# Supplementary Materials: Impacts of Climate Change and Adaptation Strategies for Rainfed Barley Production in the Almeria Province, Spain
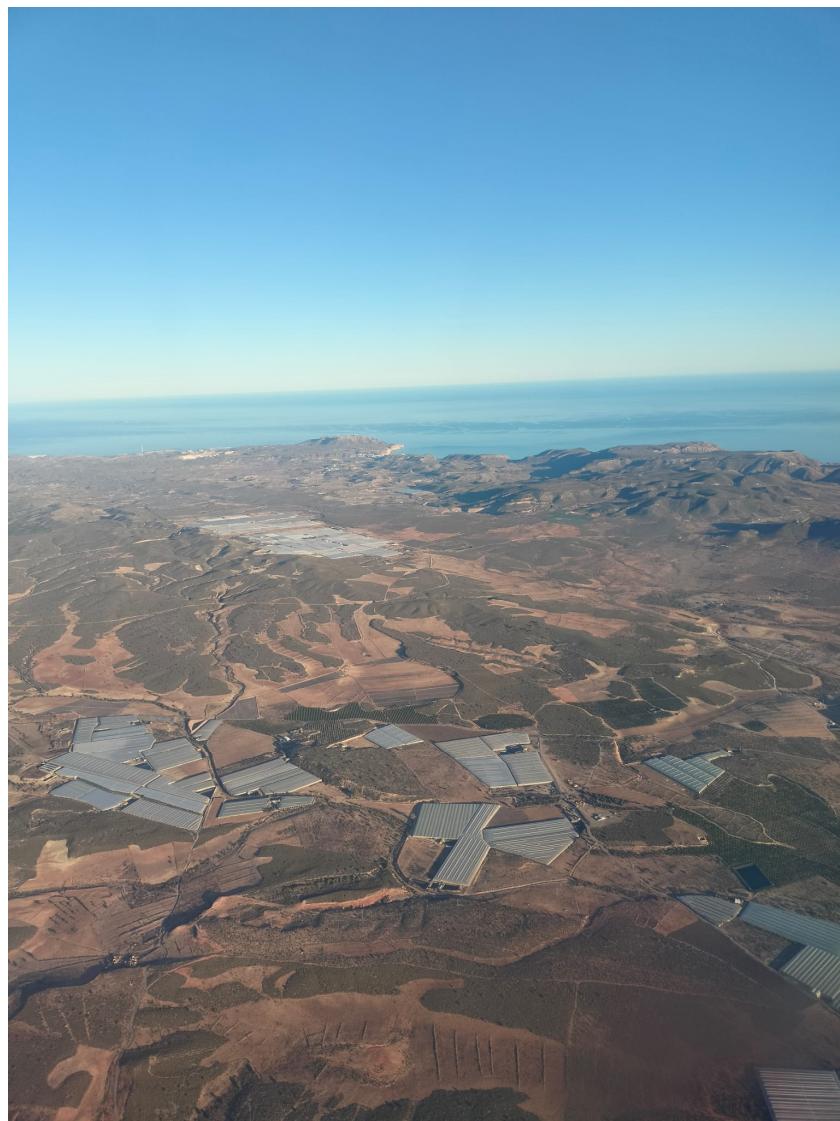
Figure S1. Aerial picture of Almería's landscape (own photograph taken in January 2024.
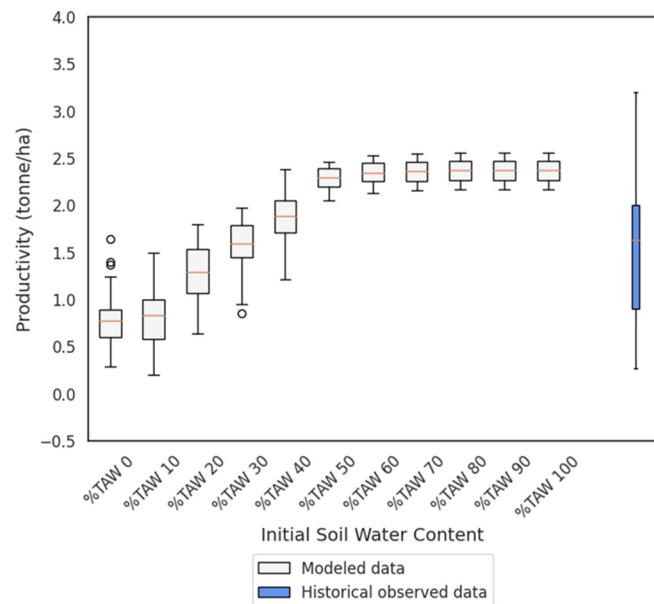
Figure S2. AquaCrop-OSPy rainfed barley productivity simulation results for the baseline period with different Initial Soil Water Contents, compared to the historical observed dataset. Each box represents the middle 50% of the values within each resulting dataset, the orange line indicates the median, and the circles indicate the outliers.

