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CROP
MODELING

Problem solving Challenge

The **challenge** is how to design deficit irrigation schedule for crop production under extreme water scarcity.

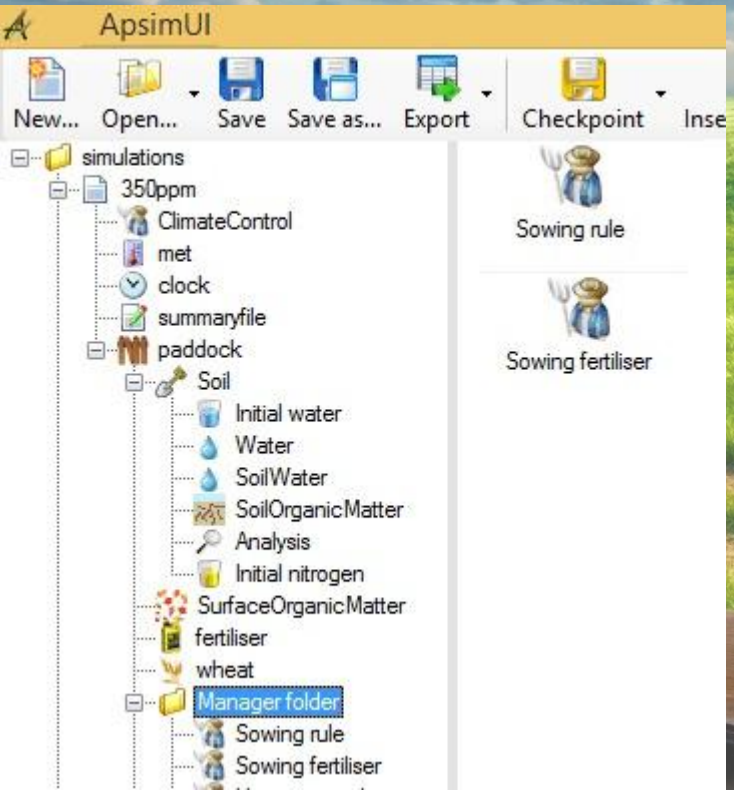
CASE STUDY

As case study, we tried to design a deficit irrigation schedule for tomato in Tunis by considering to have an availability of only **300 mm** of water for irrigation. In this situation, a certain level of plant water stress is unavoidable. In this respect, deficit irrigation has the aim to minimize the expected stress.

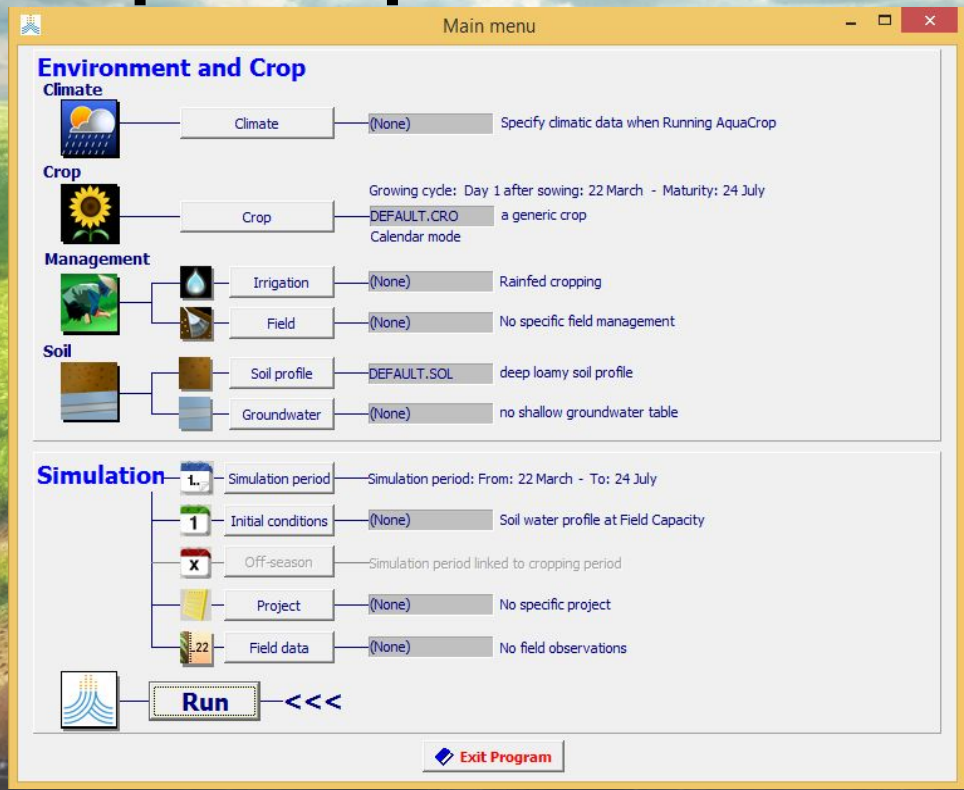
So it is necessary to identify the less sensitive phases in the crop development during which it is possible to stress the plant without damages, while applying the available water during the critical phases.

