FINAL MEETING OF THE SECUREFOOD2050 PROJECT

"Sustainable wastewater treatments and non-conventional irrigation of horticultural products obtained through precision agriculture techniques: the experience of the European Project SECUREFOOD2050"

6th March 2025 – Campus of Sesto Fiorentino, University of Florence Complex "Enrica Calabresi", Via Edoardo Detti Classroom D4

Chairman: Stefano Biricolti – University of Florence

08.30 – 09.00: Registration

09.00 – 09.20: Institutional greetings
Stefano Menichetti – Dean of the Department of Chemistry (DICUS), University of Florence
Simone Orlandini – Dean of the Department of Agriculture and Environment (DAGRI), University of Florence

09.20 – 10.40: Scientific Session 1
09.20 – Massimo Del Bubba (University of Florence, Italy, Project Coordinator). "The SECUREFOOD2050 Project: from objectives to results".
09.40 – Michelangelo Fichera (University of Florence, Italy). "Biochar from sewage sludge for wastewater treatment as a sustainable and circular win-win solution".
10.00 – Federico Sinigaglia (University of Florence, Italy). "Constructed wetlands integrated with biochar for the production of irrigation water".
10.20 – Edgardo Giordani (University of Florence, Italy). "Soilless cultivation in biochar enriched substrate irrigated with wastewaters".

10.40 – 11.10: Coffee break

11.10 – 12.50: Scientific Session 2
11.10 – Lorenzo Bini (University of Florence, Italy). "Aeroponic production of crops with treated wastewaters: the case study of rocket"
11.30 – Maria Concetta Bruzzoniti (University of Turin, Italy). "Food safety and quality of crops irrigated with treated wastewaters".
11.50 – Cédric Magain (University of Liege, Belgium). "Assessment of AquaCrop for irrigation optimization in potted plant trials".
12.10 – Helmy El-Zanfaly (National Research Centre of Cairo, Egypt). "Modification of septic tanks as simple low-cost wastewater treatment for agriculture irrigation"
12.30 – Helmy El-Zanfaly (National Research Centre of Cairo, Egypt). "Design and application of simple, low-cost reactor for biochar production from agricultural residues".

12.50 – 14.00: Lunch

14.30 – 15.50: Scientific Session 3

14.30 – Houria Ryah (Cadi Ayyad University, Morocco). “Reuse of treated wastewater for irrigation of rocket and tomato growing in soil amended by wood biochar: plants agronomic and physiological aspects”.
14.50 – Firous Oukhey (Cadi Ayyad University, Morocco). “First results of using treated wastewater for rocket (*Eruca sativa*) cultivation in a wick hydroponic system”.
15.10 – Sofiane El Barkaoui (Cadi Ayyad University, Morocco). “Biochar Applications for Wastewater Treatment”
15.30 – Zahra Azzouz (Bejaia University, Algeria). “Statistical Analysis of a Consumer Survey: Evaluating Social Acceptability of Wastewater Reuse for Irrigation in Bejaia."

15.50 – 16.10: Coffee break

16.10 – 17.10: Round Table and final remarks

Assessment of AquaCrop for irrigation optimization in potted plant trials

Sustainable wastewater treatments and non-conventional irrigation of horticultural products obtained through precision agriculture techniques: the experience of the European Project SECUREFOOD2050

Cédric MAGAIN & Joost WELLENS

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...| Today

- objectives -

1. Validate the irrigation trials system setup
2. Adapt AquaCrop to potted plants: develop optimal irrigation calendars

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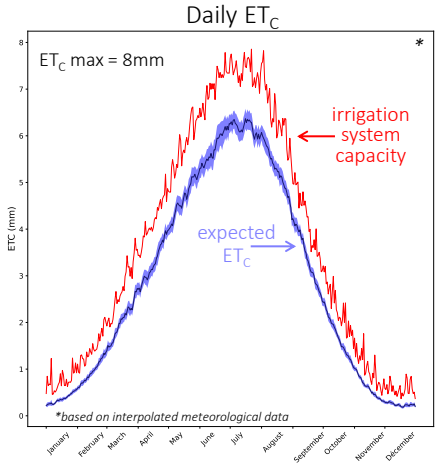
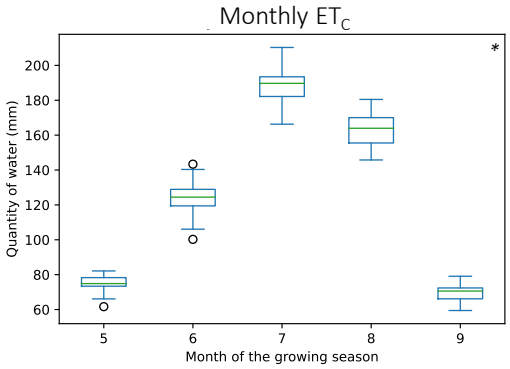
1.1| Irrigation system setup

