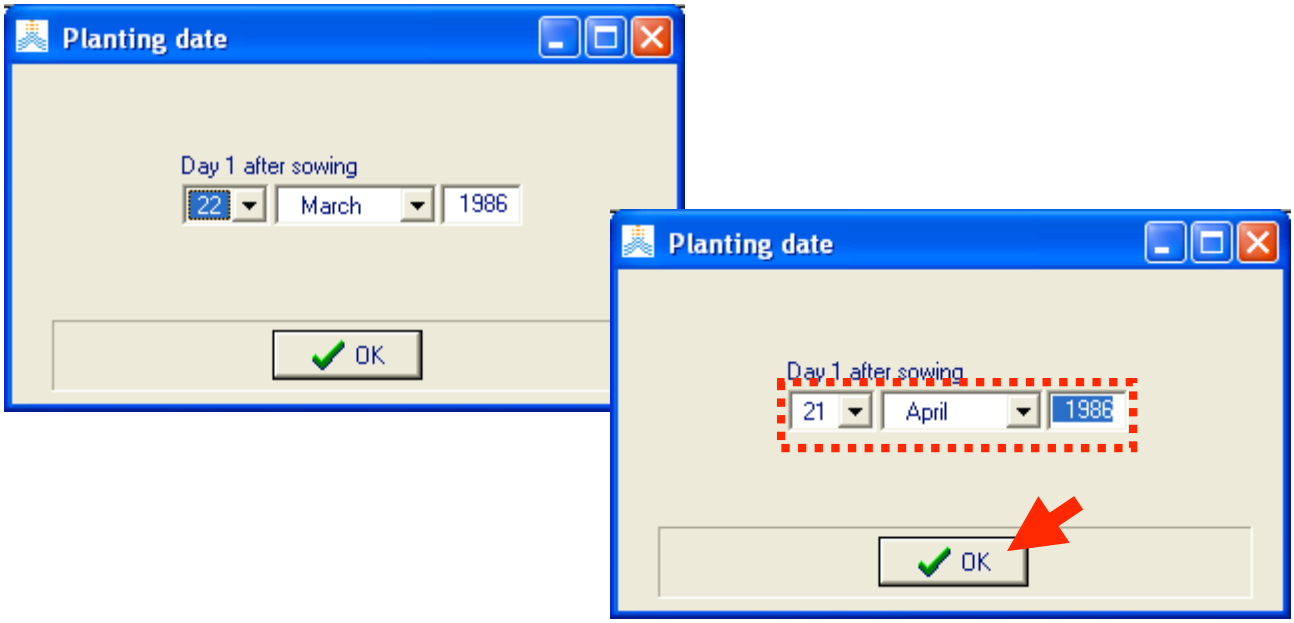
- In *Crop* (a), *Select/Create Crop file* (b).



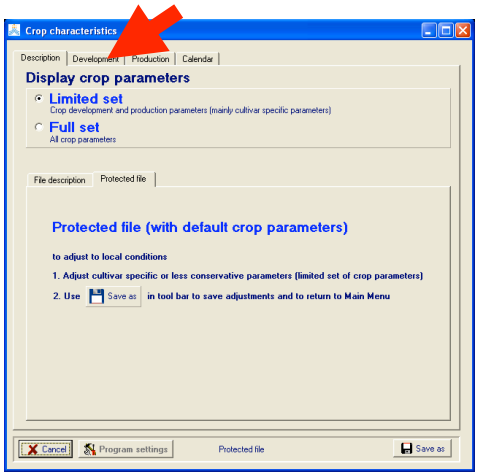
- Select the default crop file by clicking on the file (a), then *Display/Update Crop characteristics* (b).

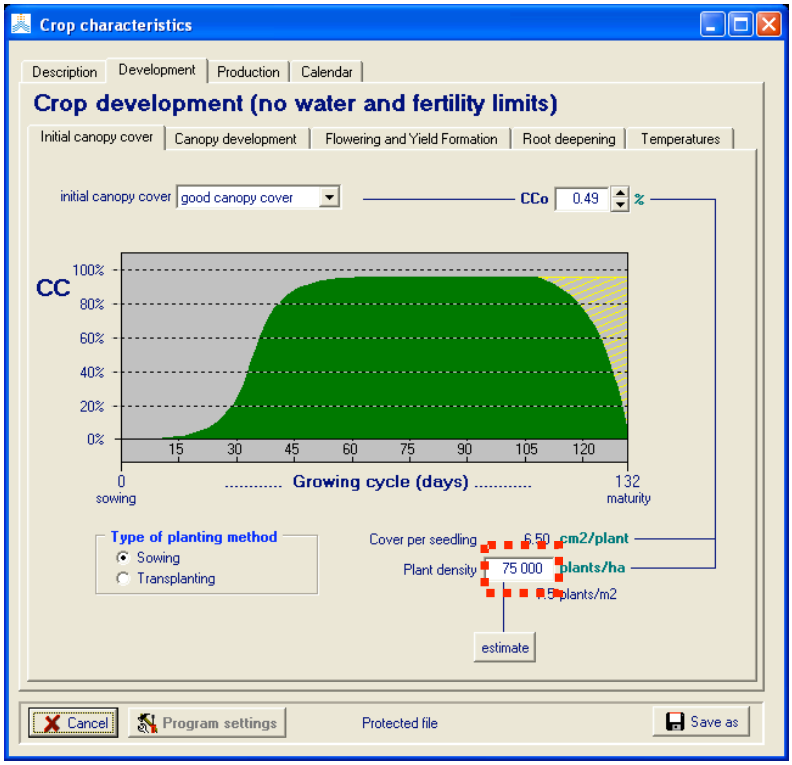


- Specify *Day 1 after sowing*, then *OK*.