Crop Models

APSIM

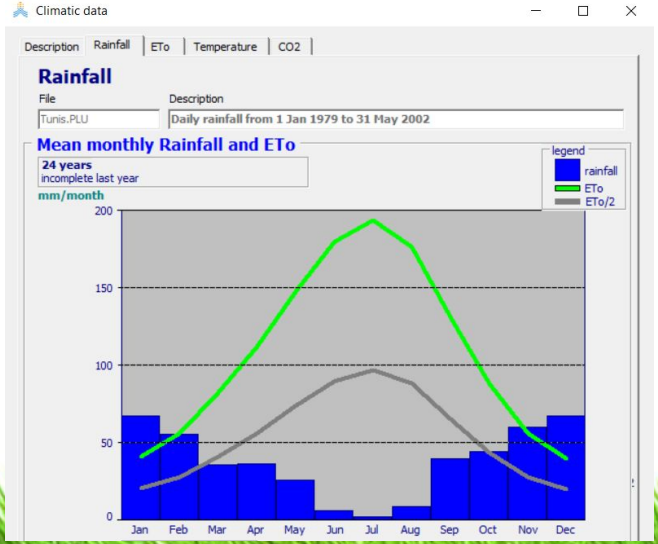


AquaCrop

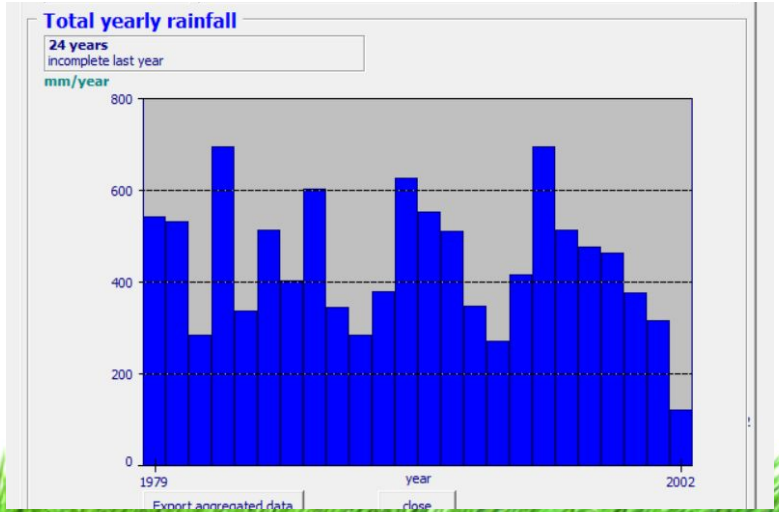


Tunis Weather Data - Rainfall

Per month (1979-2002 avg.)



