### Modeling crop water productivity

#### A quick intro & quiz



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29-Mar-2017, Wageningen, Netherlands



Research and consultancy for a sustainable future of our water resources

# AquaCrop







# AquaCrop

- Developed by scientists attached to FAO
- Balance between simplicity and accuracy
- Relatively small number of explicit parameters
- Many herbaceous annual crops are included
- User interface for practicioners









# **Training program experts Armenia 2016**

- > National Communications on Climate Change UNFCC
- > 15 specialists from different ministries



## **Underlying concepts**





## **AquaCrop Conceptual Framework**







#### AquaCrop Conceptual Framework | Crop





# **Canopy cover development**

 $CC = \frac{soil \ surface \ covered \ by \ the \ green \ canopy}{covered \ by \ the \ green \ canopy}$ 

#### unit ground surface area













# **Canopy cover development**





### THE CROP WATER PRODUCTIVITY QUIZ

# The baseline

- > Tunis
- > Meditterranean climate, 400 mm rainfall
- > Wheat
- > One single average year (1989)



Display of climate characteristics		_ 🗆
Description Rainfall ETo Temperature	e   CO2	
Reference evapotransp   File Description   Tunis.ETo Tunis (Tunisia)	oiration (ETo)	cember 2002
Total yearly ETo 24 years		
mm/year 1500 1125 750 375		
0 1979	year	2002

# The quiz

- > Simulate wheat growth, yield and water productivity for one single season.
- > Assess a few scenarios, but before we run the scenarios in the model: you as experts will give an estimate of expected change
- > Current climate vs future climate



# **Scenarios – current climate**

#### > Scen0: Baseline, wheat, Tunis:

- Near optimal soil fertility
- No irrigation
- Soil fully wetted start of season
- > Scen1: optimal fertilizer applications
- > Scen2: optimal irrigation applications
- > Scen3: optimal fertilizer and irrigation









# **Scenarios – future climate**

- > Scen4: 2090s:
  - + 2ºC
  - - 15% rainfall
  - Agricultural practices: as in current climate (fertility, irrigation, etc)
- > Scen5: optimal fertilizer applications
- > Scen6: optimal irrigation applications
- > Scen7: optimal fertilizer and irrigation applications





# **Other possible adaptation scenarios**

- > Enhanced crop varieties
- > Changes in timing of sowing, harvesting, etc
- > Terracing to reduce runoff
- > Mulching to reduce evaporation
- > Deficit irrigation practices
- > Etc..







### But for a robust future impact assessment:

- > Multiple years
- > Multiple combination of soils, degradation levels
- > Multiple crops
- > Different regions
- > Different practices
- > And of course multiple climate change projections...







### **Thank You**



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