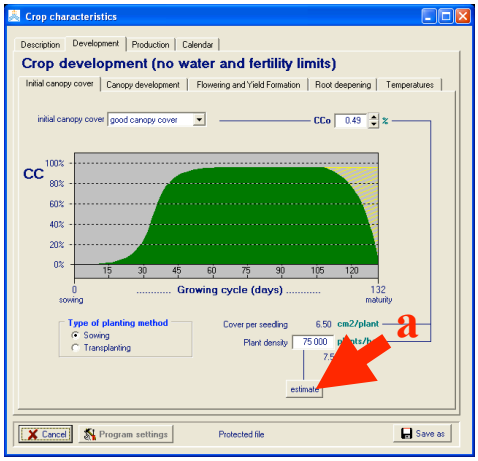


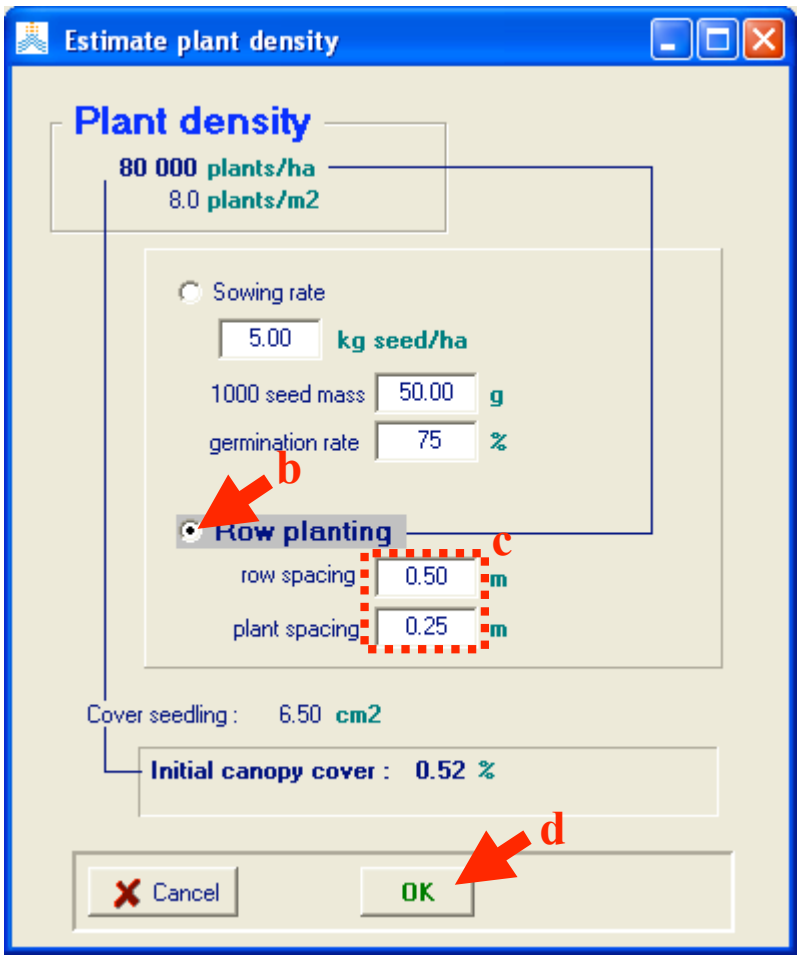
- In *Development, Initial canopy cover* modify *Plant density* according to local management practices.