Yearly variation

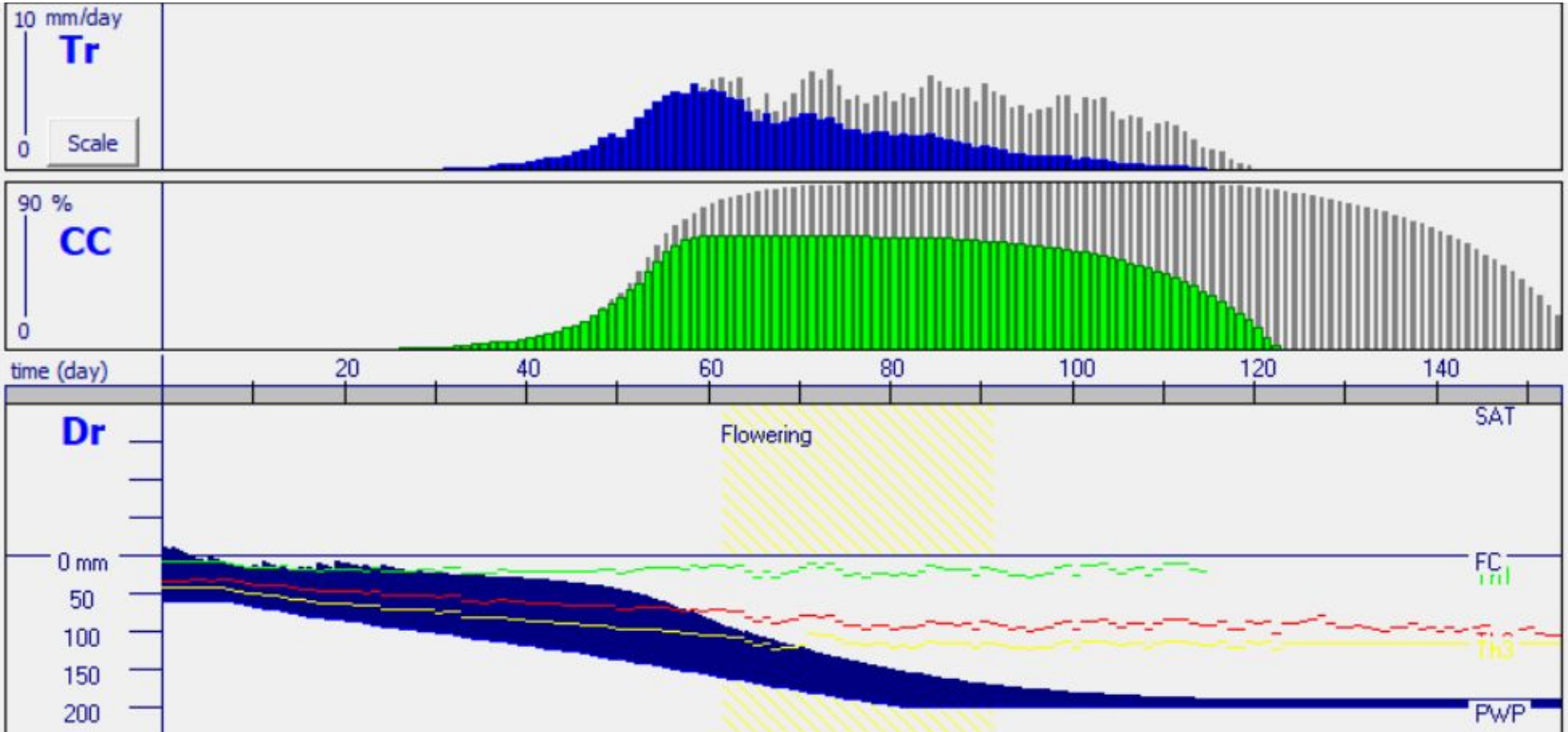


→ AquaCrop

Irrigation Schedules

- Without irrigation (0 mm)
- Good/high irrigation → potential production
- Optimized deficit irrigation (300 mm limit)

