GUIDELINES

Adaptation to Climate Change in Mediterranean Agricultural systems

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Adaptation to Climate Change of Cereal production systems in ALGERIA

Target area description

Case Study Area

AIN DEFLA- ALGERIA

General Characteristics

Indicator	AIN DEFLA	CHLEFF
Location	Northern ALGERIA	
Main crops in the area	Cereals Legumes Vegetable crops Fruit trees	Cereals Vegetable crops Fruit trees
Annual rainfall mm/year	368-473	355-400
Annual evapotranspiration (January to April)	246mm	292 mm

Agro-efficiency Performance

Indicator	Ain defla	Chleff
Yield (t/ha)	2.2	1.596
Water Productivity (kg/m3)	0.32	0.27
Cereal area (ha)	83232	88094
Irrigated/rainfed (%)	8.7	5
# Cereal varieties	11 (SIMETO-CHEN'S-VITRON-MIXICALI-BOUSSELAM-OFANTO ARZ-AIN ABID-HD1220-ANAPO-COLLOSSEO)	

Target Agro-efficiency Performance

Indicator		Durum wheat	bread Wheat
Yield (t/ha)	irrigated	5.5	5.2
	rainfed	2.5	2.8
Water Productivity (kg/m3)	irrigated	0.82	/
	rainfed	0.23	/

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Implemented by

SWIM (Sustainable Water Integrated Management) - Demonstration Project

Theme: Water and Climate Change

"European Neighborhood and Partnership (ENP) financial co-operation with Mediterranean countries"
EuropeAid/131046/C/ACT/Multi

Project Duration: 29/12/2011 - 28/12/2015

VARIETIES

ON- FARM DEMONSTRATION SITES:

Durum wheat varieties: SIMETO- CHEN'S- VITRON-OFFANTO-MIXICALI

Bread wheat varieties: AIN ABID- HD1220-ARZ-ANAPO COLLOSSEO

DETAILED TRIAL:

Durum wheat varieties: SIMETO- BOUSSELAM-AMAR6-GTA DUR

Bread wheat varieties: AIN ABID-ARZ-WIFAK- MAAOUNA

Environmental Characteristics

- Increasing Temperature
- Irregular rainfall
- Windy area
- Poor management practices.
- Low water availability
- Low organic matter content

Directly Involved Actors

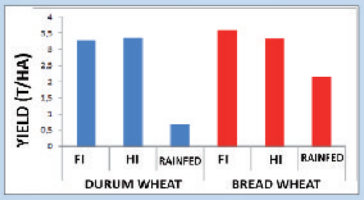
- Farmers
- Engineers and technicians

MANAGEMENT

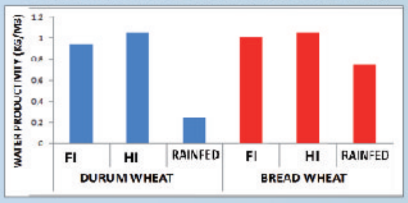
Alternative Technology Scenarios

crops	Technologies	Objectives
Durum and bread Wheat	Supplemental irrigation (SI)	Yield improvement, water use effeciency, food security,
	Nitrogen fertilization	High grain quality, yield increase

Effect of SI on yield
Durum and bread Wheat (2012/2013)

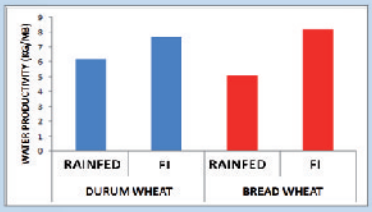


Effect of SI on water use efficiency (Water productivity :kg/m3)
Durum and bread Wheat (2012/2013)



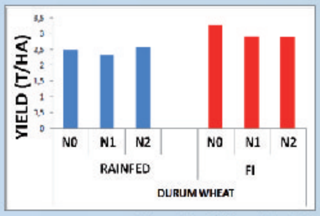
FI = Irrigation with 80 mm of water ; HI = 50% of FI; Rainfed = Rainfall only)

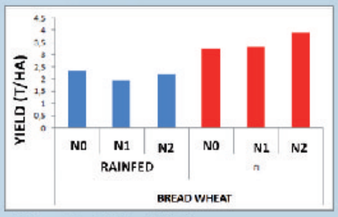
Effect of SI on grain yield
Durum and bread Wheat (2013/2014)



FI = Irrigation with 80 mm of water; HI = 50% of FI; Rainfed = Rainfall only)

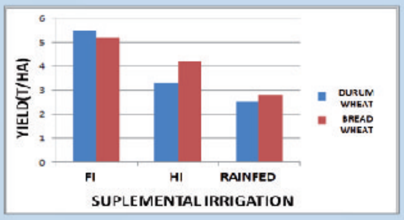
Effect of SI and nitrogen fertilizer rate variation on grain yield (detailed trial)
Durum wheat (2013/2014) Bread wheat (2013/2014)



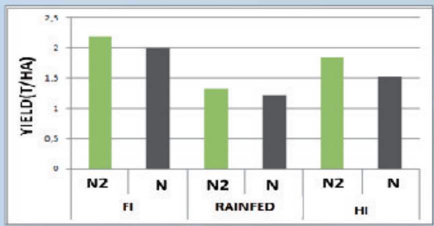


No = 0 kg N/ha; FI = 60 kg N/ha; F2 = 120 kg N/ha)