Table S1. P-values for the Pearson and Spearman correlation coefficient between the historical observed dataset and the modelled runs obtained with different rolling average windows. Bold values indicate significant correlation (p-value lower than 0.05).

Rolling Average Window	Pearson correlation coefficient			Spearman correlation coefficient		
	20% TAW	30%TAW	40%TAW	20% TAW	30%TAW	40%TAW
1	0.284557	0.323587	0.502231	0.545524	0.553215	0.644594
2	0.550793	0.145711	0.331852	0.468331	0.157054	0.202283
3	0.948099	0.342774	0.773144	0.968660	0.508111	0.656207
4	0.147013	0.448486	0.179620	0.053747	0.328978	0.399001
5	0.100353	0.129708	**0.012038**	0.068681	0.144034	**0.010503**
6	0.054993	0.078831	**0.001802**	0.113775	0.201213	**0.002917**
7	**0.034008**	0.055812	**0.001250**	0.088074	0.074140	**0.001177**
8	**0.004245**	**0.018516**	**0.000623**	**0.028450**	0.079134	**0.004476**
9	**0.000643**	**0.010385**	**0.001696**	**0.000860**	**0.017071**	**0.006657**
10	**0.001589**	**0.028883**	**0.004399**	**0.002417**	**0.028772**	**0.004623**
11	**0.002002**	**0.019713**	**0.003535**	**0.003035**	**0.045819**	**0.007905**
12	**0.000885**	**0.002191**	**0.000044**	**0.003030**	**0.001738**	**0.000138**
13	**0.000017**	**0.000101**	**0.000002**	**0.000017**	**0.000059**	**0.000033**
14	**0.000798**	**0.001825**	**0.000404**	**0.001638**	**0.002535**	**0.001018**
15	**0.006364**	**0.035858**	**0.020725**	**0.002581**	**0.016381**	**0.009215**

Table S2. Percentual changes in average barley productivity at mid-century and end-century, under SSP1-2.6, SSP2-4.5 and SSP5-8.5 compared to the average of the baseline period. Bold values indicate significant changes according to a paired t-test with significance threshold at 0.05. Green cells indicate positive changes; red cells indicate negative changes. The intensity of the colour is proportional to how positive or how negative that change is.

ISWC	2041-2070			2071-2100		
	SSP12.6	SSP24.5	SSP58.5	SSP12.6	SSP24.5	SSP58.5
10% TAW	**-37.59**	**-42.98**	**-44.82**	**-45.90**	**-42.98**	**-55.15**
20% TAW	-12.10	-12.49	-12.87	-15.60	-10.40	**-27.59**
30% TAW	11.62	**14.03**	11.06	6.06	11.97	4.04

Table S3. Effect of mulches on irrigation water needs (m³/ha) and yields (ton/ha), expressed as the absolute change from the results obtained under the same conditions, but without the application of mulches, for SSP12.6, SSP24.5 and SSP58.5 scenarios, and for mid- and end-century periods. Green cells represent change in yields, and blue cells change in irrigation needs. The intensity of the colour is proportional to how positive or how negative that change is.

ISWC	Irrigation threshold	Parameter (percentage change)	2041-2070			2071-2100		
			SSP12.6	SSP24.5	SSP58.5	SSP12.6	SSP24.5	SSP58.5
10% TAW	0%	Yield	0.04	0.06	0.05	0.05	0.03	0.05
		Irrigation needs	-9.85	-4.93	-4.93	-7.39	-6.16	-12.32
	20%	Yield	0.07	0.04	0.07	0.05	0.05	0.06
		Irrigation needs	-11.08	-18.47	-16.01	-14.78	-16.01	-19.70
20% TAW	0%	Yield	0.07	0.08	0.07	0.06	0.06	0.09
		Irrigation needs	0.00	-1.23	-2.46	-1.23	-1.23	-2.46
	20%	Yield	0.08	0.07	0.11	0.08	0.09	0.10
		Irrigation needs	-2.46	-4.93	0.00	-3.69	-2.46	-3.69
30% TAW	0%	Yield	0.05	0.05	0.07	0.06	0.06	0.09
		Irrigation needs	0.00	0.00	0.00	0.00	0.00	0.00
	20%	Yield change	0.05	0.05	0.07	0.06	0.06	0.09
		Irrigation needs	-1.23	0.00	0.00	-1.23	0.00	-1.23