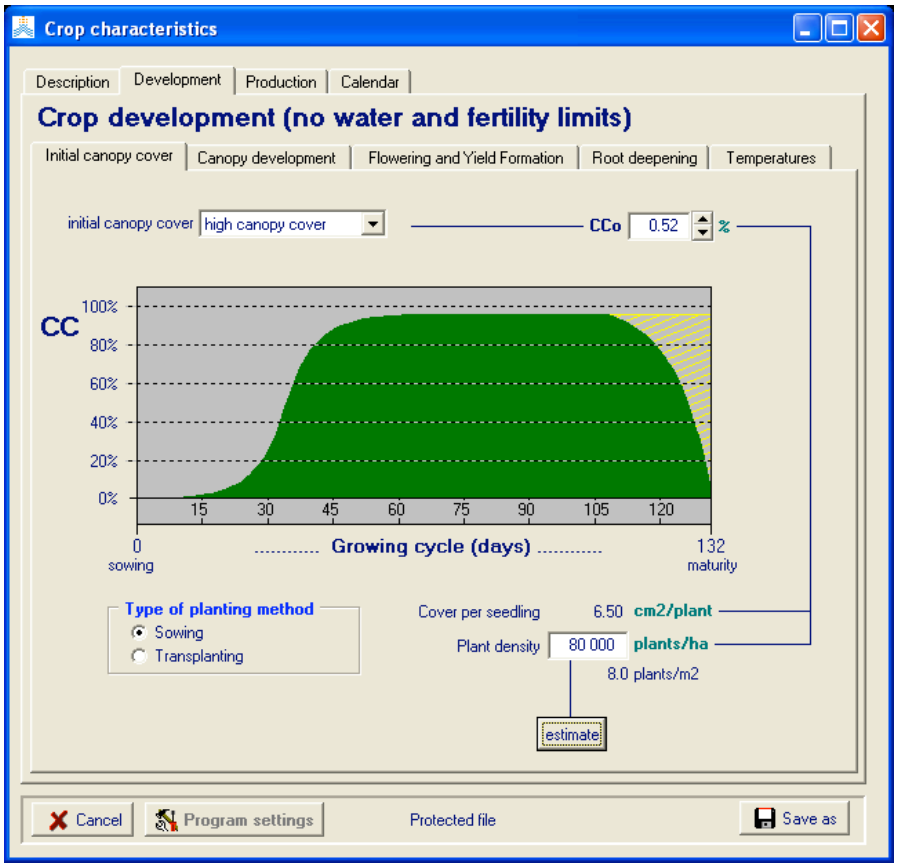


- If needed, the option *estimate* (a) can be used to calculate *Plant density* from *Row planting* (b): *Row spacing* and *Plant spacing* (c), then *OK* (d).

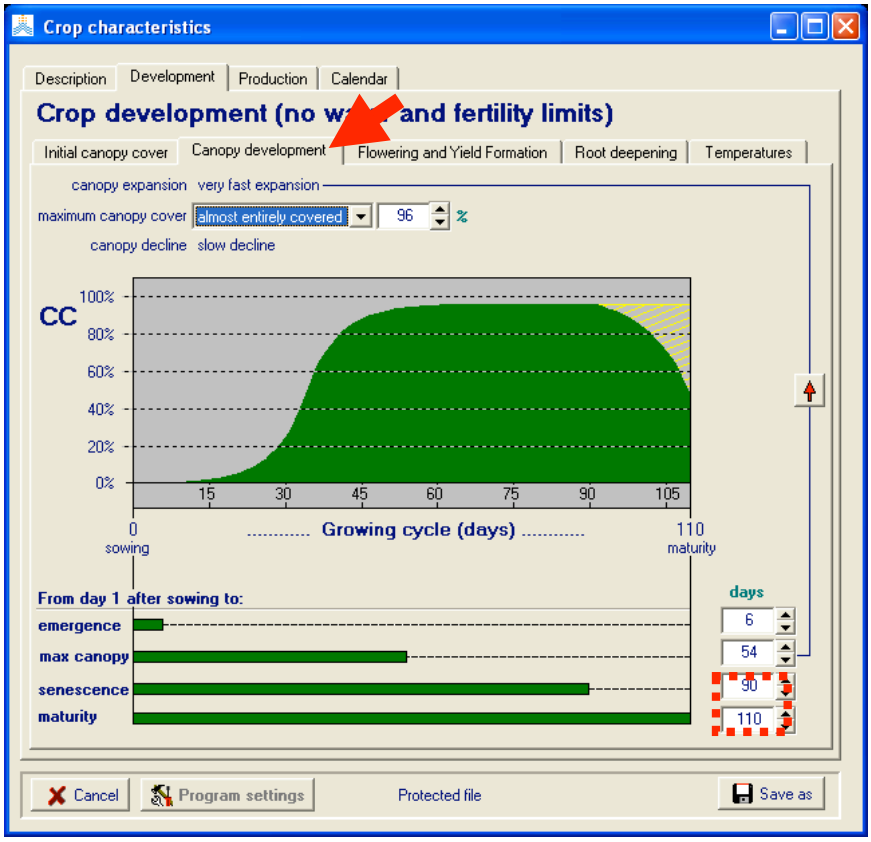




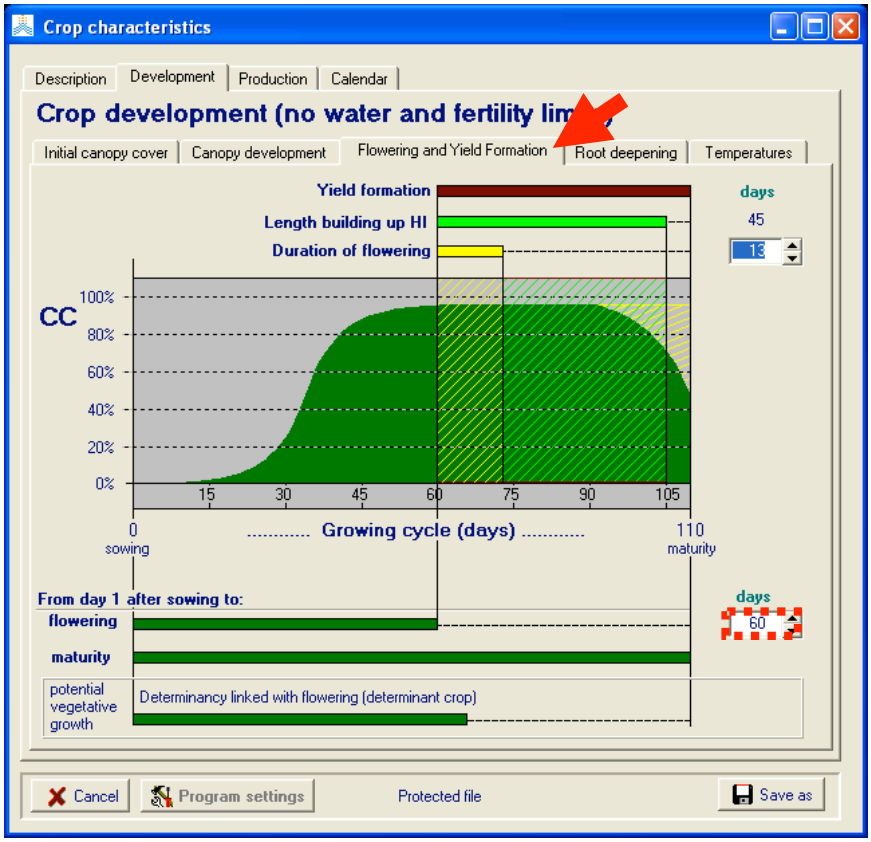
- The modified *Plant density* is displayed.