- authoritative ET_C -





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1.2| Irrigation system setup

- ET_C based irrigation scheduling -

Daily ET_C (mm/day)

Month	April					May				June				July					August				September					October			
Week	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
Tomato				2	2	2	2	3	3	3	4	5	5	6	6	6	6	6	6	5	5	4	4	3	3	2					
Strawberry	1	1	2	3	3	3	3	4	4	4	4	4	5	5	4	4	4	4	4	4											
Lettuce	2	2	2	2	3	3	4	4	4	5	5	5	5																		
Olive				2	2	2	3	3	3	3	3	3	4	4	4	4	4	4	3	3	3	3	2	2	2	2	1	1	1	1	1

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1.3| Irrigation system setup

- check-up -

- Irrigation system able to deliver the maximum amount of water (worst case scenario)
- Rough idea of the water requirements
- Meteorological data from an on-site station

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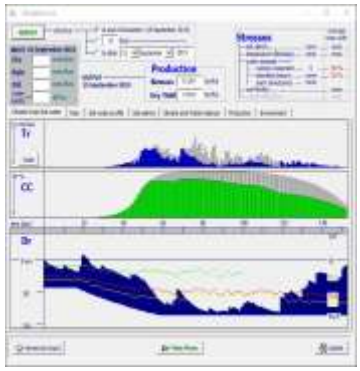
2.1| What is AquaCrop ?

- click & play … -



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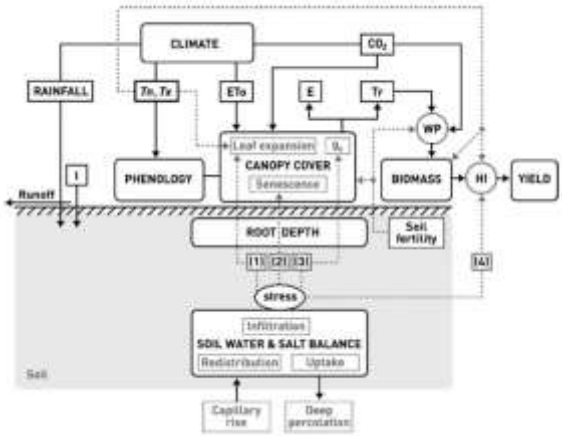
2.2| What is AquaCrop ?

- … under the hood -

B = WP · ΣTr or Biomass = Water productivity · Sum of transpiration

Y = HI · B or Yield = Harvest index · Biomass

simple & solid



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3.1| AquaCrop & potted plants

- assumptions -

- Specific to potted culture:
  - plant density
  - no runoff
  - rooting depth
  - soil depth
- Specific to *SecureFood* trials:
  - soil hydraulic properties
  - saturated hydraulic conductivity (*Ksat*)
  - solar radiation

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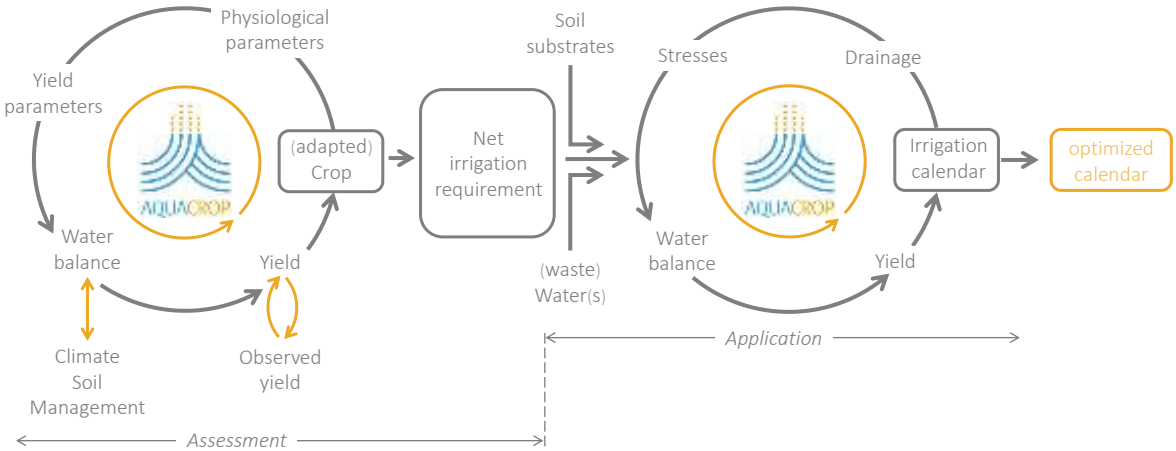
3.2| AquaCrop & potted plants