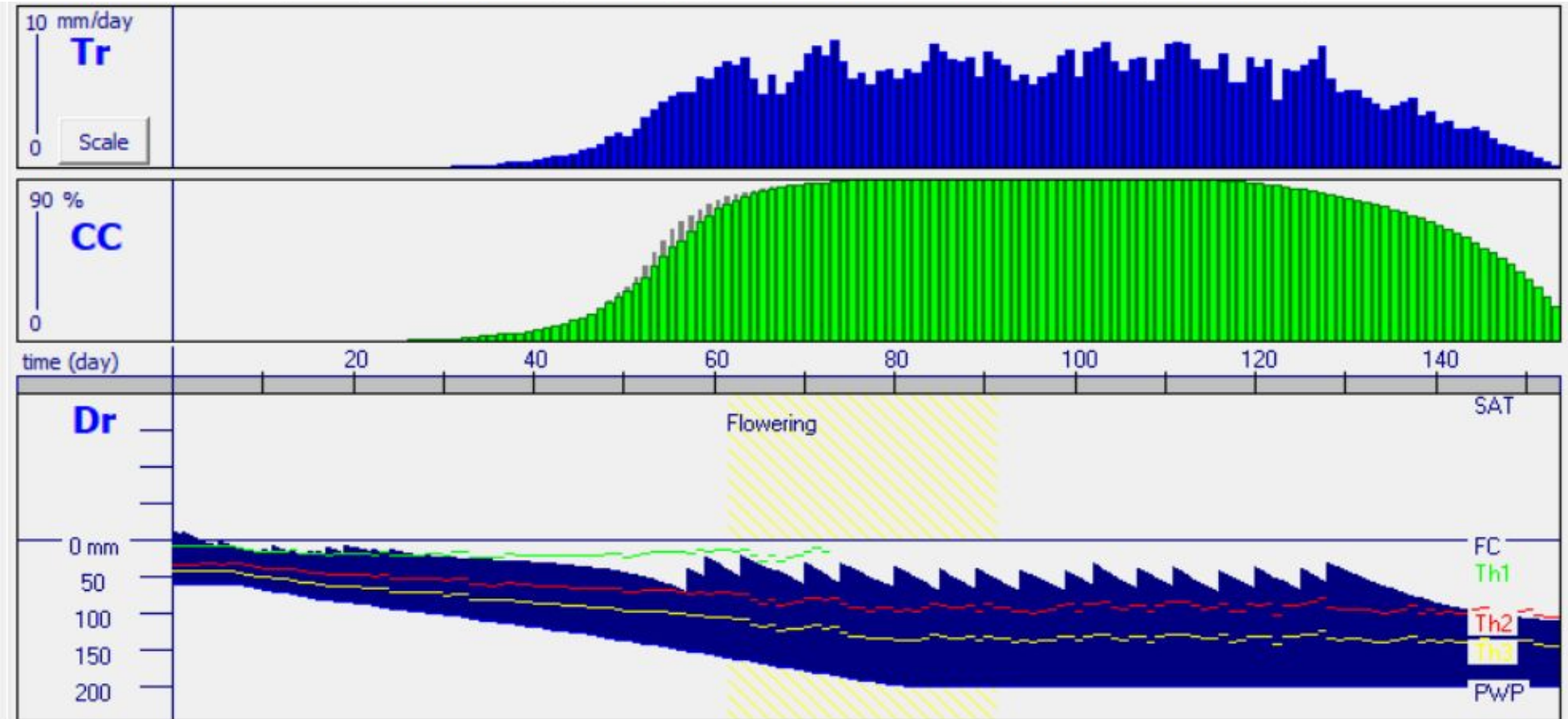
Without irrigation



High irrigation

Days after planting	Stage	Threshold	Irrigation [mm]
1-60	Vegetative growth	Stomata closure	30
60-130	Flowering	Above stomata closure	30
130+	End of ripening	-	0