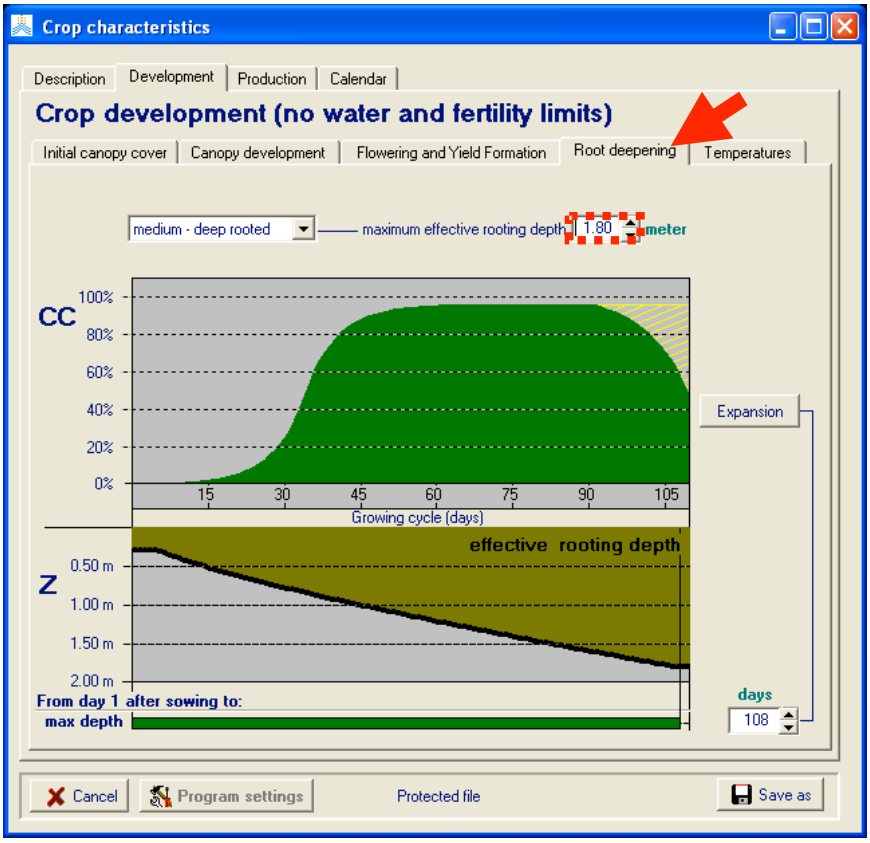
- In *Canopy Development*, modify time *From day 1 after sowing to Senescence* and *to Maturity* according to local observations of the specific crop variety [under non limiting conditions (no water stress, no fertility stress)](#).