- methodology -



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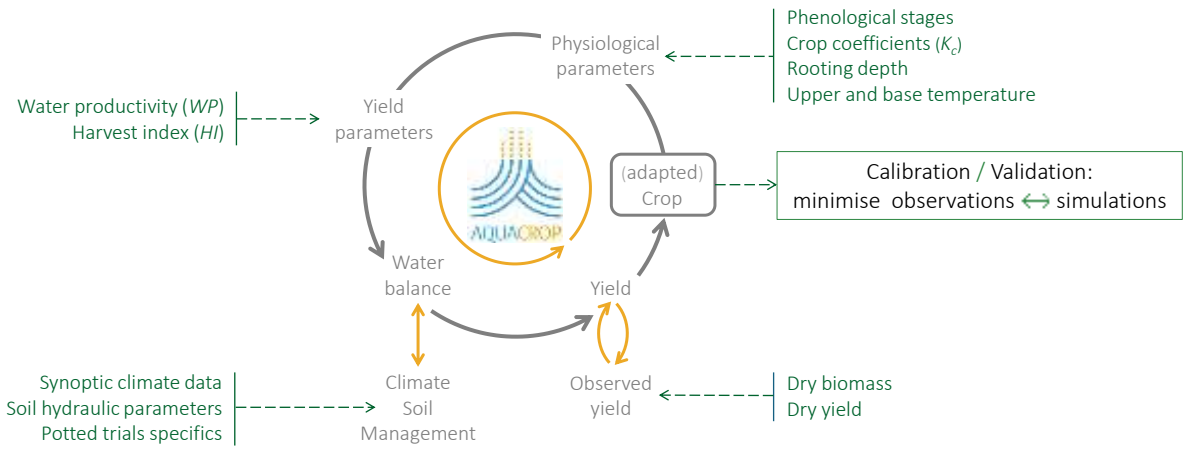
3.3| Adapting & creating crops

- literature & trials -



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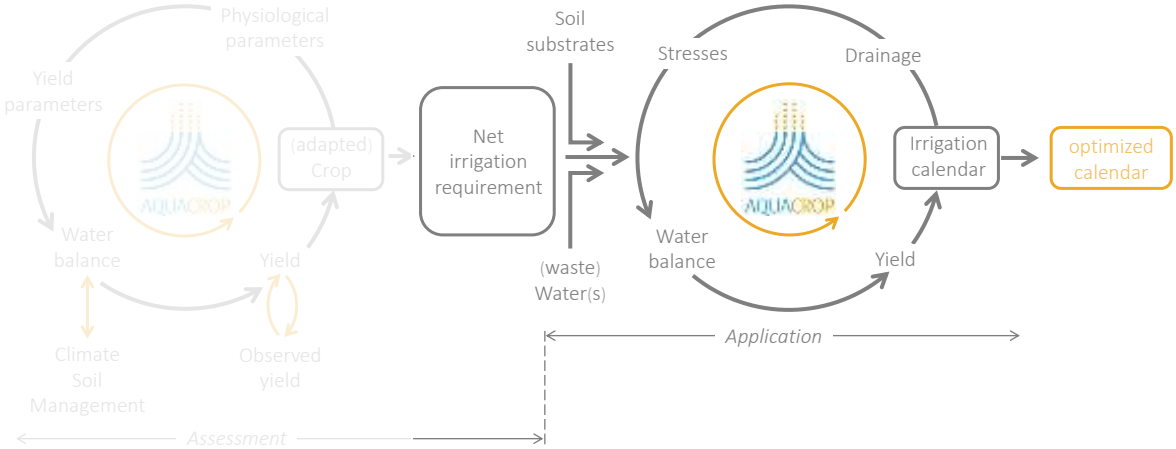
3.4| AquaCrop & potted plants