Effect of SI (demonstration sites)
Durum and bread Wheat



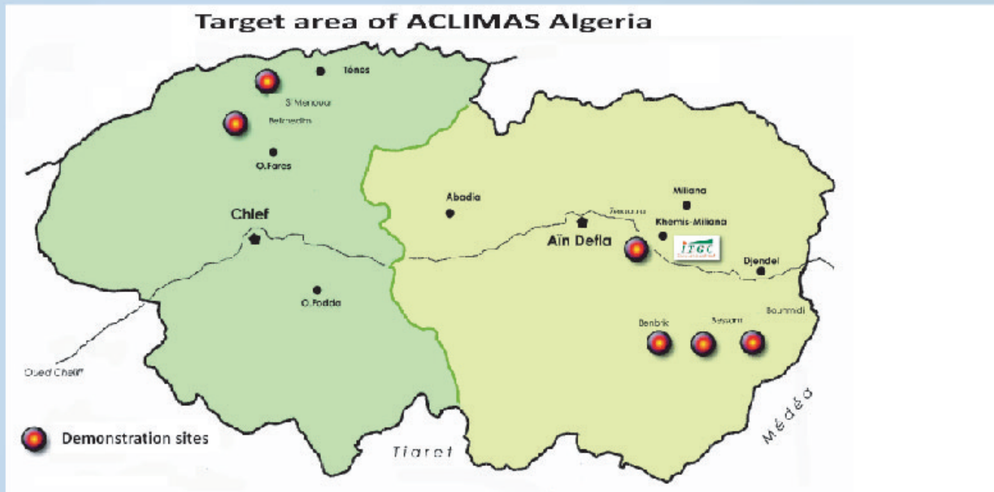
Effect of SI and nitrogen rate variation on yield (demonstration sites)
Durum and bread Wheat



No = 0 kg N/ha; FI = 60 kg N/ha; F2 = 120 kg N/ha)

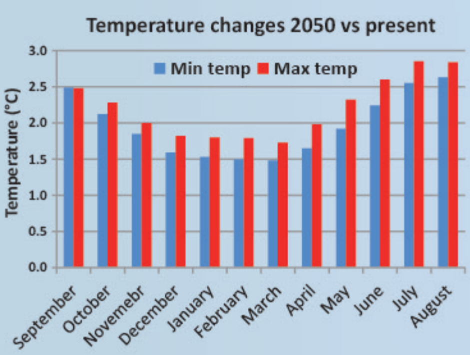
DEMONSTRATION & IMPLEMENTATION FACTS

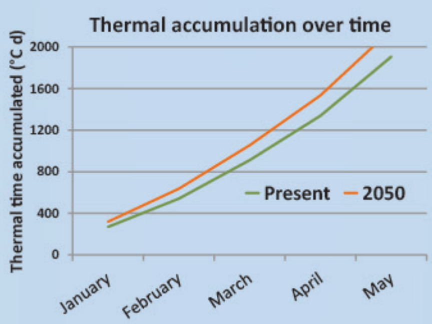
The demonstrations have been implemented in 6 sites (4 in Ain-Defla and 2 in Chlef). 4 sites on durum wheat and 2 sites on bread wheat with 2 levels of nitrogen fertilization (60 units and 120 units) and 3 treatments of irrigation (Control, 40 mm , 80 mm). The first results show that bread wheat gives better production than durum wheat. Any useful irrigation includes 40 mm with 120 units of nitrogen fertilization. Some farmers have seen the difference in field and they practice those recommendations in future.

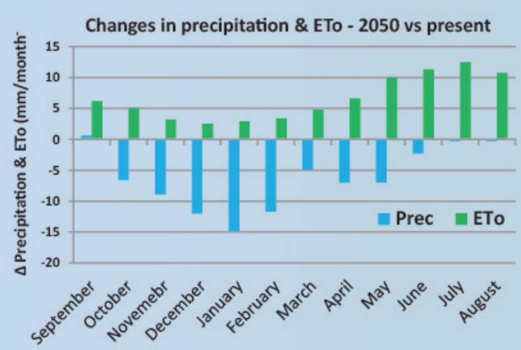


CLIMATE CHANGE IMPACT: year 2050 vs. baseline (1961-2000)

Climate change projections for the medium-term (2050 as average over 2041-2060) were defined for Ain Defla and Chleff as average over 19 Global Circulation Models based on the RCP4.5 scenario, which is a medium emission scenario. For simplicity the results indicate average values, and not uncertainty (especially significant for precipitation). According to these medium-term climate projections, Ain Defla and Chleff will experience an average increase in mean annual temperature of 2.0 °C (1.3 to 2.7 °C according to different GCMs). Seasonally, increases in temperature will be greater in summer and lower in winter. Maximum temperatures would face larger increases than minimum temperatures, especially for winter and spring wherein daily temperature ranges widens. Higher temperatures will lead to increasing evapotranspiration and crop water demand. Increasing temperatures will also raise thermal accumulation over time, measured as Growing Degree Days (°C d, Tbase = 0 °C), shortening crop growing seasons.







The average projected precipitations will show a moderate reduction of about 14% for 2050. However, the changes in precipitation projected by different GCMs vary, with uncertainty ranging between -24 to -6%. Reduction of precipitation will be more evident in winter and spring. Higher temperature will increase evapotranspiration and vegetation water requirements, which, together with reduced precipitations, will amplify aridity and soil water deficit. The soil water stress cumulated during the growing season, suggests increasing crop irrigation requirements, which need to be compensated by either irrigation application or water use efficient agronomic practices.

Climate variable	Baseline	2040-2060 RCP4.5	Changes vs. baseline	
			Difference	%
Precipitation (mm)	539	464	- 75	- 13.9
Mean Temperature (°C)	17.1	19.1	+ 2.0	--
Minimum temperature (°C)	13.1	15.1	+ 2.0	--
Maximum temperature (°C)	20.9	23.1	+ 2.2	--
Thermal time accumulated January-May (°C d, or GDD)	1906	2167	+ 261	+ 13.7
Reference ET (mm)	1053	1132	+ 79	+ 7.5

Climate change analyses elaborated by CMCC

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