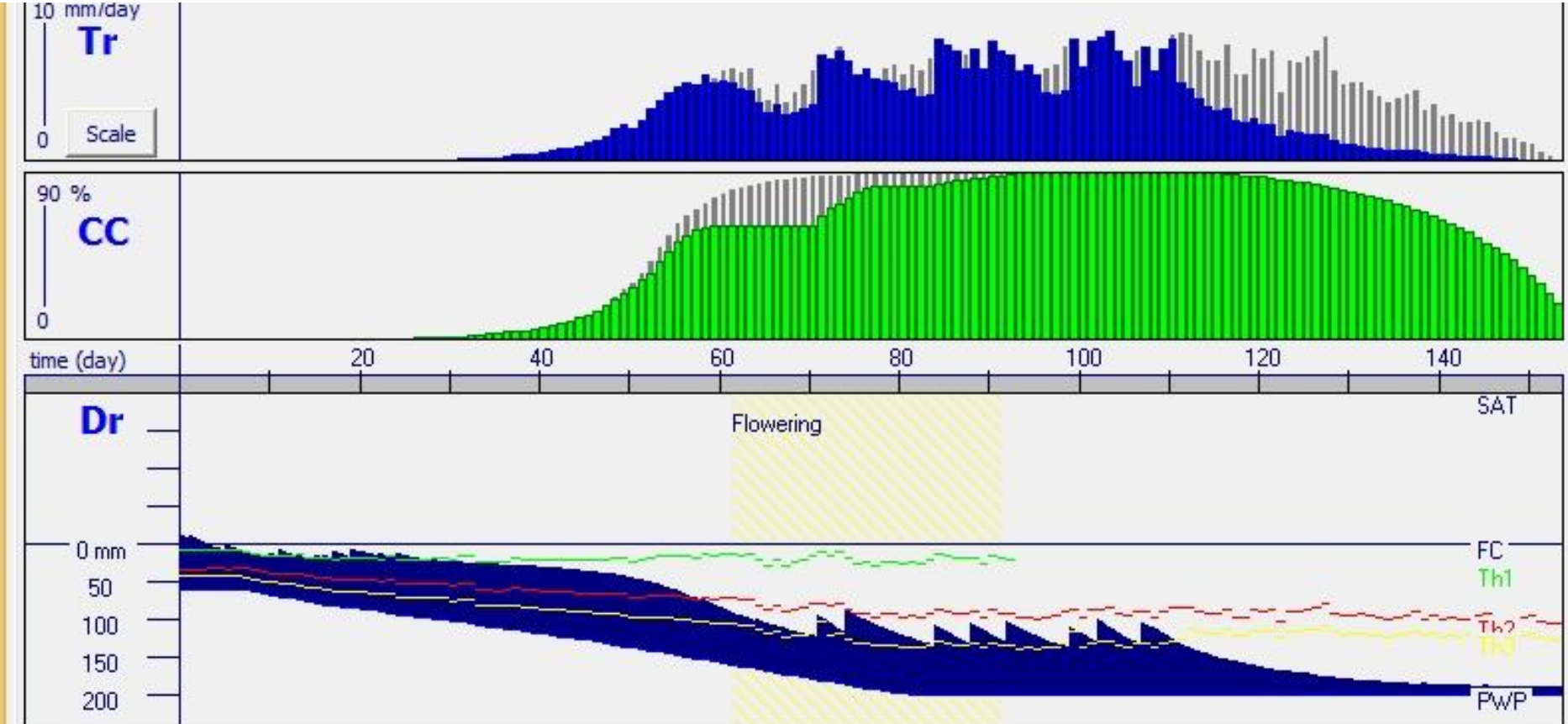
High irrigation



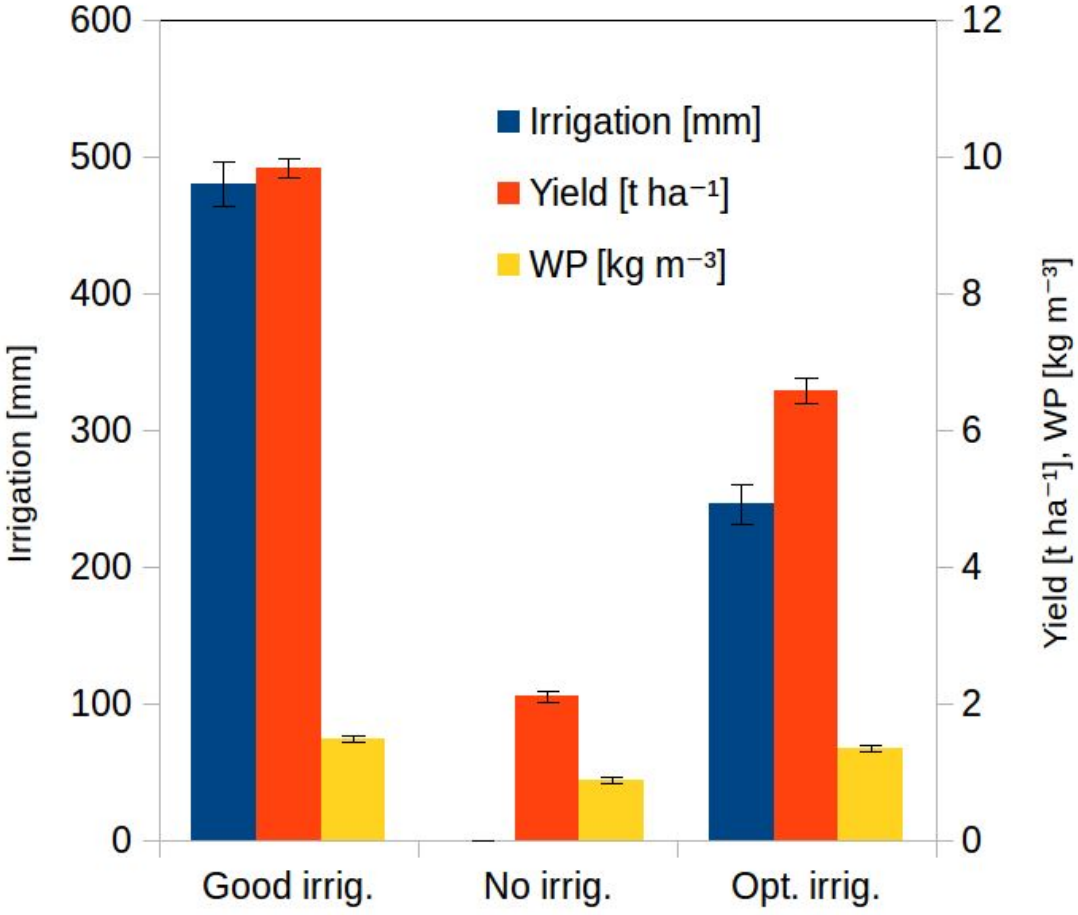
Optimized Deficit Irrigation

Days after planting	Stage	Threshold	Irrigation [mm]
1-65	Vegetative growth	**Far below canopy senescence**	30
65-110	Flowering	**Below canopy senescence**	30
110+	End of ripening	-	0