- optimized calendar -



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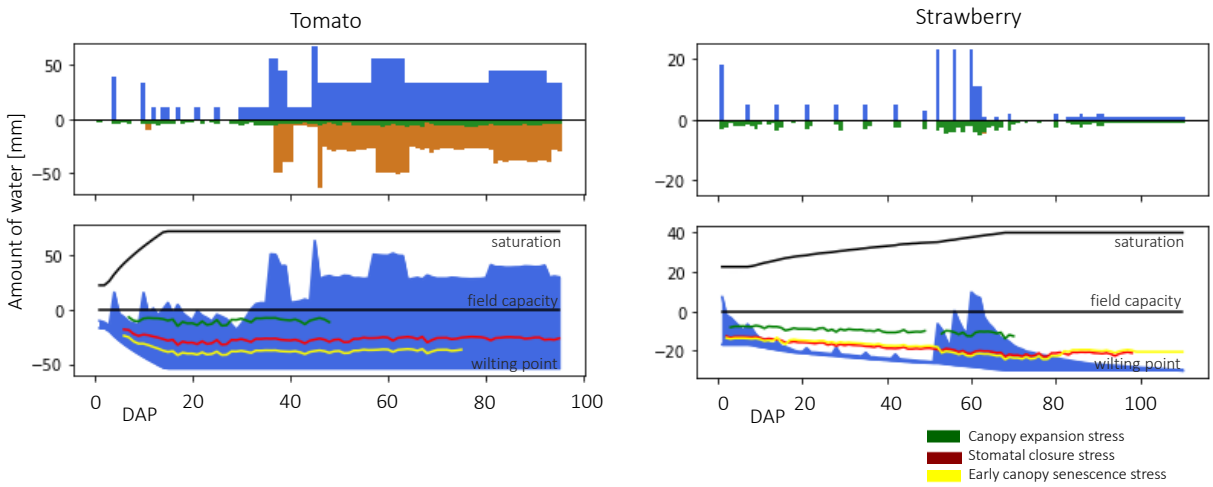
4| Irrigation scheduling

- applied irrigation -



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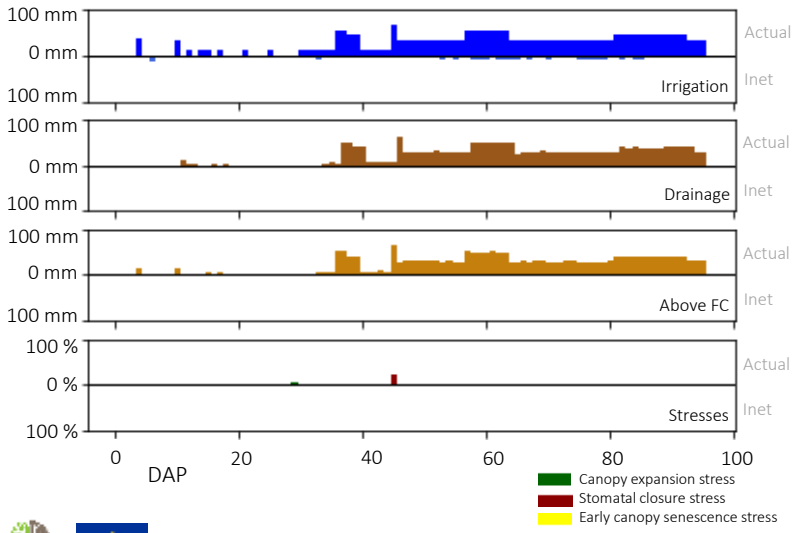
5.1| Potted tomato

- optimized irrigation: actual vs net irrigation -



	Actual	Inet
Irrigation [mm]	2 515	477
Drainage [mm]	1 986	0
Dry yield [t/ha]	5.4	5.4

