



Conférence Parmenides IX – GID-CIHEAM – Bari – octobre 2021 Gestion durable des bassins versants méditerranéens face aux impacts des changements sociétaux et climatiques

Mohammed Hachicha Water and salt regimes under irrigation with brackish/saline water in Tunisian semi-arid context

Summary

Under climate change and in the absence of appropriate irrigation management, the use of brackish/saline water leads to a considerable salt soil accumulation that causes damage to the agricultural productivity, lead to soil and groundwater properties degradation. Thus, good knowledge of salt water dynamics associated with appropriate management practices are required to ensure sustainability of saline water irrigation. Tunisia is among semi-arid regions having long experience in using saline water for irrigation. Now, saline water management practices.



WATER AND SALT REGIMES UNDER IRRIGATION WITH BRACKISH/SALINE WATER IN TUNISIAN SEMI ARID CONTEXT

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Problematic

Salinity: World problem, Old problem, New dimension.

Now :

There is an important social and economic pressure to use salt-affected soils and saline waters

SALTWAR

Reclamation of salt-affected soils

➢ Use water more and more saline in agriculture

Closed systems by water mobilization

 \blacktriangleright Intensification of the use of water and soil resources

Over exploitation and decrease of the watertable level

Use of fertilizers (salts)

Climate change

Evolution trajectory of water sector



Challenges

Resilience of Tunisian Agriculture

to the Rarefaction of Water, its Degradation

and Climatic Change



Agriculture Development:

Use of Brackish/Saline waters



Respectful of the environment

Saline Water Use in Semi Arid Regions

Opportunities and Risks

Conventional Waters Vs Non Conventional

'Mejerda Example'



Water & Salt Regimes

Water Volume and Salt Quantity = f (Time)



Short term soil salinity variation





? Salts Future

Long term soil salinity variation

- In the long term, a major part of salts is leached to deep layers by irrigation and rain
- Salinization affects the deep layer and on the long term, the aquifer



INNOVATION AND NEW TECHNIQUES FOR MANAGING SALINITY

Alternatives saline agrosystem under saline condition

From extensive rainfall agrosystem to semi-intensive saline irrigated

farming agrosystem

- New crops / varieties
- Localized irrigation with saline water
- More adapted farmer' practices

Alternative farming saline agrosystem under saline condition :

Olive trees

Old olive tree

INITIAL RAINFED FARMING SYSTEM

Irrigated farming saline agrosystem



Alternatives crops/varieties under saline conditions

- Olive trees: New varieties
 Jatropha: Energetic plant
 Quinoa: Pseudo-cereal
 Aloe Vera: Cosmetic plant
- Sesbania: Forage legume











Reclamation of saline sodic clayey soils by irrigation with brackish water and olive trees

Mobilization of the water by dams induces new natural evolution of saline sodic clayey soils.

Rain produces slow dynamic of salts

> Olive trees and barley can be used for improving soil productivity.

- Different olive trees varieties
- Localized irrigation with saline water







Adapted irrigation system under saline condition : SDI

 SDI improve water efficiency and reduce saline stress on tomato crop.
 Less decrease of yield by SDI in particular for sensitive cultivar.





Improve crop salinity tolerance by organic substances : Proline

➢Foliar pulverization

Small quantity of proline increase germination and growth of crops exposed to salt stress.

 \blacktriangleright Large quantity of proline has a toxicity effect.





Improve water quality by electromagnetic treatment of saline water

Comparative study on soil and crop irrigated with untreated and treated saline waters by Aqua-4D







EFFECT ON THE SOIL: ECe

Net difference of soil salinity between TW and UW particularly in surface layer.



EFFECT ON THE POTATO

About 11% increase of yield with TW.
Little increase of the caliber C3 (>45 mm) with TW.



Conclusion

WATER AND SOIL FUTURES:

Limited and bad qualities of water and soil resources under global change.

 \succ High abiotic stress: water and salt stress.

INITIATIVES TO IMPROVE:

Innovation and new technology.

≻Integrated approaches.

More informations

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