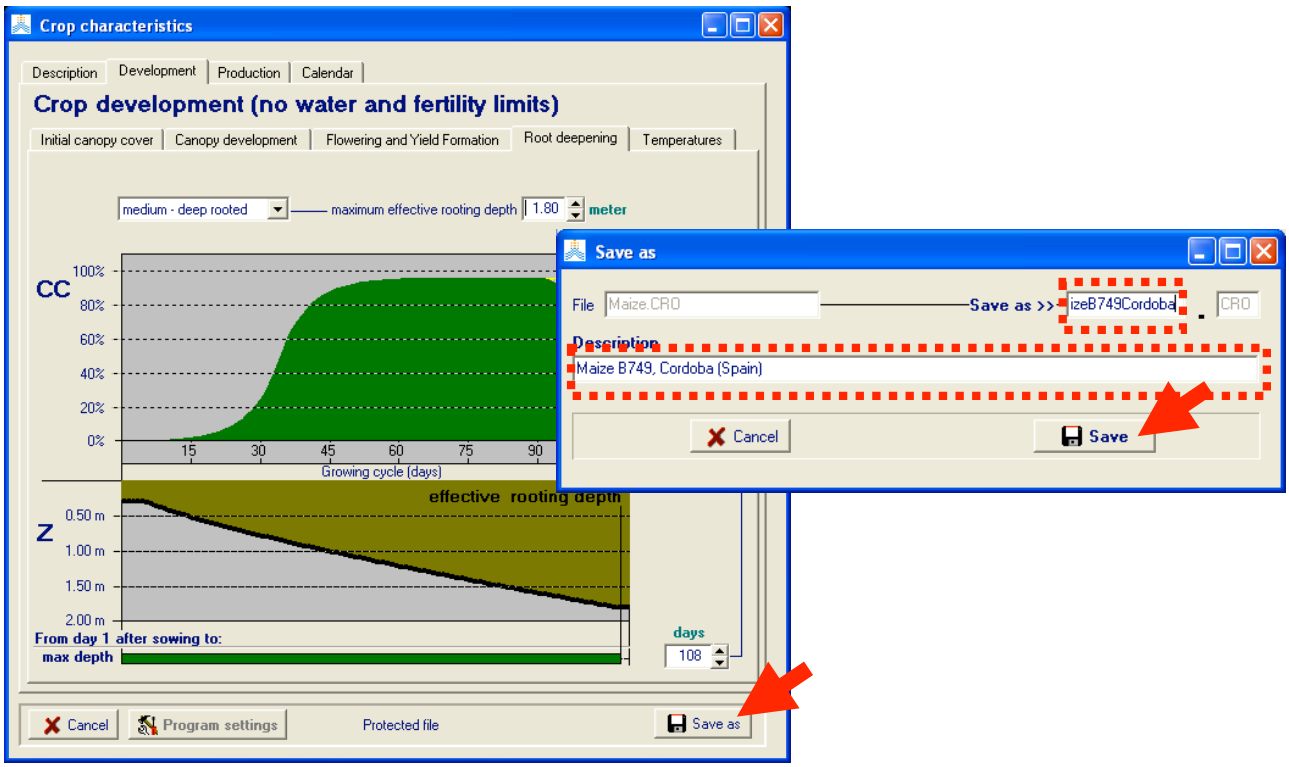
- In *Flowering and yield formation*, modify *From day 1 after sowing to Flowering* according to local observations of the specific crop variety under non limiting conditions (no water stress, no fertility stress).



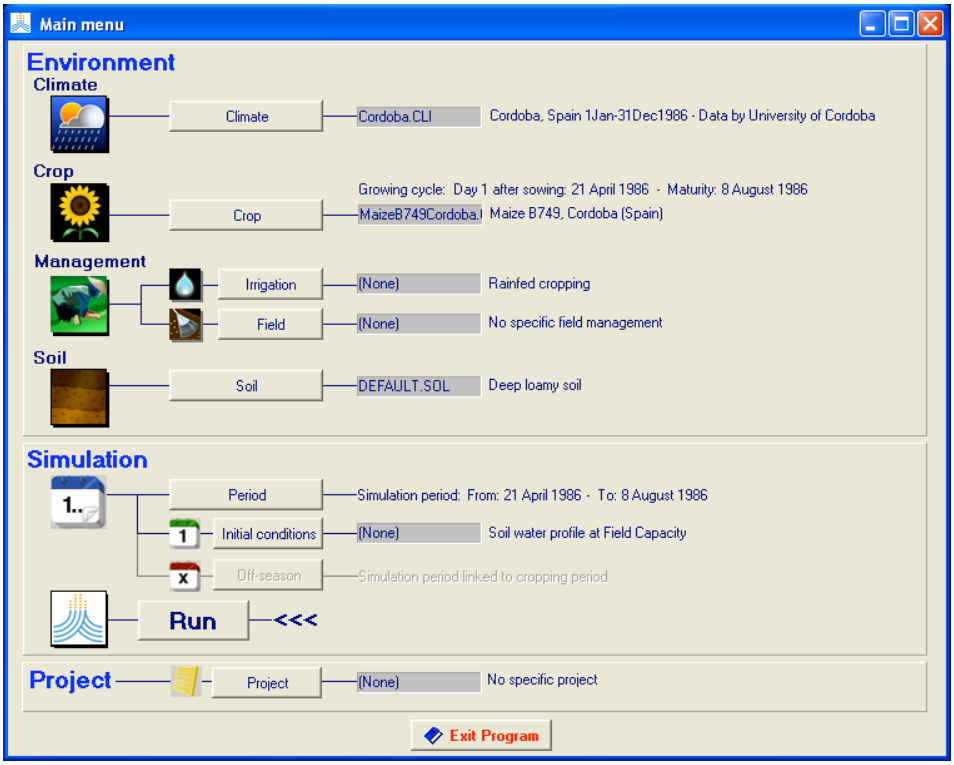
- In *Root deepening*, modify *Maximum effective rooting depth* according to local observations.



- *Save as*, provide *File name* and *Description* (optional), then *Save*.