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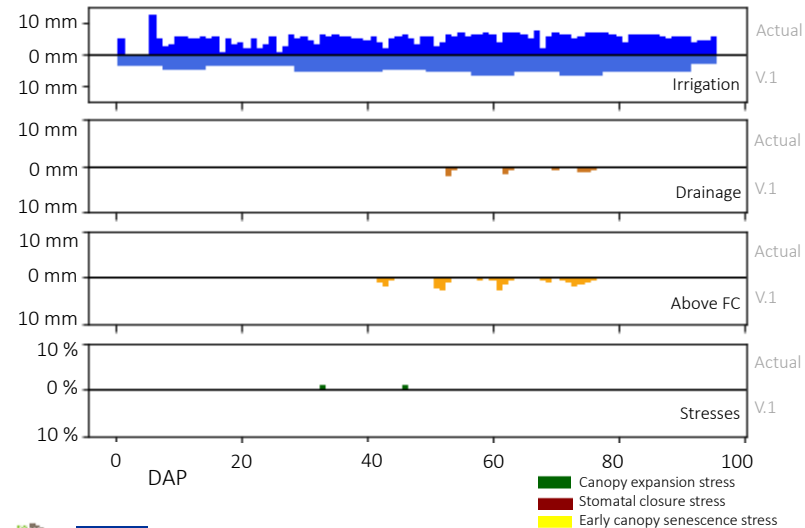
5.2| Potted tomato

- optimized irrigation v.1 -



	Inet	Optimized v.1
Irrigation [mm]	477	516
Drainage [mm]	0	16
Dry yield [t/ha]	5.4	5.4

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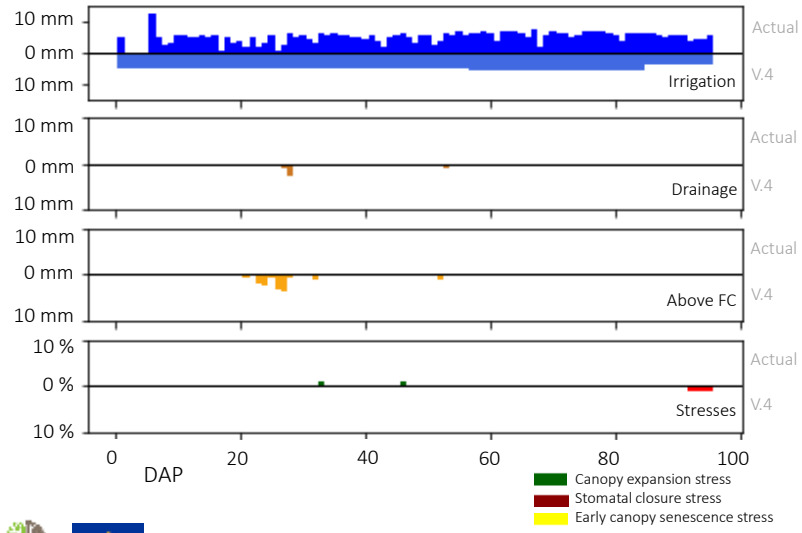
5.3| Potted tomato

- optimized irrigation v.4 -



	Inet	Optimized v.4
Irrigation [mm]	477	492
Drainage [mm]	0	6
Dry yield [t/ha]	5.4	5.4

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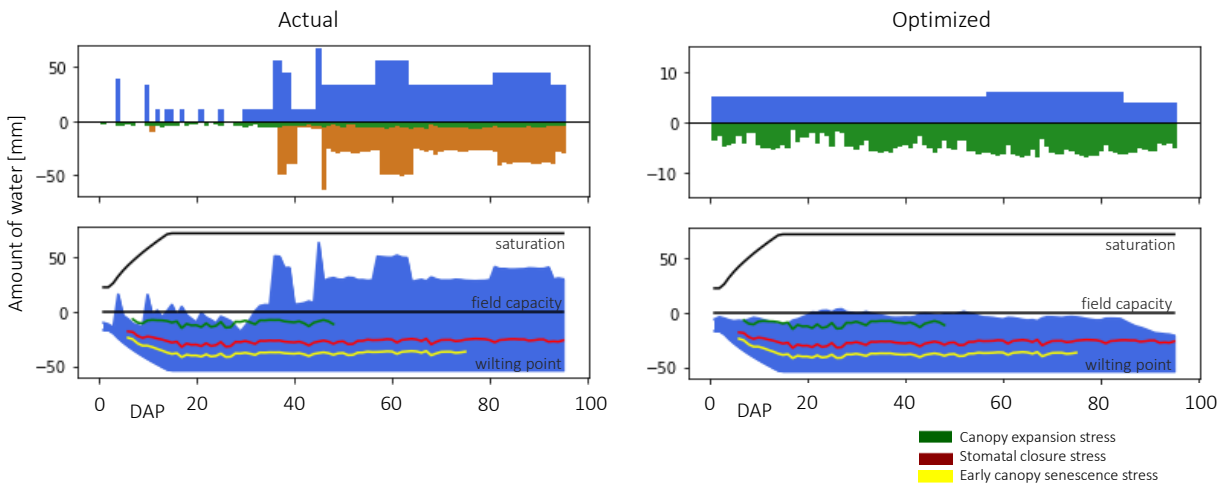
5.4| Potted tomato