Optimized Deficit Irrigation



Results

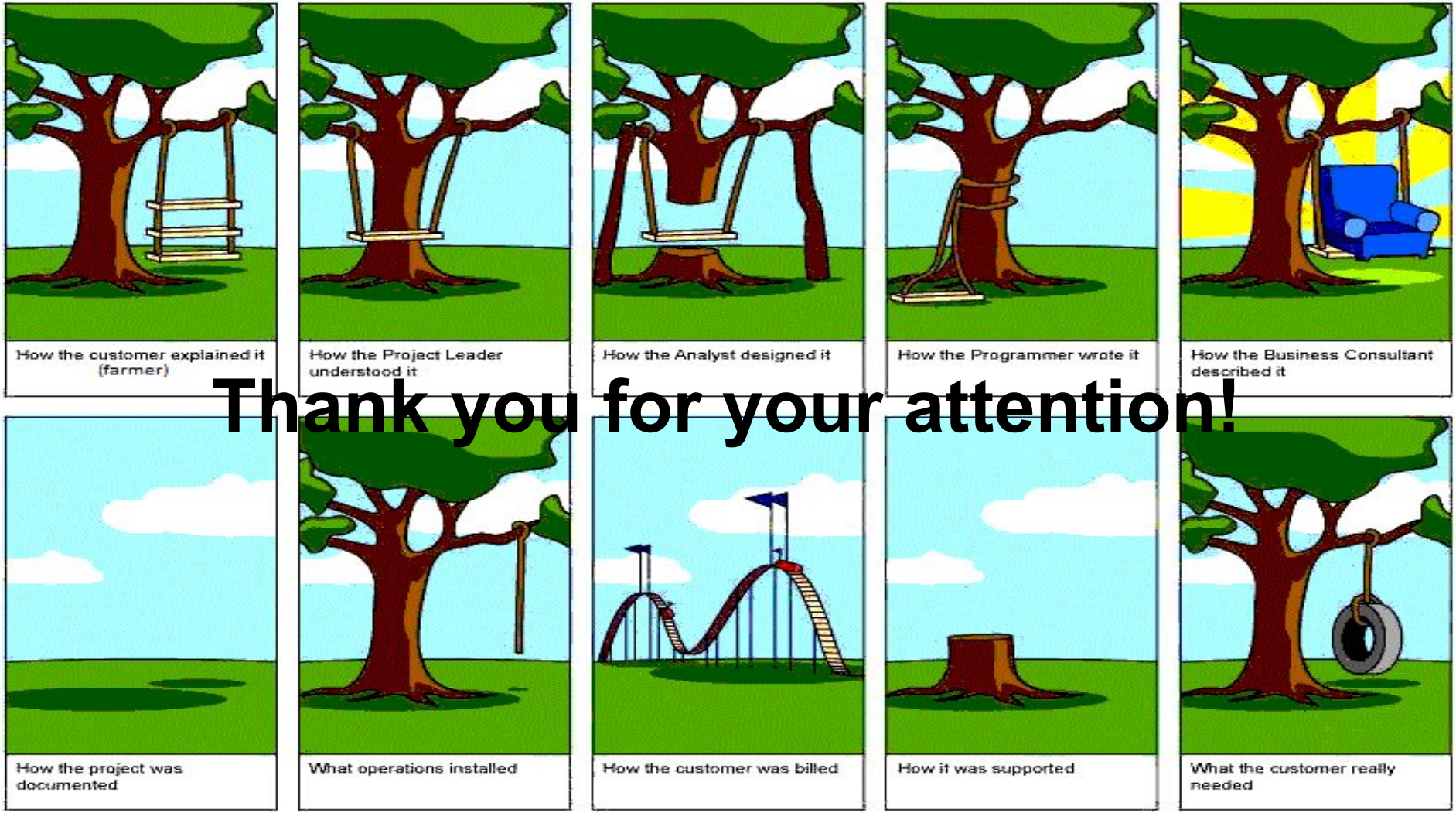


Optimized deficit irrigation compared to good irrigation:

- -30% yield
- -50% irrigation water

CONCLUSIONS

The AQUACROP model is a useful tool to design deficit irrigation schedules to optimize **irrigation water use**, **yield** and **water productivity** levels under different scenarios.



Thank you for your attention!