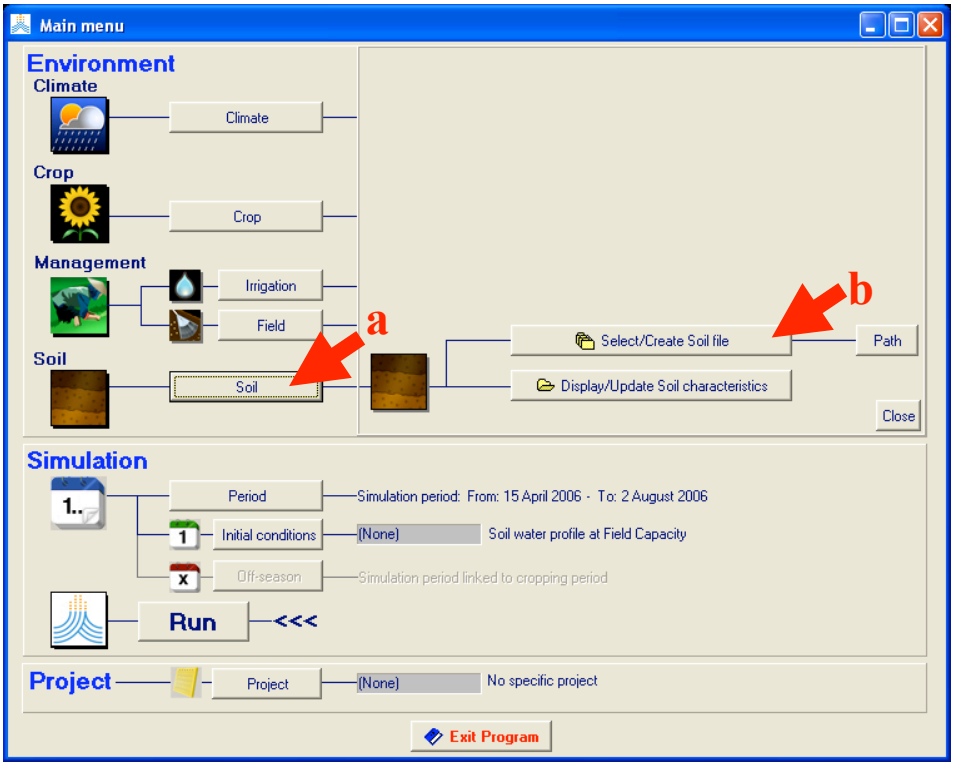


- The name of the newly created Crop file and the Growing cycle are displayed.