- irrigation comparison -



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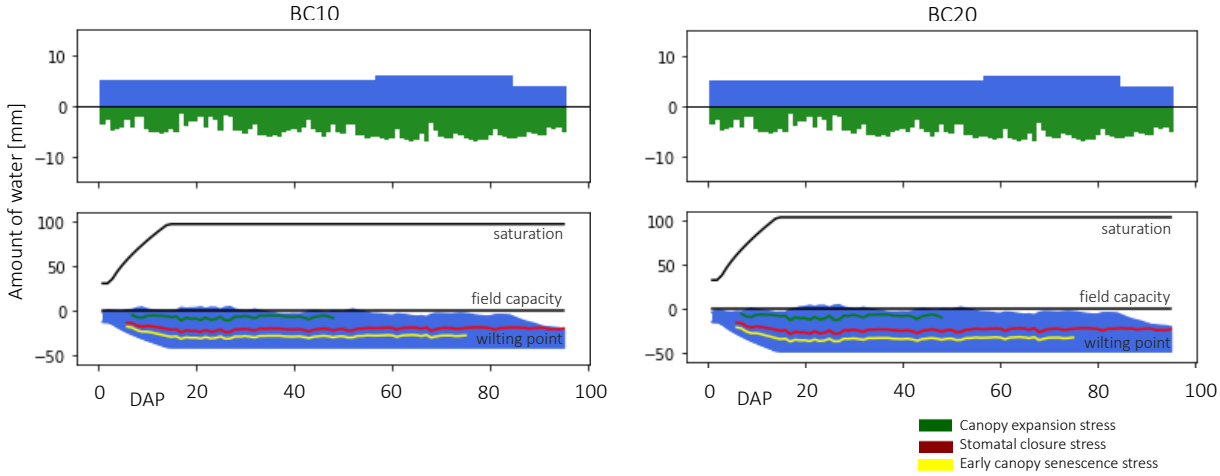
6| Substrates

- soil(less) -



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7| AquaCrop and potted plants

- optimized irrigation calendars -

Tomato irrigation calendar for **BC0**, **BC10** & **BC20** :

Month	April	May				June				July				
Week	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Daily dose (mm)	5								6				4	

Strawberry irrigation calendar for **BC0**, **BC10** & **BC20** :

Month	March				April					May				June			
Week	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Daily dose (mm)	3									4							

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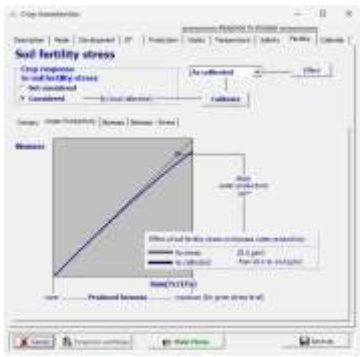
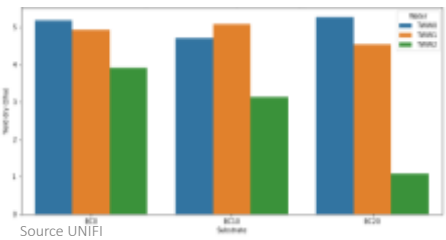
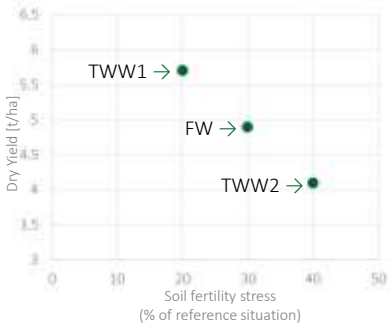
8| Water & soil fertility

- perspectives -







≠ WP → = Inet !
→ ≠ Yields !!

…

- more observations !
- interactions water & substrates ?

Pot observations ← ? → AquaCrop

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Thank you for listening!

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