

# QUANTITY AND QUALITY OF SWEETPOTATO CROP IRRIGATION WATER

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## INTRODUCTION

In the Mediterranean region, climate issues are important due to the large seasonal and interannual variability and change scenarios. In all hydrographic regions of mainland Portugal, climate projections suggest decrease in precipitation and increasing temperature/evapotranspiration, droughts and water scarcity. Thus, increasing water storage availability for the agricultural sector requirements is a priority. Best irrigation projects and practices must be adapted to site-specific conditions (soil, climate/meteorology, crop), regarding the correct operation of irrigation systems, production competitiveness and sustainability.

## IRRIGATION WATER QUANTITY

The plant is tolerant to water deficit, even in poorly developed soils. Regarding water availability, sweetpotato responds favourably to its rational application (up to 400-500 mm), increasing the productivity (kg/ha) and ensuring its quality. When scheduling water balances, it should be noted that: excess soil moisture is harmful whereas ‘deficit irrigation’ and the occurrence of some water stress during the leaf growth phases and at the final stage of senescence, showed no significant implications.

### EVALUATION OF IRRIGATION OPTIONS

Production of 4 ha of sweetpotato (sale value - 800 euro/ton)

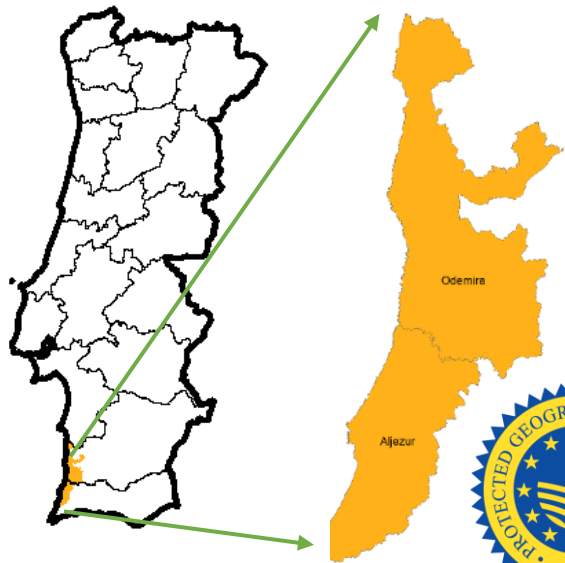
#### Case 1 – Without water restrictions

Options	Yield (ton)	Gross income (€)	Variable costs (€)	Economic result (€)
A - 4 ha (1000 m <sup>3</sup> /ha)	40 (10 ton/ha)	32000	8800 (2200 €/ha)	23200
B - 4 ha (2500 m <sup>3</sup> /ha)	60 (15 ton/ha)	48000	10400 (2600 €/ha)	37600
C - 4 ha (4000 m <sup>3</sup> /ha)	80 ( 20 ton/ha)	64000	12000 (3000 €/ha)	52000

#### Case 2 – With water restrictions: maximum 4000 m<sup>3</sup>

Options	Yield (ton)	Gross income (€)	Variable costs (€)	Economic result (€)
D - 4 ha (1000 m <sup>3</sup> /ha)	40 (10 ton/ha)	32000	8800 (2200 €/ha)	23200
E - 2 ha (2000 m <sup>3</sup> /ha)	27 (13,5 ton/ha)	21600	5000 (2500 €/ha)	16600
F - 1 ha (4000 m <sup>3</sup> /ha)	20 ( 20 ton/ha)	16000	3000 (3000 €/ha)	13000

### ALJEZUR SWEETPOTATO

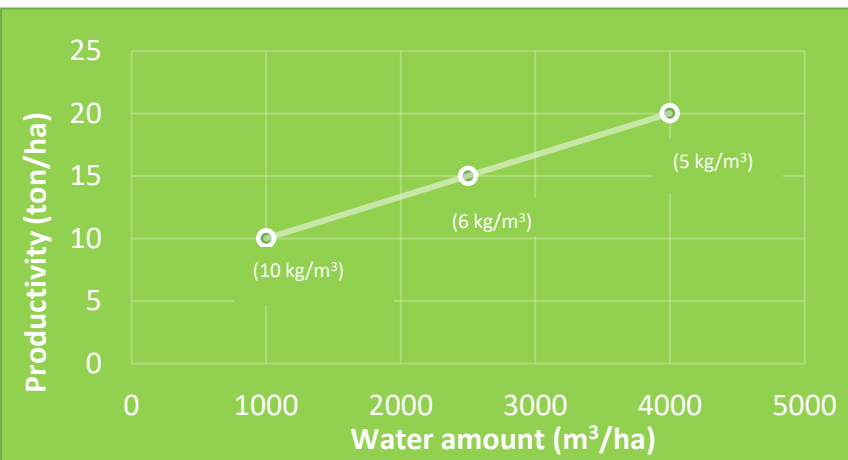


Sweetpotato is an option for irrigated regions. Alentejo Coast and Algarve are regions of the so-called 'Aljezur Sweetpotato', a Protected Geographical Indication (PGI).



#### Productivity of sweetpotato

(var. Lira and non-certified vegetable planting material)



• The water-yield relationship, associated to a typical range of water use by sweetpotato (100 to 400 mm), shows the advantage of ‘deficit irrigation’ when water restrictions are established.

• With deficit irrigation, the water use efficiency (WUE) may increase up to 10 kg/m<sup>3</sup> and the economic result is higher than the farmer options regarding reduced area with more water consumption per hectare.

• For better comparing purposes the yield reports to non-certified vegetable planting material.

## IRRIGATION WATER QUALITY

- Irrigation water should be analyzed every 4 years, or annually if any parameter exceeds maximum limits.

(Nr of samples = 10)



Potential irrigation problems	Parameters involved and units	No restriction level	Number of samples with	
			No restriction	Slight to moderate restriction
<b>Salinity</b> Affects crop water availability	Electrical conductivity ECw (mS/cm)	<0.7	10	-
<b>Infiltration</b> Affects infiltration rate of water into the soil	Sodium adsorption ratio (SAR) and ECw	SAR and ECw 0 – 3 and >0.7	-	10
<b>Specific ion toxicity</b>	Sodium • Drip irrigation SAR	<3	6	-
	• Sprinkler irrigation Na (mg/L)	<69	3	1
	Chloride Cl (mg/L)			
	• Drip irrigation	<142	6	-
	• Sprinkler irrigation	<106	4	-
	Boron B (mg/L)	<0.7	10	-
	Iron Fe (mg/L)	<5	10	-
<b>Miscellaneous effects</b>	Manganese Mn (mg/L)	<0.2	9	1
	Bicarbonate HCO <sub>3</sub> (mg/L) (overhead sprinkling only)	<90	10	-
	Suspended solids (mg/L)	<50	10	-
	Saturation index	Negative (-)	9	1
	pH	Normal range 6.5 – 8.4	9	1

## CONCLUSIONS

- The tolerance of sweetpotato to water deficit tends to be favourable during periods of water restrictions, as low water amounts of about 100 mm will increase the water use efficiency (kg/m<sup>3</sup>).
- The quality of the irrigation water is crucial to optimize yield, to adjust the fertilization plan, to protect soil and water sources and to prevent deterioration of the irrigation equipment.

## REFERENCES

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