

METEOROLOGICAL APPLICATIONS FOR AGRICULTURE

Summary on the IRRFIB model

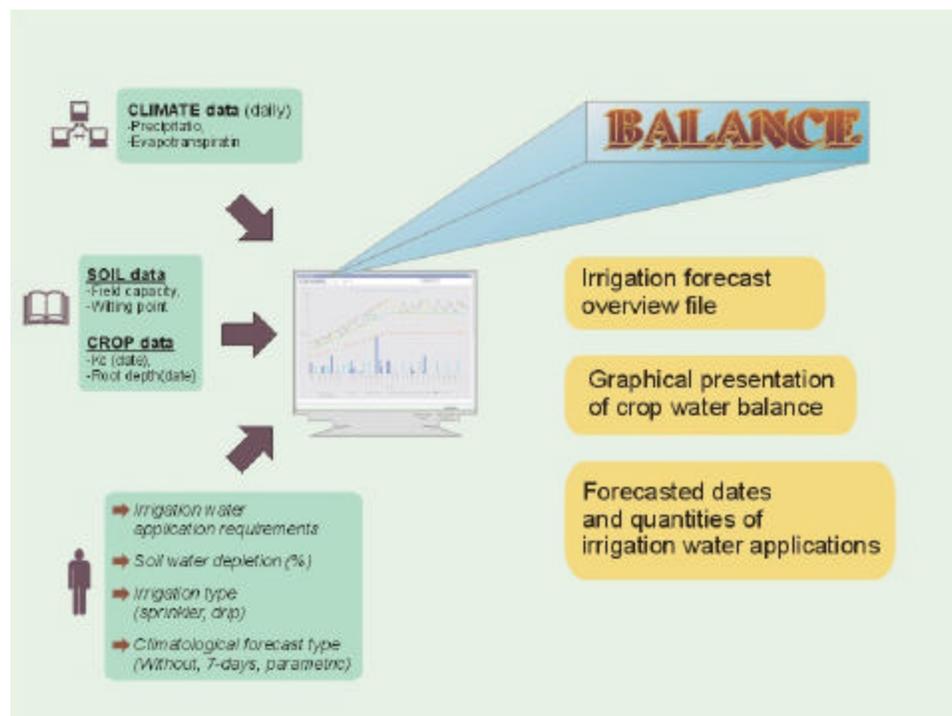
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General

Agrometeorological model IRRFIB was developed at AgMet Departement of Meteorological sector of Hydrometeorological Institute of Slovenia in 1984. It is in fact the computer model that gives the soil water balance and calculates the content of available water around rooting system. Together with the weather forecast parameters it estimates the soil water consumption for next three days.

System definition

Irrfib model simulates the water consumption by crops during their vegetation – growing and ripening season taking into account soil water characteristics, phenological phases of crops, rooting depth and naturally atmospheric conditions. Boundary conditions – soil water availability from saturation to defined depletion – are considered. The area covered by specific crop is limited by soil type, for surfaces containing different soil types the average of soil water characteristic is guiding the calculation of soil water balance. As the depth of ground water at irrigation fields in most cases is more than two meters, the capillary rise of it is not being computed. It would be better for more precise estimation of water uptake of the crop roots to include two soil layers instead of only one in Irrfib model.



Model input

Reference evapotranspiration (ET_0) is calculated daily according to Penman's method (FAO Drainage and Irrigation Paper No. 24).

Phenological dates and rooting depths of crops as well as crop coefficients are given in ASCII file – *crop.etp* , soil water characteristics – field capacity and wilting point - are ASCII file – *soil.etp* . Including measured daily precipitation daily water balance is obtained. Optional parameters can be included in the model:

- ?? synoptic weather parameters for future 3 to 7 days (air temperature, relative air humidity, sunshine duration and wind speed)
- ?? soil water depletion
- ?? type of irrigation
- ?? irrigation water requirements.

Model output

The model generates the crop-soil-water balance ranging from one day to whole vegetation period. Data obtained can be given as tables including time increments or entire vegetation period or graphically presented curves of soil water content for irrigated and non irrigated crops. Different degrees of plant water stress for crops can be observed on the graph when crops are not irrigated. The additional curve of irrigation water applications is generated when for a specific crop the maximum application rate of water for the predefined irrigation system is given (it depends on irrigation system applied and naturally on soil water infiltration rate).

The model gives the near future irrigation needs up to seven days, when including forecasted weather parameters. In the case of weather forecast with precipitation sufficient to replenish the soil water reservoir throughout the crop rooting depth the irrigation can be cancelled.

The export files can be directly used for irrigation system design and for calculations of water volumes for irrigation reservoirs which are for fruit and vegetable producers on small plots quite common.