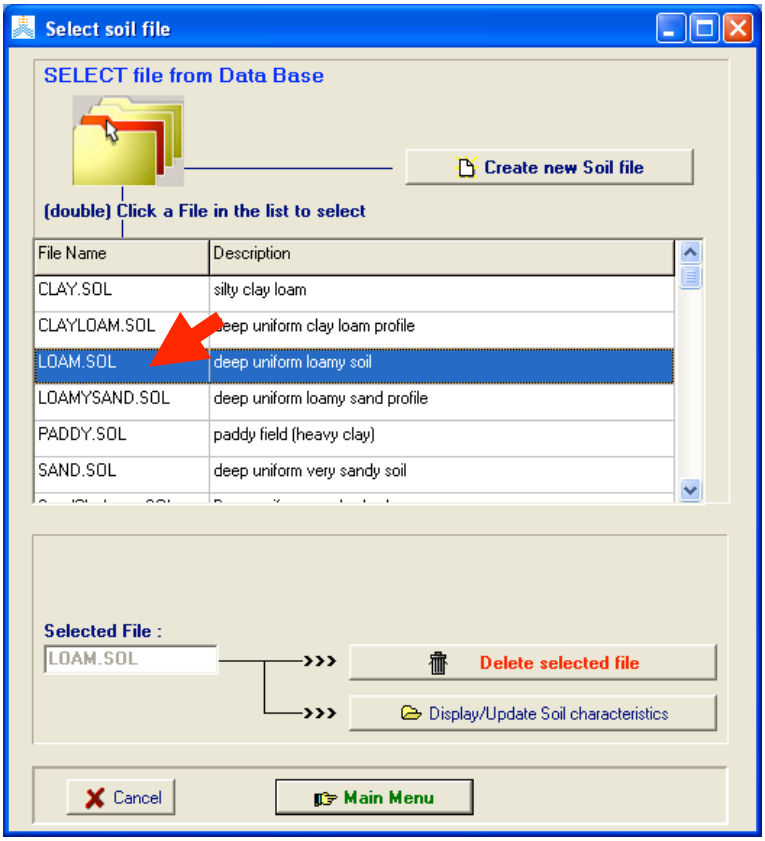


SOIL FILE

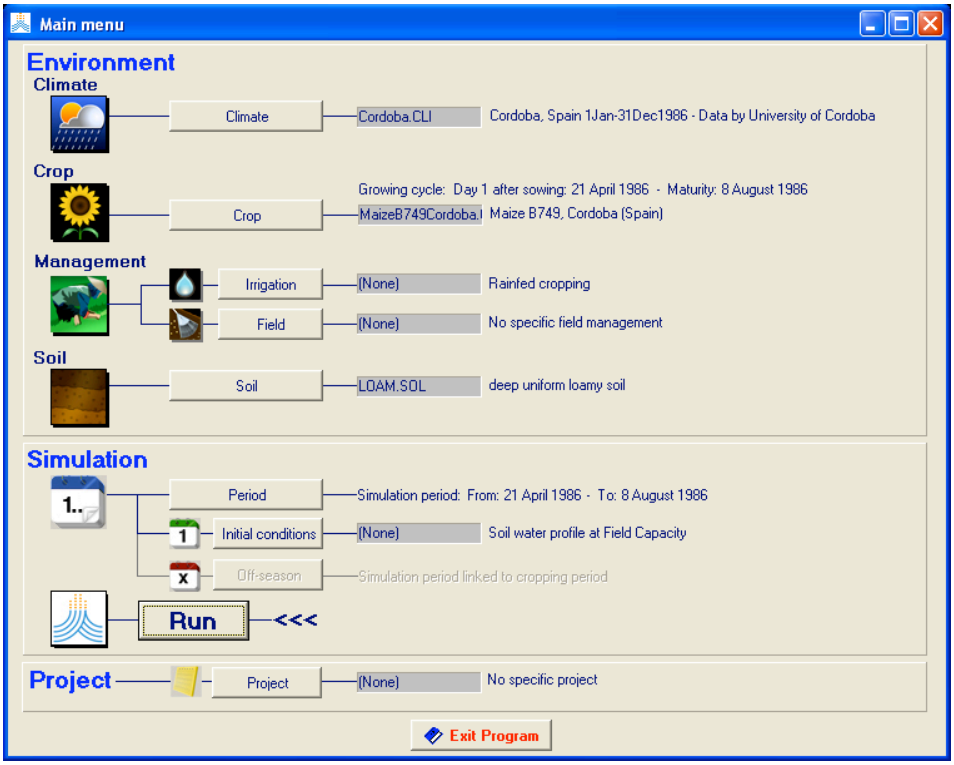
- In *Soil* (a), *Select/Create Soil file* (b).



- Select file from Data Base by double clicking on the file.

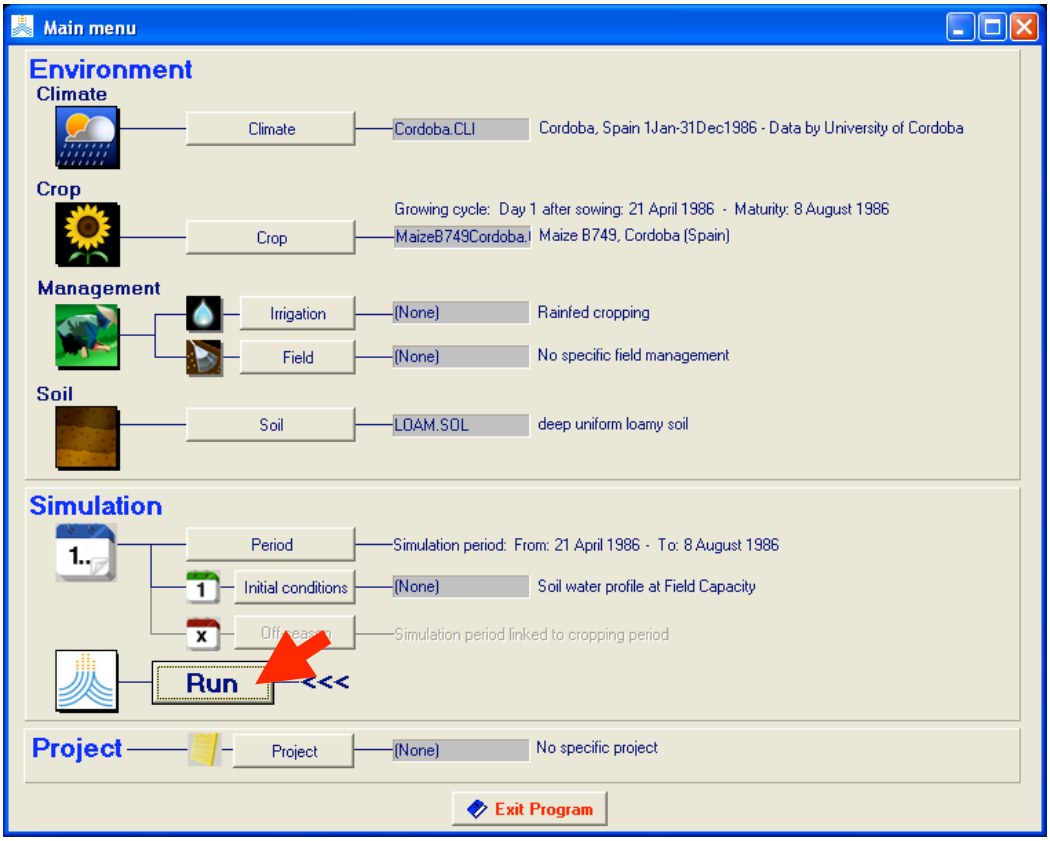


- The name of the selected Soil file is displayed.

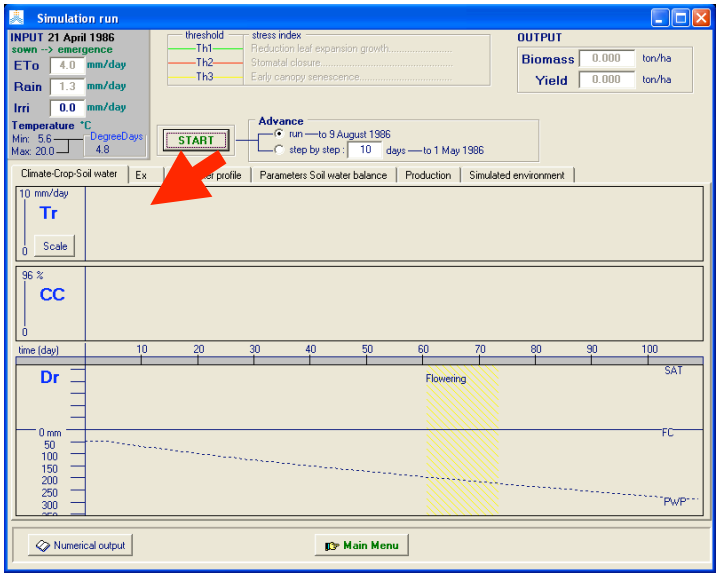


SIMULATION RUN AND INTERPRETATION OF RESULTS

- *Run* the Simulation.

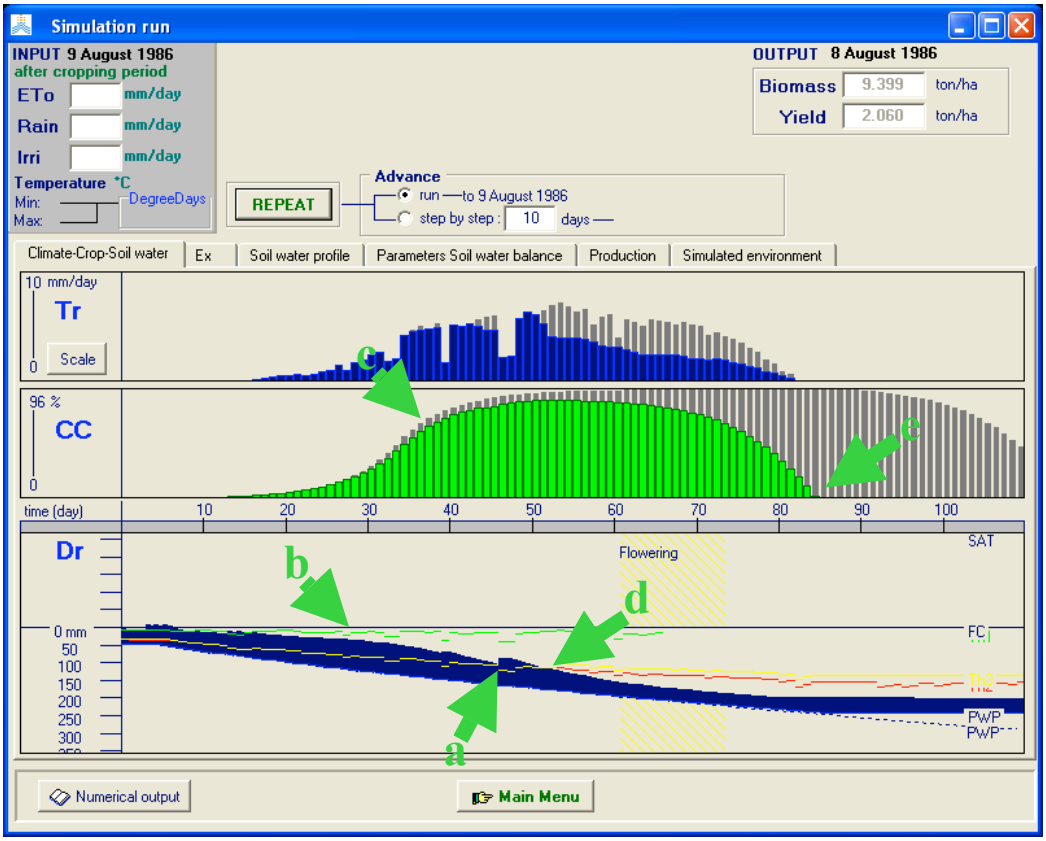


- *Start* the simulation run.



- AquaCrop simulates maize crop (variety B749) in Cordoba, Spain on a loamy soil. As no specific management has been selected, maize develops under rainfed conditions (no irrigation) and under full fertility (no fertility stress). As no Initial soil water content has been specified, soil profile on first day of the simulation is assumed at Field capacity.

- Soil water content decreases throughout the crop cycle due to water extraction through the maize root system. Sometimes, rainfall occurs and results in a (slight) increase in soil water content, i.e. around days after sowing 45 (a).
Due to soil water content lower than the upper threshold p(upper) for Canopy expansion during vegetative growth (represented by the green line, b), canopy cover is slightly reduced compared to non limiting water conditions (c).
Due to continuous water extraction, soil water content drops below the upper threshold p(upper) for Early canopy senescence (represented by the yellow line, d) around day after sowing 53. As a result, the canopy dries out earlier, being completely wilted at day 85 after sowing (e).



- Due to soil water content lower than the upper threshold p(upper) for Stomatal closure (represented by the red line, a), transpiration is reduced compared to non limiting water conditions starting from day after sowing 42 (b). Transpiration is zero from day after sowing 82 onward, as the crop has completely dried out (c).
Note that in maize the upper thresholds p(upper) for Stomatal closure (represented by the red line) and Early canopy senescence (represented by the yellow line) coincide, thus the yellow line overwrites the red line.
In the end of the cycle, above-ground dry biomass equals to 9.4 ton/ha, and yield is 2 ton/ha (d). Yield is lower than the maximum due to water stress.